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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the Radio Resource Control protocol for the radio interface between UE and E-UTRAN as well as for the radio interface between RN and E-UTRAN.

The scope of the present document also includes:

- the radio related information transported in a transparent container between source eNB and target eNB upon inter eNB handover;
- the radio related information transported in a transparent container between a source or target eNB and another system upon inter RAT handover.

2 References

1).

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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[1]	3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
[2]	Void.
[3]	3GPP TS 36.302: "Evolved Universal Terrestrial Radio Access (E-UTRA); Services provided by the physical layer ".
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[5]	3GPP TS 36.306 "Evolved Universal Terrestrial Radio Access (E-UTRA); UE Radio Access Capabilities".
[6]	3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".
[7]	3GPP TS 36.322:"Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Link Control (RLC) protocol specification".
[8]	3GPP TS 36.323: "Evolved Universal Terrestrial Radio Access (E-UTRA); Packet Data Convergence Protocol (PDCP) Specification".
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[10]	3GPP TS 22.011: "Service accessibility".
[11]	3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".
[12]	3GPP2 C.S0002-F v1.0: "Physical Layer Standard for cdma2000 Spread Spectrum Systems".
[13]	ITU-T Recommendation X.680 (07/2002) "Information Technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation" (Same as the ISO/IEC International Standard 8824-

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[39]	3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access (E-UTRAN); S1 Application Protocol (S1 AP)".
[40]	3GPP TS 25.304: "Universal Terrestrial Radio Access (UTRAN); User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".
[41]	3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".
[42]	3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".
[43]	3GPP TS 45.005: "GSM/EDGE Radio transmission and reception".
[44]	3GPP2 C.S0087-A v2.0: "E-UTRAN - cdma2000 HRPD Connectivity and Interworking Air Interface Specification"
[45]	3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control (RRC) protocol".
[46]	3GPP TS 25.223: "Spreading and modulation (TDD)".
[47]	3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".
[48]	3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer - Measurements".
[49]	3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".
[50]	3GPP TS 45.010:"Radio subsystem synchronization".
[51]	3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2".
[52]	3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".
[53]	$3GPP2\ C.S00970\ v3.0$: "E-UTRAN - cdma2000 1x Connectivity and Interworking Air Interface Specification".
[54]	3GPP TS 36.355: "LTE Positioning Protocol (LPP)".
[55]	3GPP TS 36.216: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer for relaying operation".
[56]	3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".
[57]	3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".
[58]	3GPP TS 32.422: "Telecommunication management; Subsriber and equipment trace; Trace control and confiuration management".
[59]	3GPP TS 22.368: "Service Requirements for Machine Type Communications; Stage 1".
[60]	3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".
[61]	3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".
[62]	3GPP TS 22.146: "Multimedia Broadcast/Multicast Service (MBMS); Stage 1".
[63]	3GPP TR 36.816: "Evolved Universal Terrestrial Radio Access (E-UTRA); Study on signalling and procedure for interference avoidance for in-device coexistence".
[64]	IS-GPS-200F: "Navstar GPS Space Segment/Navigation User Segment Interfaces".

[65]	3GPP TS 25.307: "Requirement on User Equipments (UEs) supporting a release-independent frequency band".
[66]	3GPP TS 24.312: "Access Network Discovery and Selection Function (ANDSF) Management Object (MO)".
[67]	IEEE 802.11-2012, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std.
[68]	3GPP TS 23.303: "Proximity-based services (ProSe); Stage 2".
[69]	3GPP TS 24.334: "Proximity-services (ProSe) User Equipment (UE) to ProSe function protocol aspects; Stage 3".
[70]	3GPP TS 24.333: "Proximity-services (ProSe) Management Objects (MO)".
[71]	3GPP TS 36.314: "Evolved Universal Terrestrial Radio Access (E-UTRA); Layer 2-Measurements".
[72]	3GPP TS 24.105: "Application specific Congestion control for Data Communication (ACDC) Management Object (MO)".
[73]	3GPP TS 23.179: "Functional architecture and information flows to support mission critical communication services; Stage 2".
[74]	3GPP TS 24.302: "Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks".
[75]	3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses; Stage-2".
[76]	Wi-Fi Alliance® Technical Committee, Hotspot 2.0 Technical Task Group Hotspot 2.0 (Release 2) Technical Specification Version 3.11.
[77]	3GPP TS 22.101: "Service aspects; Service principles".
[78]	3GPP TS 23.285: "Technical Specification Group Services and System Aspects; Architecture enhancements for V2X services".
[79]	3GPP TS 36.307: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements on User Equipments (UEs) supporting a release-independent frequency band".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

 $\textbf{Anchor carrier:} \ In \ NB-IoT, a \ carrier \ where \ the \ UE \ assumes \ that \ NPSS/NSSS/NPBCH/SIB-NB \ are \ transmitted.$

Bandwidth Reduced: Refers to operation in downlink and uplink with a limited channel bandwidth of 6 PRBs.

Cellular IoT EPS Optimisation: Provides improved support of small data transfer, as defined in TS 24.301 [35].

Commercial Mobile Alert System: Public Warning System that delivers *Warning Notifications* provided by *Warning Notification Providers* to CMAS capable UEs.

Common access barring parameters: The common access barring parameters refer to the access class barring parameters that are broadcast in *SystemInformationBlockType2* outside the list of PLMN specific parameters (i.e. in *ac-BarringPerPLMN-List*).

Control plane CIoT EPS optimisation: Enables support of efficient transport of user data (IP, non-IP or SMS) over control plane via the MME without triggering data radio bearer establishment, as defined in TS 24.301 [35].

CSG member cell: A cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN and for which the CSG whitelist of the UE includes an entry comprising cell's CSG ID and the respective PLMN identity.

Dual Connectivity: A UE in RRC_CONNECTED is configured with Dual Connectivity when configured with a Master and a Secondary Cell Group.

EU-Alert: Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

Field: The individual contents of an information element are referred as fields.

Floor: Mathematical function used to 'round down' i.e. to the nearest integer having a lower or equal value.

Information element: A structural element containing a single or multiple fields is referred as information element.

Korean Public Alert System (KPAS): Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

Master Cell Group: For a UE not configured with DC, the MCG comprises all serving cells. For a UE configured with DC, the MCG concerns a subset of the serving cells comprising of the PCell and zero or more secondary cells.

MBMS service: MBMS bearer service as defined in TS 23.246 [56] (i.e. provided via an MRB or an SC-MRB).

NB-IoT allows access to network services via E-UTRA with a channel bandwidth limited to 200 kHz.

NB-IoT UE: A UE that uses NB-IoT.

NCSG: Network controlled small gap as defined in TS 36.133 [16].

Non-anchor carrier: In NB-IoT, a carrier where the UE does not assume that NPSS/NSSS/NPBCH/SIB-NB are transmitted.

Primary Cell: The cell, operating on the primary frequency, in which the UE either performs the initial connection establishment procedure or initiates the connection re-establishment procedure, or the cell indicated as the primary cell in the handover procedure.

Primary Secondary Cell: The SCG cell in which the UE is instructed to perform random access or initial PUSCH transmission if random access procedure is skipped when performing the SCG change procedure.

Primary Timing Advance Group: Timing Advance Group containing the PCell or the PSCell.

PUCCH SCell: An SCell configured with PUCCH.

Secondary Cell: A cell, operating on a secondary frequency, which may be configured once an RRC connection is established and which may be used to provide additional radio resources.

Secondary Cell Group: For a UE configured with DC, the subset of serving cells not part of the MCG, i.e. comprising of the PSCell and zero or more other secondary cells.

Secondary Timing Advance Group: Timing Advance Group neither containing the PCell nor the PSCell. A secondary timing advance group contains at least one cell with configured uplink.

Serving Cell: For a UE in RRC_CONNECTED not configured with CA/ DC there is only one serving cell comprising of the primary cell. For a UE in RRC_CONNECTED configured with CA/ DC the term 'serving cells' is used to denote the set of one or more cells comprising of the primary cell and all secondary cells.

Sidelink: UE to UE interface for sidelink communication, V2X sidelink communication and sidelink discovery. The sidelink corresponds to the PC5 interface as defined in TS 23.303 [68].

Sidelink communication: AS functionality enabling ProSe Direct Communication as defined in TS 23.303 [68], between two or more nearby UEs, using E-UTRA technology but not traversing any network node. In this version, the terminology "sidelink communication" without "V2X" prefix only concerns PS unless specifically stated otherwise.

Sidelink discovery: AS functionality enabling ProSe Direct Discovery as defined in TS 23.303 [68], using E-UTRA technology but not traversing any network node.

Sidelink operation: Includes sidelink communication, V2X sidelink communication and sidelink discovery.

User plane CIoT EPS optimisation: Enables support for change from EMM-IDLE mode to EMM-CONNECTED mode without the need for using the Service Request procedure, as defined in TS 24.301 [35].

Timing Advance Group: A group of serving cells that is configured by RRC and that, for the cells with an UL configured, use the same timing reference cell and the same Timing Advance value. A Timing Advance Group only includes cells of the same cell group i.e. it either includes MCG cells or SCG cells.

V2X Sidelink communication: AS functionality enabling V2X Communication as defined in TS 23.285 [78], between nearby UEs, using E-UTRA technology but not traversing any network node.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], TS 36.300 [9] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1] or TS 36.300 [9].

1xRTT CDMA2000 1x Radio Transmission Technology

AB Access Barring

ACDC Application specific Congestion control for Data Communication

ACK Acknowledgement AM Acknowledged Mode

ANDSF Access Network Discovery and Selection Function

ARQ Automatic Repeat Request

AS Access Stratum

ASN.1 Abstract Syntax Notation One BCCH Broadcast Control Channel BCD Binary Coded Decimal BCH Broadcast Channel

BL Bandwidth reduced Low complexity

BLER Block Error Rate
BR Bandwidth Reduced

BR-BCCH Bandwidth Reduced Broadcast Control Channel

CA Carrier Aggregation
CBR Channel Busy Ratio
CCCH Common Control Channel
CCO Cell Change Order
CE Coverage Enhancement

CG Cell Group CIoT Cellular IoT

CMAS Commercial Mobile Alert Service

CP Control Plane C-RNTI Cell RNTI

CRS Cell-specific Reference Signal

CSFB CS fallback

CSG Closed Subscriber Group
CSI Channel State Information
DC Dual Connectivity

DCCH Dedicated Control Channel
DCI Downlink Control Information
DCN Dedicated Core Networks

Direct Frame Number

DL Downlink

DFN

DL-SCH Downlink Shared Channel
DRB (user) Data Radio Bearer
DRX Discontinuous Reception
DTCH Dedicated Traffic Channel
EAB Extended Access Barring

eDRX Extended DRX

EHPLMN Equivalent Home Public Land Mobile Network

eIMTA Enhanced Interference Management and Traffic Adaptation

ENB Evolved Node B
EPC Evolved Packet Core

EPDCCH Enhanced Physical Downlink Control Channel

EPS Evolved Packet System

ETWS Earthquake and Tsunami Warning System
E-UTRA Evolved Universal Terrestrial Radio Access

E-UTRAN Evolved Universal Terrestrial Radio Access Network

FDD Frequency Division Duplex

FFS For Further Study

GERAN GSM/EDGE Radio Access Network GNSS Global Navigation Satellite System

G-RNTI Group RNTI

GSM Global System for Mobile Communications

HARQ Hybrid Automatic Repeat Request

HFN Hyper Frame Number

HPLMN Home Public Land Mobile Network HRPD CDMA2000 High Rate Packet Data

H-SFN Hyper SFN

IDC In-Device Coexistence IE Information element

IMEI International Mobile Equipment Identity
IMSI International Mobile Subscriber Identity

IoT Internet of Things

ISM Industrial, Scientific and Medical

kB Kilobyte (1000 bytes)

L1 Layer 1 L2 Layer 2 L3 Layer 3

LAA Licensed-Assisted Access LWA LTE-WLAN Aggregation

LWAAP LTE-WLAN Aggregation Adaptation Protocol

LWIP LTE-WLAN Radio Level Integration with IPsec Tunnel

MAC Medium Access Control

MBMS Multimedia Broadcast Multicast Service

MBSFN Multimedia Broadcast multicast service Single Frequency Network

MCG Master Cell Group

MCPTT Mission Critical Push To Talk
MDT Minimization of Drive Tests
MIB Master Information Block
MO Mobile Originating

MPDCCH MTC Physical Downlink Control Channel
MRB MBMS Point to Multipoint Radio Bearer
MRO Mobility Robustness Optimisation
MSI MCH Scheduling Information

MT Mobile Terminating

MUST MultiUser Superposition Transmission

N/A Not Applicable

NACC Network Assisted Cell Change

NAICS Network Assisted Interference Cancellation/Suppression

NAS Non Access Stratum

NB-IoT NarrowBand Internet of Things

NPBCH Narrowband Physical Broadcast channel

NPDCCH Narrowband Physical Downlink Control channel
NPDSCH Narrowband Physical Downlink Shared channel
NPRACH Narrowband Physical Random Access channel
NPSS Narrowband Primary Synchronization Signal
NPUSCH Narrowband Physical Uplink Shared channel

NRS Narrowband Reference Signal

NSSS Narrowband Secondary Synchronization Signal

P2X Pedestrian-to-Everything PCCH Paging Control Channel

PCell Primary Cell

PDCCH Physical Downlink Control Channel PDCP Packet Data Convergence Protocol

PDU Protocol Data Unit

PLMN Public Land Mobile Network
PMK Pairwise Master Key
ProSe Proximity based Services

PS Public Safety (in context of sidelink), Packet Switched (otherwise)

PSCell Primary Secondary Cell

PSK Pre-Shared Key

PTAG Primary Timing Advance Group PUCCH Physical Uplink Control Channel

QCI QoS Class Identifier
QoS Quality of Service
RACH Random Access CHannel
RAI Release Assistance Indication
RAT Radio Access Technology

RB Radio Bearer

RCLWI RAN Controlled LTE-WLAN Integration

RLC Radio Link Control

RMTC RSSI Measurement Timing Configuration

RN Relay Node

RNTI Radio Network Temporary Identifier ROHC RObust Header Compression

RPLMN Registered Public Land Mobile Network

RRC Radio Resource Control
RSCP Received Signal Code Power
RSRP Reference Signal Received Power
RSRQ Reference Signal Received Quality
RSSI Received Signal Strength Indicator
SAE System Architecture Evolution

SAP Service Access Point
SC Sidelink Control
SCell Secondary Cell
SCG Secondary Cell Group
SC-MRB Single Cell MRB
SC-RNTI Single Cell RNTI

SD-RSRP Sidelink Discovery Reference Signal Received Power

SFN System Frame Number
SI System Information
SIB System Information Block
SI-RNTI System Information RNTI

SL Sidelink

SLSS Sidelink Synchronisation Signal

SMC Security Mode Control
SPS Semi-Persistent Scheduling
SR Scheduling Request
SRB Signalling Radio Bearer

S-RSRP Sidelink Reference Signal Received Power

SSAC Service Specific Access Control
SSTD SFN and Subframe Timing Difference
STAG Secondary Timing Advance Group
S-TMSI SAE Temporary Mobile Station Identifier

TA Tracking Area

TAG Timing Advance Group
TDD Time Division Duplex
TDM Time Division Multiplexing

TM Transparent Mode

TPC-RNTI Transmit Power Control RNTI

T-RPT Time Resource Pattern of Transmission

TTT Time To Trigger UE User Equipment

UICC Universal Integrated Circuit Card

UL Uplink

UL-SCH Uplink Shared Channel UM Unacknowledged Mode

UP User Plane

UTC Coordinated Universal Time

UTRAN Universal Terrestrial Radio Access Network

V2X Vehicle-to-Everything

VoLTE Voice over Long Term Evolution WLAN Wireless Local Area Network

WT WLAN Termination

In the ASN.1, lower case may be used for some (parts) of the above abbreviations e.g. c-RNTI.

4 General

4.1 Introduction

In this specification, (parts of) procedures and messages specified for the UE equally apply to the RN for functionality necessary for the RN. There are also (parts of) procedures and messages which are only applicable to the RN in its communication with the E-UTRAN, in which case the specification denotes the RN instead of the UE. Such RN-specific aspects are not applicable to the UE.

NB-IoT is a non backward compatible variant of E-UTRAN supporting a reduced set of functionality. In this specification, (parts of) procedures and messages specified for the UE equally apply to the UE in NB-IoT. There are also some features and related procedures and messages that are not supported by UEs in NB-IoT.

In particular, the following features are not supported in NB-IoT and corresponding procedures and messages do not apply to the UE in NB-IoT:

- Connected mode mobility (Handover and measurement reporting);
- Inter-RAT cell reselection or inter-RAT mobility in connected mode;
- CSG:
- Relay Node (RN);
- Carrier Aggregation (CA);
- Dual connectivity (DC);
- GBR (QoS);
- ACB, EAB, SSAC and ACDC;
- MBMS, except for MBMS via SC-PTM in Idle mode;
- Self-configuration and self-optimisation;
- Measurement logging and reporting for network performance optimisation;
- Public warning systems e.g. CMAS, ETWS and PWS;
- Real time services (including emergency call);
- CS services and CS fallback;
- In-device coexistence;
- RAN assisted WLAN interworking;

- Network-assisted interference cancellation/suppression;
- Sidelink (including direct communication and direct discovery).

NOTE: In regard to mobility, NB-IoT is a separate RAT from E-UTRAN.

In this specification, there are also (parts of) procedures and messages which are only applicable to UEs in NB-IoT, in which case this is stated explicitly.

This specification is organised as follows:

- sub-clause 4.2 describes the RRC protocol model;
- sub-clause 4.3 specifies the services provided to upper layers as well as the services expected from lower layers;
- sub-clause 4.4 lists the RRC functions;
- clause 5 specifies RRC procedures, including UE state transitions;
- clause 6 specifies the RRC message in a mixed format (i.e. tabular & ASN.1 together);
- clause 7 specifies the variables (including protocol timers and constants) and counters to be used by the UE;
- clause 8 specifies the encoding of the RRC messages;
- clause 9 specifies the specified and default radio configurations;
- clause 10 specifies the RRC messages transferred across network nodes;
- clause 11 specifies the UE capability related constraints and performance requirements.

4.2 Architecture

4.2.1 UE states and state transitions including inter RAT

A UE is in RRC_CONNECTED when an RRC connection has been established. If this is not the case, i.e. no RRC connection is established, the UE is in RRC_IDLE state. The RRC states can further be characterised as follows:

RRC_IDLE:

- A UE specific DRX may be configured by upper layers (not applicable for NB-IoT);
- UE controlled mobility;
- The UE:
 - Monitors a Paging channel to detect incoming calls, system information change, for ETWS capable UEs, ETWS notification, and for CMAS capable UEs, CMAS notification;
 - Performs neighbouring cell measurements and cell (re-)selection;
 - Acquires system information.
 - Performs logging of available measurements together with location and time for logged measurement configured UEs.

- RRC CONNECTED:

- Transfer of unicast data to/from UE.
- At lower layers, the UE may be configured with a UE specific DRX.
- For UEs supporting CA, use of one or more SCells, aggregated with the PCell, for increased bandwidth;
- For UEs supporting DC, use of one SCG, aggregated with the MCG, for increased bandwidth;

- Network controlled mobility, i.e. handover and cell change order with optional network assistance (NACC) to GERAN (not applicable for NB-IoT);
- The UE:
 - Monitors a Paging channel and/ or System Information Block Type 1 contents to detect system information change, for ETWS capable UEs, ETWS notification, and for CMAS capable UEs, CMAS notification (not applicable for NB-IoT);
 - Monitors control channels associated with the shared data channel to determine if data is scheduled for it;
 - Provides channel quality and feedback information (not applicable for NB-IoT);
 - Performs neighbouring cell measurements and measurement reporting (not applicable for NB-IoT);
 - Acquires system information (not applicable for NB-IoT).

The following figure not only provides an overview of the RRC states in E-UTRA, but also illustrates the mobility support between E-UTRAN, UTRAN and GERAN.

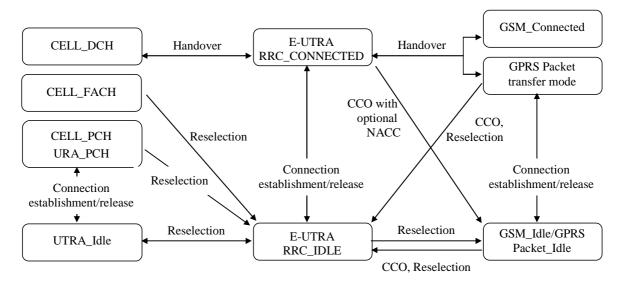


Figure 4.2.1-1: E-UTRA states and inter RAT mobility procedures, 3GPP

The following figure illustrates the mobility support between E-UTRAN, CDMA2000 1xRTT and CDMA2000 HRPD. The details of the CDMA2000 state models are out of the scope of this specification.

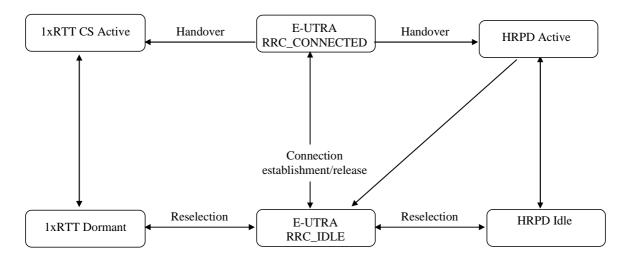


Figure 4.2.1-2: Mobility procedures between E-UTRA and CDMA2000

The inter-RAT handover procedure(s) supports the case of signalling, conversational services, non-conversational services and combinations of these.

In addition to the state transitions shown in Figure 4.2.1-1 and Figure 4.2.1-2, there is support for connection release with redirection information from E-UTRA RRC_CONNECTED to GERAN, UTRAN and CDMA2000 (HRPD Idle/1xRTT Dormant mode).

For NB-IoT, mobility between E-UTRA and UTRAN, GERAN and between E-UTRA and CDMA2000 1xRTT and CDMA2000 HRPD is not supported at AS level and hence only the E-UTRA states depicted in Figure 4.2.1-1 are applicable.

4.2.2 Signalling radio bearers

"Signalling Radio Bearers" (SRBs) are defined as Radio Bearers (RB) that are used only for the transmission of RRC and NAS messages. More specifically, the following SRBs are defined:

- SRB0 is for RRC messages using the CCCH logical channel;
- SRB1 is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the establishment of SRB2, all using DCCH logical channel;
- For NB-IoT, SRB1bis is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the activation of security, all using DCCH logical channel;
- SRB2 is for RRC messages which include logged measurement information as well as for NAS messages, all using DCCH logical channel. SRB2 has a lower-priority than SRB1 and is always configured by E-UTRAN after security activation. SRB2 is not applicable for NB-IoT.

In downlink piggybacking of NAS messages is used only for one dependant (i.e. with joint success/ failure) procedure: bearer establishment/ modification/ release. In uplink NAS message piggybacking is used only for transferring the initial NAS message during connection setup.

NOTE: The NAS messages transferred via SRB2 are also contained in RRC messages, which however do not include any RRC protocol control information.

Once security is activated, all RRC messages on SRB1 and SRB2, including those containing NAS or non-3GPP messages, are integrity protected and ciphered by PDCP. NAS independently applies integrity protection and ciphering to the NAS messages.

For a UE configured with DC, all RRC messages, regardless of the SRB used and both in downlink and uplink, are transferred via the MCG.

4.3 Services

4.3.1 Services provided to upper layers

The RRC protocol offers the following services to upper layers:

- Broadcast of common control information;
- Notification of UEs in RRC_IDLE, e.g. about a terminating call, for ETWS, for CMAS;
- Transfer of dedicated control information, i.e. information for one specific UE.

4.3.2 Services expected from lower layers

In brief, the following are the main services that RRC expects from lower layers:

- PDCP: integrity protection and ciphering;
- RLC: reliable and in-sequence transfer of information, without introducing duplicates and with support for segmentation and concatenation.

Further details about the services provided by Packet Data Convergence Protocol layer (e.g. integrity and ciphering) are provided in TS 36.323 [8]. The services provided by Radio Link Control layer (e.g. the RLC modes) are specified in TS 36.322 [7]. Further details about the services provided by Medium Access Control layer (e.g. the logical channels) are provided in TS 36.321 [6]. The services provided by physical layer (e.g. the transport channels) are specified in TS 36.302 [3].

4.4 Functions

The RRC protocol includes the following main functions:

- Broadcast of system information:
 - Including NAS common information;
 - Information applicable for UEs in RRC_IDLE, e.g. cell (re-)selection parameters, neighbouring cell information and information (also) applicable for UEs in RRC_CONNECTED, e.g. common channel configuration information.
 - Including ETWS notification, CMAS notification (not applicable for NB-IoT);
- RRC connection control:
 - Paging;
 - Establishment/ modification/ suspension / resumption / release of RRC connection, including e.g. assignment/ modification of UE identity (C-RNTI), establishment/ modification/ release of SRB1, SRB1bis and SRB2, access class barring;
 - Initial security activation, i.e. initial configuration of AS integrity protection (SRBs) and AS ciphering (SRBs, DRBs);
 - For RNs, configuration of AS integrity protection for DRBs;
 - RRC connection mobility including e.g. intra-frequency and inter-frequency handover, associated security handling, i.e. key/ algorithm change, specification of RRC context information transferred between network nodes;

NOTE 1: In NB-IoT, only key change (but no re-keying) at RRC Connection Resumption and RRC context information transfer are applicable.

- Establishment/ modification/ release of RBs carrying user data (DRBs);
- Radio configuration control including e.g. assignment/ modification of ARQ configuration, HARQ configuration, DRX configuration;
- For RNs, RN-specific radio configuration control for the radio interface between RN and E-UTRAN;
- In case of CA, cell management including e.g. change of PCell, addition/modification/release of SCell(s) and addition/modification/release of STAG(s);
- In case of DC, cell management including e.g. change of PSCell, addition/ modification/ release of SCG cell(s) and addition/modification/release of SCG TAG(s).
- QoS control including assignment/ modification of semi-persistent scheduling (SPS) configuration information for DL and UL, assignment/ modification of parameters for UL rate control in the UE, i.e. allocation of a priority and a prioritised bit rate (PBR) for each RB (not applicable for NB-IoT);

- Recovery from radio link failure;
- In case of LWA, RCLWI and LWIP, WLAN mobility set management including e.g. addition/ modification/ release of WLAN(s) from the WLAN mobility set;
- Inter-RAT mobility including e.g. security activation, transfer of RRC context information (not applicable for NB-IoT);
- Measurement configuration and reporting (not applicable for NB-IoT):
 - Establishment/ modification/ release of measurements (e.g. intra-frequency, inter-frequency and inter- RAT measurements);
 - Setup and release of measurement gaps;
 - Measurement reporting;
- Other functions including e.g. transfer of dedicated NAS information and non-3GPP dedicated information, transfer of UE radio access capability information, support for E-UTRAN sharing (multiple PLMN identities);
- Generic protocol error handling;
- Support of self-configuration and self-optimisation (not applicable for NB-IoT);
- Support of measurement logging and reporting for network performance optimisation [60] (not applicable for NB-IoT);

NOTE 2: Random access is specified entirely in the MAC including initial transmission power estimation.

4.5 Data available for transmission for NB-IoT

For the purpose of MAC Data Volume and Power Headroom reporting, the NB-IoT UE shall consider the following as data available for transmission in the RRC layer:

- For SDUs to be submitted to lower layers:
 - the SDU itself, if the SDU has not yet been processed by RRC, or
 - the PDU if the SDU has been processed by RRC; or
- The data available for transmission in upper layers not submitted to the RRC layer.

5 Procedures

5.1 General

5.1.1 Introduction

The procedural requirements are structured according to the main functional areas: system information (5.2), connection control (5.3), inter-RAT mobility (5.4) and measurements (5.5). In addition, sub-clause 5.6 covers other aspects e.g. NAS dedicated information transfer, UE capability transfer, sub-clause 5.7 specifies the generic error handling, sub-clause 5.8 covers MBMS (i.e. MBMS service reception via MRB), sub-clause 5.8a covers SC-PTM (i.e. MBMS service reception via SC-MRB), sub-clause 5.9 covers RN-specific procedures and sub-clause 5.10 covers sidelink.

For NB-IoT, only a subset of the above procedural requirements applies: system information (5.2), connection control (5.3), some part of other aspects (5.6), general error handling (5.7), and SC-PTM (5.8a). Subclauses inter-RAT mobility (5.4), measurements (5.5), MBMS (5.8), RN procedures (5.9) and Sidelink (5.10) are not applicable in NB-IoT.

5.1.2 General requirements

The UE shall:

- 1> process the received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message;
- NOTE 1: E-UTRAN may initiate a subsequent procedure prior to receiving the UE's response of a previously initiated procedure.
- 1> within a sub-clause execute the steps according to the order specified in the procedural description;
- 1> consider the term 'radio bearer' (RB) to cover SRBs and DRBs but not MRBs or SC-MRBs unless explicitly stated otherwise:
- 1> set the *rrc-TransactionIdentifier* in the response message, if included, to the same value as included in the message received from E-UTRAN that triggered the response message;
- 1> upon receiving a choice value set to *setup*:
 - 2> apply the corresponding received configuration and start using the associated resources, unless explicitly specified otherwise;
- 1> upon receiving a choice value set to release:
 - 2> clear the corresponding configuration and stop using the associated resources;

NOTE 1a: Following receipt of choice value set to release, the UE considers the field as if it was never configured.

- 1> upon handover to E-UTRA; or
- 1> upon receiving an RRCConnectionReconfiguration message including the fullConfig:
 - 2> apply the Conditions in the ASN.1 for inclusion of the fields for the DRB/PDCP/RLC setup during the reconfiguration of the DRBs included in the *drb-ToAddModList*;
- NOTE 2: At each point in time, the UE keeps a single value for each field except for during handover when the UE temporarily stores the previous configuration so it can revert back upon handover failure. In other words: when the UE reconfigures a field, the existing value is released except for during handover.
- NOTE 3: Although not explicitly stated, the UE initially considers all functionality to be deactivated/ released until it is explicitly stated that the functionality is setup/ activated. Correspondingly, the UE initially considers lists to be empty e.g. the list of radio bearers, the list of measurements.
- 1> upon receiving an extension field comprising the entries in addition to the ones carried by the original field (regardless of whether E-UTRAN may signal more entries in total); apply the following generic behaviour if explicitly stated to be applicable:
 - 2> create a combined list by concatenating the additional entries included in the extension field to the original field while maintaining the order among both the original and the additional entries;
 - 2> for the combined list, created according to the previous, apply the same behaviour as defined for the original field:
- NOTE 4: A field comprising a list of entries normally includes 'list' in the field name. The typical way to extend (the size of) such a list is to introduce a field comprising the additional entries, which should include 'listExt' in the name of the field/ IE. E.g. field1List-RAT, field1ListExt-RAT.

5.2 System information

5.2.1 Introduction

5.2.1.1 General

System information is divided into the *MasterInformationBlock* (MIB) and a number of *SystemInformationBlocks* (SIBs). The MIB includes a limited number of most essential and most frequently transmitted parameters that are needed to acquire other information from the cell, and is transmitted on BCH. SIBs other than *SystemInformationBlockType1* are carried in *SystemInformation* (SI) messages and mapping of SIBs to SI messages is flexibly configurable by *schedulingInfoList* included in *SystemInformationBlockType1*, with restrictions that: each SIB is contained only in a single SI message, and at most once in that message; only SIBs having the same scheduling requirement (periodicity) can be mapped to the same SI message; *SystemInformationBlockType2* is always mapped to the SI message that corresponds to the first entry in the list of SI messages in *schedulingInfoList*. There may be multiple SI messages transmitted with the same periodicity. *SystemInformationBlockType1* and all SI messages are transmitted on DL-SCH.

The Bandwidth reduced Low Complexity (BL) UEs and UEs in Coverage Enhancement (CE) apply Bandwidth Reduced (BR) version of the SIB or SI messages. A UE considers itself in enhanced coverage as specified in TS 36.304 [4]. In this and subsequent clauses, anything applicable for a particular SIB or SI message equally applies to the corresponding BR version unless explicitly stated otherwise.

For NB-IoT, a reduced set of system information block with similar functionality but different content is defined; the UE applies the NB-IoT (NB) version of the MIB and the SIBs. These are denoted *MasterInformationBlock-NB and SystemInformationBlockTypeX-NB* in this specification. All other system information blocks (without NB suffix) are not applicable to NB-IoT; this is not further stated in the corresponding text.

NOTE 1: The physical layer imposes a limit to the maximum size a SIB can take. When DCI format 1C is used the maximum allowed by the physical layer is 1736 bits (217 bytes) while for format 1A the limit is 2216 bits (277 bytes), see TS 36.212 [22] and TS 36.213 [23]. For BL UEs and UEs in CE, the maximum SIB and SI message size is 936 bits, see TS 36.213 [23]. For NB-IoT, the maximum SIB and SI message size is 680 bits, see TS 36.213 [23].

In addition to broadcasting, E-UTRAN may provide *SystemInformationBlockType1* and/or *SystemInformationBlockType2*, including the same parameter values, via dedicated signalling i.e., within an *RRCConnectionReconfiguration* message.

The UE applies the system information acquisition and change monitoring procedures for the PCell, except when being a BL UE or a UE in CE or a NB-IoT UE in RRC_CONNECTED mode while T311 is not running. For an SCell, E-UTRAN provides, via dedicated signalling, all system information relevant for operation in RRC_CONNECTED when adding the SCell. However, a UE that is configured with DC shall aquire the *MasterInformationBlock* of the PSCell but use it only to determine the SFN timing of the SCG, which may be different from the MCG. Upon change of the relevant system information of a configured SCell, E-UTRAN releases and subsequently adds the concerned SCell, which may be done with a single *RRCConnectionReconfiguration* message. If the UE is receiving or interested to receive an MBMS service in a cell, the UE shall apply the system information acquisition and change monitoring procedure to acquire parameters relevant for MBMS operation and apply the parameters acquired from system information only for MBMS operation for this cell.

NOTE 2: E-UTRAN may configure via dedicated signalling different parameter values than the ones broadcast in the concerned SCell.

In MBMS-dedicated cell, non-MBSFN subframes are used for providing *MasterInformationBlock-MBMS* (MIB-MBMS) and *SystemInformationBlockType1-MBMS*. SIBs other than *SystemInformationBlockType1-MBMS* are carried in *SystemInformation-MBMS* message which is also provided on non-MBSFN subframes.

An RN configured with an RN subframe configuration does not need to apply the system information acquisition and change monitoring procedures. Upon change of any system information relevant to an RN, E-UTRAN provides the system information blocks containing the relevant system information to an RN configured with an RN subframe configuration via dedicated signalling using the *RNReconfiguration* message. For RNs configured with an RN subframe configuration, the system information contained in this dedicated signalling replaces any corresponding stored system information and takes precedence over any corresponding system information acquired through the system information acquired through the system information acquired through the system information acquired until overridden.

NOTE 3: E-UTRAN may configure an RN, via dedicated signalling, with different parameter values than the ones broadcast in the concerned cell.

5.2.1.2 Scheduling

The MIB uses a fixed schedule with a periodicity of 40 ms and repetitions made within 40 ms. The first transmission of the MIB is scheduled in subframe #0 of radio frames for which the SFN mod 4 = 0, and repetitions are scheduled in subframe #0 of all other radio frames. For TDD/FDD system with a bandwidth larger than 1.4 MHz that supports BL UEs or UEs in CE, MIB transmission may additionally be repeated in subframe#0 of the same radio frame, and in subframe#9 of the previous radio frame for FDD and subframe #5 of the same radio frame for TDD.

NOTE: The UE may assume the scheduling of MIB repetitions does not change.

The MIB-MBMS uses a fixed schedule with a periodicity of 160 ms and repetitions made within 160 ms. The first transmission of the MIB-MBMS is scheduled in subframe #0 of radio frames for which the SFN mod 16 = 0, and repetitions are scheduled in subframe #0 of all other radio frames for which the SFN mod 4 = 0.

The SystemInformationBlockType1 uses a fixed schedule with a periodicity of 80 ms and repetitions made within 80 ms. The first transmission of SystemInformationBlockType1 is scheduled in subframe #5 of radio frames for which the SFN mod 8 = 0, and repetitions are scheduled in subframe #5 of all other radio frames for which SFN mod 2 = 0.

For BL UEs or UEs in CE, MIB is applied which may be provided with additional repetitions, while for SIB1 and further SI messages, separate messages are used which are scheduled independently and with content that may differ. The separate instance of SIB1 is named as *SystemInformationBlockType1-BR*. The *SystemInformationBlockType1-BR* uses a schedule with a periodicity of 80ms. TBS for *SystemInformationBlockType1-BR* and the repetitions made within 80ms are indicated via *schedulingInfoSIB1-BR* in MIB.

The *SystemInformationBlockType1-MBMS* uses fixed schedule with a periodicity of 160 ms. The first transmission of *SystemInformationBlockType1-MBMS* is scheduled in subframe #0 of radio frames for which the SFN mod 16 = 0, and repetitions are scheduled in subframe #0 of all other radio frames for which SFN mod 8 = 0. Additionally, the *SystemInformationBlockType1-MBMS* and other system informations blocks may be scheduled in additional non-MBSFN subframes indicated in *MasterInformationBlock-MBMS*.

The SI messages are transmitted within periodically occurring time domain windows (referred to as SI-windows) using dynamic scheduling. Each SI message is associated with a SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI is transmitted. The length of the SI-window is common for all SI messages, and is configurable. Within the SI-window, the corresponding SI message can be transmitted a number of times in any subframe other than MBSFN subframes, uplink subframes in TDD, and subframe #5 of radio frames for which SFN mod 2=0. The UE acquires the detailed time-domain scheduling (and other information, e.g. frequency-domain scheduling, used transport format) from decoding SI-RNTI on PDCCH (see TS 36.321 [6]). For a BL UE or a UE in CE, the detailed time/frequency domain scheduling information for the SI messages is provided in SystemInformationBlockType1-BR.

For UEs other than BL UE or UEs in CE SI-RNTI is used to address *SystemInformationBlockType1* as well as all SI messages. On MBMS-dedicated cell and on FeMBMS/Unicast-mixed cell, SI-RNTI with value in accordance with TS 36.321 [6] is used to address *SystemInformationBlockType1-MBMS*.

SystemInformationBlockType1 configures the SI-window length and the transmission periodicity for the SI messages.

5.2.1.2a Scheduling for NB-IoT

The MasterInformationBlock-NB (MIB-NB) uses a fixed schedule with a periodicity of 640 ms and repetitions made within 640 ms. The first transmission of the MIB-NB is scheduled in subframe #0 of radio frames for which the SFN mod 64 = 0 and repetitions are scheduled in subframe #0 of all other radio frames. The transmissions are arranged in 8 independently decodable blocks of 80 ms duration.

The *SystemInformationBlockType1-NB* (SIB1-NB) uses a fixed schedule with a periodicity of 2560 ms. SIB1-NB transmission occurs in subframe #4 of every other frame in 16 continuous frames. The starting frame for the first transmission of the SIB1-NB is derived from the cell PCID and the number of repetitions within the 2560 ms period and repetitions are made, equally spaced, within the 2560 ms period (see TS 36.213 [23]). TBS for *SystemInformationBlockType1-NB* and the repetitions made within the 2560 ms are indicated by *schedulingInfoSIB1* field in the MIB-NB.

The SI messages are transmitted within periodically occurring time domain windows (referred to as SI-windows) using scheduling information provided in *SystemInformationBlockType1-NB*. Each SI message is associated with a SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI is transmitted. The length of the SI-window is common for all SI messages, and is configurable.

Within the SI-window, the corresponding SI message can be transmitted a number of times over 2 or 8 consecutive NB-IoT downlink subframes depending on TBS. The UE acquires the detailed time/frequency domain scheduling information and other information, e.g. used transport format for the SI messages from *schedulingInfoList* field in *SystemInformationBlockType1-NB*. The UE is not required to accumulate several SI messages in parallel but may need to accumulate a SI message across multiple SI windows, depending on coverage condition.

SystemInformationBlockType1-NB configures the SI-window length and the transmission periodicity for all SI messages.

5.2.1.3 System information validity and notification of changes

Change of system information (other than for ETWS, CMAS and EAB parameters and other than for AB parameters for NB-IoT) only occurs at specific radio frames, i.e. the concept of a modification period is used. System information may be transmitted a number of times with the same content within a modification period, as defined by its scheduling. The modification period boundaries are defined by SFN values for which SFN mod m= 0, where m is the number of radio frames comprising the modification period. The modification period is configured by system information. If H-SFN is provided in SystemInformationBlockType1-BR, modification period boundaries for BL UEs and UEs in CE are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0. For NB-IoT, H-SFN is always provided and the modification period boundaries are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0.

To enable system information update notification for RRC_IDLE UEs configured to use a DRX cycle longer than the modification period, an eDRX acquisition period is defined. The boundaries of the eDRX acquisition period are determined by H-SFN values for which H-SFN mod 256 = 0. For NB-IoT, the boundaries of the eDRX acquisition period are determined by H-SFN values for which H-SFN mod 1024 = 0.

When the network changes (some of the) system information, it first notifies the UEs about this change, i.e. this may be done throughout a modification period. In the next modification period, the network transmits the updated system information. These general principles are illustrated in figure 5.2.1.3-1, in which different colours indicate different system information. Upon receiving a change notification, the UE not configured to use a DRX cycle that is longer than the modification period acquires the new system information immediately from the start of the next modification period. Upon receiving a change notification applicable to eDRX, a UE in RRC_IDLE configured to use a DRX cycle that is longer than the modification period acquires the updated system information immediately from the start of the next eDRX acquisition period. The UE applies the previously acquired system information until the UE acquires the new system information. The possible boundaries of modification for *SystemInformationBlockType1-BR* are defined by SFN values for which SFN mod 512 = 0 except for notification of ETWS/CMAS for which the eNB may change *SystemInformationBlockType1-BR* content at any time. For NB-IoT, the possible boundaries of modification for *SystemInformationBlockType1-NB* are defined by SFN values for which (H-SFN * 1024 + SFN) mod 4096 = 0.

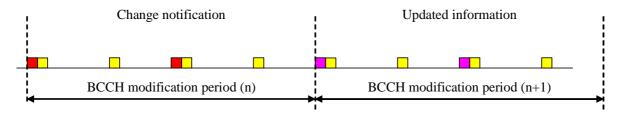


Figure 5.2.1.3-1: Change of system Information

The *Paging* message is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about a system information change. If the UE is in RRC_CONNECTED or is not configured to use a DRX cycle longer than the modification period in RRC_IDLE, and receives a *Paging* message including the *systemInfoModification*, it knows that the system information will change at the next modification period boundary. A UE in RRC_IDLE that is configured to use a DRX cycle longer than the modification period, and receives in an eDRX acquisition period at least one *Paging* message including the *systemInfoModification-eDRX*, shall acquire the updated system information at the next eDRX acquisition period boundary. Although the UE may be informed about changes in system information, no further details are

provided e.g. regarding which system information will change, except if *systemInfoValueTagSI* is received by BL UEs or UEs in CE.

In RRC_CONNECTED, BL UEs or UEs in CE or NB-IoT UEs are not required to acquire system information except when T311 is running or upon handover where the UE is only required to acquire the *MasterInformationBlock* in the target PCell. In RRC_IDLE, E-UTRAN may notify BL UEs or UEs in CE or NB-IoT UEs about SI update, and except for NB-IoT, ETWS and CMAS notification and EAB modification, using Direct Indication information, as specified in 6.6 (or 6.7.5 in NB-IoT) and TS 36.212 [22].

NOTE: Upon system information change essential for BL UEs, UEs in CE, or NB-IoT UEs in RRC CONNECTED, E-UTRAN may initiate connection release.

SystemInformationBlockType1 (or MasterInformationBlock-NB in NB-IoT) includes a value tag systemInfoValueTag, that indicates if a change has occurred in the SI messages. UEs may use systemInfoValueTag, e.g. upon return from out of coverage, to verify if the previously stored SI messages are still valid. Additionally, for other than BL UEs or UEs in CE or NB-IoT UEs, the UE considers stored system information to be invalid after 3 hours from the moment it was successfully confirmed as valid, unless specified otherwise. BL UE or UE in CE considers stored system information to be invalid after 24 hours from the moment it was successfully confirmed as valid, unless the UE is configured by parameter si-ValidityTime to consider stored system information to be invalid 3 hours after validity confirmed as valid. If a BL UE, UE in CE or NB-IoT UE in RRC_CONNECTED state considers the stored system information invalid, the UE shall continue using the stored system information while in RRC_CONNECTED state in the serving cell.

For BL UEs or UEs in CE or NB-IoT UEs, the change of specific SI message can additionally be indicated by a SI message specific value tag <code>systemInfoValueTagSI</code>. If <code>systemInfoValueTag</code> included in the <code>SystemInformationBlockType1-BR</code> (or <code>MasterInformationBlock-NB</code> in NB-IoT) is different from the one of the stored system information and if <code>systemInfoValueTagSI</code> is included in the <code>SystemInformationBlockType1-BR</code> (or <code>SystemInformationBlockType1-NB</code> in NB-IoT) for a specific SI message and is different from the stored one, the UE shall consider this specific SI message to be invalid. If only <code>systemInfoValueTag</code> is included and is different from the stored one, the BL UE or UE in CE should consider any stored system information except <code>SystemInformationBlockType10</code>, <code>SystemInformationBlockType11</code>, <code>SystemInformationBlockType12</code> and <code>SystemInformationBlockType14</code> to be invalid; the NB-IoT UE should consider any stored system information except <code>SystemInformationBlockType14-NB</code> to be invalid.

On MBMS-dedicated cell and on FeMBMS/Unicast-mixed cell, the change of system information and ETWS/CMAS notification is indicated by using Direct Indication FeMBMS defined in 6.6a. The modification periodicity follows MCCH modification periodicity as defined in 5.8.1.3.

E-UTRAN may not update *systemInfoValueTag* upon change of some system information e.g. ETWS information, CMAS information, regularly changing parameters like time information (*SystemInformationBlockType8*, *SystemInformationBlockType16*, *hyperSFN-MSB* in *SystemInformationBlockType1-NB*), EAB and AB parameters. Similarly, E-UTRAN may not include the *systemInfoModification* within the *Paging* message upon change of some system information.

The UE that is not configured to use a DRX cycle longer than the modification period verifies that stored system information remains valid by either checking <code>systemInfoValueTag</code> in <code>SystemInformationBlockType1</code> (or <code>MasterInformationBlock-NB</code> in NB-IoT) after the modification period boundary, or attempting to find the <code>systemInfoModification</code> indication at least <code>modificationPeriodCoeff</code> times during the modification period in case no paging is received, in every modification period. If no paging message is received by the UE during a modification period, the UE may assume that no change of system information will occur at the next modification period boundary. If UE in RRC_CONNECTED, during a modification period, receives one paging message, it may deduce from the presence/ absence of <code>systemInfoModification</code> whether a change of system information other than ETWS information, CMAS information and EAB parameters will occur in the next modification period or not.

When the RRC_IDLE UE is configured with a DRX cycle that is longer than the modification period, and at least one modification period boundary has passed since the UE last verified validity of stored system information, the UE verifies that stored system information remains valid by checking the <code>systemInfoValueTag</code> before establishing or resuming an RRC connection.

ETWS and/or CMAS capable UEs in RRC_CONNECTED shall attempt to read paging at least once every *defaultPagingCycle* to check whether ETWS and/or CMAS notification is present or not.

5.2.1.4 Indication of ETWS notification

ETWS primary notification and/ or ETWS secondary notification can occur at any point in time. The *Paging* message is used to inform ETWS capable UEs in RRC_IDLE and UEs in RRC_CONNECTED about presence of an ETWS primary notification and/ or ETWS secondary notification. If the UE receives a *Paging* message including the *etws-Indication*, it shall start receiving the ETWS primary notification and/ or ETWS secondary notification according to *schedulingInfoList* contained in *SystemInformationBlockType1*. If the UE receives *Paging* message including the *etws-Indication* while it is acquiring ETWS notification(s), the UE shall continue acquiring ETWS notification(s) based on the previously acquired *schedulingInfoList* until it re-acquires *schedulingInfoList* in *SystemInformationBlockType1*.

NOTE: The UE is not required to periodically check schedulingInfoList contained in SystemInformationBlockType1, but Paging message including the etws-Indication triggers the UE to reacquire schedulingInfoList contained in SystemInformationBlockType1 for scheduling changes for SystemInformationBlockType10 and SystemInformationBlockType11. The UE may or may not receive a Paging message including the etws-Indication and/or systemInfoModification when ETWS is no longer scheduled.

ETWS primary notification is contained in *SystemInformationBlockType10* and ETWS secondary notification is contained in *SystemInformationBlockType11*. Segmentation can be applied for the delivery of a secondary notification. The segmentation is fixed for transmission of a given secondary notification within a cell (i.e. the same segment size for a given segment with the same *messageIdentifier*, *serialNumber* and *warningMessageSegmentNumber*). An ETWS secondary notification corresponds to a single *CB data* IE as defined according to TS 23.041 [37].

5.2.1.5 Indication of CMAS notification

CMAS notification can occur at any point in time. The *Paging* message is used to inform CMAS capable UEs in RRC_IDLE and UEs in RRC_CONNECTED about presence of one or more CMAS notifications. If the UE receives a *Paging* message including the *cmas-Indication*, it shall start receiving the CMAS notifications according to *schedulingInfoList* contained in *SystemInformationBlockType1*. If the UE receives *Paging* message including the *cmas-Indication* while it is acquiring CMAS notification(s), the UE shall continue acquiring CMAS notification(s) based on the previously acquired *schedulingInfoList* until it re-acquires *schedulingInfoList* in *SystemInformationBlockType1*.

NOTE: The UE is not required to periodically check *schedulingInfoList* contained in *SystemInformationBlockType1*, but *Paging* message including the *cmas-Indication* triggers the UE to reacquire *schedulingInfoList* contained in *SystemInformationBlockType1* for scheduling changes for *SystemInformationBlockType12*. The UE may or may not receive a *Paging* message including the *cmas-Indication* and/or *systemInfoModification* when *SystemInformationBlockType12* is no longer scheduled.

CMAS notification is contained in *SystemInformationBlockType12*. Segmentation can be applied for the delivery of a CMAS notification. The segmentation is fixed for transmission of a given CMAS notification within a cell (i.e. the same segment size for a given segment with the same *messageIdentifier*, *serialNumber* and *warningMessageSegmentNumber*). E-UTRAN does not interleave transmissions of CMAS notifications, i.e. all segments of a given CMAS notification transmission are transmitted prior to those of another CMAS notification. A CMAS notification corresponds to a single *CB data* IE as defined according to TS 23.041 [37].

5.2.1.6 Notification of EAB parameters change

Change of EAB parameters can occur at any point in time. The EAB parameters are contained in *SystemInformationBlockType14*. The *Paging* message is used to inform EAB capable UEs in RRC_IDLE about a change of EAB parameters or that *SystemInformationBlockType14* is no longer scheduled. If the UE receives a *Paging* message including the *eab-ParamModification*, it shall acquire *SystemInformationBlockType14* according to *schedulingInfoList* contained in *SystemInformationBlockType1*. If the UE receives a *Paging* message including the *eab-ParamModification* while it is acquiring *SystemInformationBlockType14*, the UE shall continue acquiring *SystemInformationBlockType14* based on the previously acquired *schedulingInfoList* until it re-acquires *schedulingInfoList* in *SystemInformationBlockType1*.

NOTE: The EAB capable UE is not expected to periodically check *schedulingInfoList* contained in *SystemInformationBlockType1*.

5.2.1.7 Access Barring parameters change in NB-IoT

Change of Access Barring (AB) parameters can occur at any point in time. The AB parameters are contained in *SystemInformationBlockType14-NB*. Update of the AB parameters does not impact the *systemInfoValueTag* in the *MasterInformationBlock-NB* or the *systemInfoValueTagSI* in *SystemInformationBlockType1-NB*.

A NB-IoT UE checks *ab-Enabled* indication in the *MasterInformationBlock-NB* to know whether access barring is enabled. If access barring is enabled the UE shall not initiate the RRC connection establishment / resume for all access causes except mobile terminating calls until the UE has a valid version of *SystemInformationBlockType14-NB*.

5.2.2 System information acquisition

5.2.2.1 General

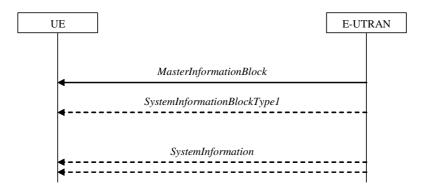


Figure 5.2.2.1-1: System information acquisition, normal

The UE applies the system information acquisition procedure to acquire the AS- and NAS- system information that is broadcasted by the E-UTRAN. The procedure applies to UEs in RRC_IDLE and UEs in RRC_CONNECTED.

For BL UE, UE in CE and NB-IoT UE, specific conditions apply, as specified below.

5.2.2.2 Initiation

The UE shall apply the system information acquisition procedure upon selecting (e.g. upon power on) and upon reselecting a cell, after handover completion, after entering E-UTRA from another RAT, upon return from out of coverage, upon receiving a notification that the system information has changed, upon receiving an indication about the presence of an ETWS notification, upon receiving an indication about the presence of a CMAS notification, upon receiving a notification that the EAB parameters have changed, upon receiving a request from CDMA2000 upper layers and upon exceeding the maximum validity duration. Unless explicitly stated otherwise in the procedural specification, the system information acquisition procedure overwrites any stored system information, i.e. delta configuration is not applicable for system information and the UE discontinues using a field if it is absent in system information unless explicitly specified otherwise.

In RRC_CONNECTED, BL UEs and UEs in CE are required to acquire system information when T311 is running or upon handover where the UE is only required to acquire the *MasterInformationBlock* in the target PCell.

NOTE: Upon handover, E-UTRAN provides system information required by the UE in RRC_CONNECTED except MIB with RRC signalling, i.e. *systemInformationBlockType1Dedicated* and *mobilityControlInfo*.

5.2.2.3 System information required by the UE

The UE shall:

1> ensure having a valid version, as defined below, of (at least) the following system information, also referred to as the 'required' system information:

2> if in RRC_IDLE:

3> if the UE is a NB-IoT UE:

4> the *MasterInformationBlock-NB* and *SystemInformationBlockType1-NB* as well as *SystemInformationBlockType2-NB* through *SystemInformationBlockType5-NB*, *SystemInformationBlockType22-NB*;

3> else:

- 4> the *MasterInformationBlock* and *SystemInformationBlockType1* (or *SystemInformationBlockType1-BR* depending on whether the UE is a BL UE or the UE in CE) as well as *SystemInformationBlockType2* through *SystemInformationBlockType8* (depending on support of the concerned RATs), *SystemInformationBlockType17* (depending on support of RAN-assisted WLAN interworking);
- 2> if in RRC_CONNECTED; and
- 2> the UE is not a BL UE; and
- 2> the UE is not in CE; and
- 2> the UE is not a NB-IoT UE:
 - 3> the *MasterInformationBlock*, *SystemInformationBlockType1* and *SystemInformationBlockType2* as well as *SystemInformationBlockType8* (depending on support of CDMA2000), *SystemInformationBlockType17* (depending on support of RAN-assisted WLAN interworking);
- 2> if in RRC_CONNECTED and T311 is running; and
- 2> the UE is a BL UE or the UE is in CE or the UE is a NB-IoT UE;
 - 3> the MasterInformationBlock (or MasterInformationBlock-NB in NB-IoT), SystemInformationBlockType1-BR (or SystemInformationBlockType1-NB in NB-IoT) and SystemInformationBlockType2 (or SystemInformationBlockType2-NB in NB-IoT), and for NB-IoT SystemInformationBlockType22-NB;
- 1> delete any stored system information after 3 hours or 24 hours from the moment it was confirmed to be valid as defined in 5.2.1.3, unless specified otherwise;
- 1> consider any stored system information except SystemInformationBlockType10, SystemInformationBlockType11, systemInformationBlockType12 and systemInformationBlockType14 (systemInformationBlockType14-NB in NB-IoT) to be invalid if systemInfoValueTag included in the SystemInformationBlockType1 (MasterInformationBlock-NB in NB-IoT) is different from the one of the stored system information and in case of NB-IoT UEs, BL UEs and UEs in CE, systemInfoValueTagSI is not broadcasted. Otherwise consider system information validity as defined in 5.2.1.3;

5.2.2.4 System information acquisition by the UE

The UE shall:

- 1> apply the specified BCCH configuration defined in 9.1.1.1 or BR-BCCH configuration defined in 9.1.1.8;
- 1> if the procedure is triggered by a system information change notification:
 - 2> if the UE uses an idle DRX cycle longer than the modification period:
 - 3> start acquiring the required system information, as defined in 5.2.2.3, from the next eDRX acquisition period boundary;
 - 2> else
 - 3> start acquiring the required system information, as defined in 5.2.2.3, from the beginning of the modification period following the one in which the change notification was received;
- NOTE 1: The UE continues using the previously received system information until the new system information has been acquired.
- 1> if the UE is in RRC_IDLE and enters a cell for which the UE does not have stored a valid version of the system information required in RRC_IDLE, as defined in 5.2.2.3:

- 2> acquire, using the system information acquisition procedure as defined in 5.2.3, the system information required in RRC_IDLE, as defined in 5.2.2.3;
- 1> following successful handover completion to a PCell for which the UE does not have stored a valid version of the system information required in RRC_CONNECTED, as defined in 5.2.2.3:
 - 2> acquire, using the system information acquisition procedure as defined in 5.2.3, the system information required in RRC_CONNECTED, as defined in 5.2.2.3;
 - 2> upon acquiring the concerned system information:
 - 3> discard the corresponding radio resource configuration information included in the *radioResourceConfigCommon* previously received in a dedicated message, if any;
- 1> following a request from CDMA2000 upper layers:
 - 2> acquire SystemInformationBlockType8, as defined in 5.2.3;
- 1> neither initiate the RRC connection establishment/resume procedure nor initiate transmission of the RRCConnectionReestablishmentRequest message until the UE has a valid version of the MasterInformationBlock (MasterInformationBlock-NB in NB-IoT) and SystemInformationBlockType1 (SystemInformationBlockType1-NB in NB-IoT) messages as well as SystemInformationBlockType2 (SystemInformationBlockType2-NB in NB-IoT), and for NB-IoT, SystemInformationBlockType22-NB;
- 1> not initiate the RRC connection establishment/resume procedure subject to EAB until the UE has a valid version of *SystemInformationBlockType14*, if broadcast;
- 1> if the UE is ETWS capable:
 - 2> upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:
 - 3> discard any previously buffered warningMessageSegment;
 - 3> clear, if any, the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;
 - 2> when the UE acquires *SystemInformationBlockType1* following ETWS indication, upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:
 - 3> if *schedulingInfoList* indicates that *SystemInformationBlockType10* is present:
 - 4> if the UE is in CE:
- 5> start acquiring SystemInformationBlockType10;
 - 4> else
 - 5> start acquiring *SystemInformationBlockType10* immediately;
 - 3> if *schedulingInfoList* indicates that *SystemInformationBlockType11* is present:
 - 4> start acquiring *SystemInformationBlockType11* immediately;
 - NOTE 2: UEs shall start acquiring *SystemInformationBlockType10* and *SystemInformationBlockType11* as described above even when *systemInfoValueTag* in *SystemInformationBlockType1* has not changed.
 - 1> if the UE is CMAS capable:
 - 2> upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:
 - 3> discard any previously buffered warningMessageSegment;
 - 3> clear, if any, stored values of *messageIdentifier* and *serialNumber* for *SystemInformationBlockType12* associated with the discarded *warningMessageSegment*;
 - 2> when the UE acquires *SystemInformationBlockType1* following CMAS indication, upon entering a cell during RRC_IDLE, following successful handover and upon connection re-establishment:

- 3> if schedulingInfoList indicates that SystemInformationBlockType12 is present:
 - 4> acquire SystemInformationBlockType12;
- NOTE 3: UEs shall start acquiring *SystemInformationBlockType12* as described above even when *systemInfoValueTag* in *SystemInformationBlockType1* has not changed.
- 1> if the UE is interested to receive MBMS services:
 - 2> if the UE is capable of MBMS reception as specified in 5.8:
 - 3> if *schedulingInfoList* indicates that *SystemInformationBlockType13* is present and the UE does not have stored a valid version of this system information block:
 - 4> acquire SystemInformationBlockType13;
 - 3> else if *SystemInformationBlockType13* is present in *SystemInformationBlockType1-MBMS* and the UE does not have stored a valid version of this system information block:
 - 4> acquire SystemInformationBlockType13 from SystemInformationBlockType1-MBMS;
 - 2> if the UE is capable of SC-PTM reception as specified in 5.8a:
 - 3> if schedulingInfoList indicates that SystemInformationBlockType20 (SystemInformationBlockType20-NB in NB-IoT) is present and the UE does not have stored a valid version of this system information block:
 - 4> acquire SystemInformationBlockType20 (SystemInformationBlockType20-NB in NB-IoT);
 - 2> if the UE is capable of MBMS Service Continuity:
 - 3> if schedulingInfoList indicates that SystemInformationBlockType15 (SystemInformationBlockType15-NB in NB-IoT) is present and the UE does not have stored a valid version of this system information block:
 - 4> acquire SystemInformationBlockType15 (SystemInformationBlockType15-NB in NB-IoT);
- 1> if the UE is EAB capable:
 - 2> when the UE does not have stored a valid version of *SystemInformationBlockType14* upon entering RRC_IDLE, or when the UE acquires *SystemInformationBlockType1* following EAB parameters change notification, or upon entering a cell during RRC_IDLE, or before establishing an RRC connection if using eDRX with DRX cycle longer than the modification period:
 - 3> if *schedulingInfoList* indicates that *SystemInformationBlockType14* is present:
 - 4> start acquiring *SystemInformationBlockType14* immediately;
 - 3> else:
 - 4> discard SystemInformationBlockType14, if previously received;
- NOTE 4: EAB capable UEs start acquiring *SystemInformationBlockType14* as described above even when *systemInfoValueTag* in *SystemInformationBlockType1* has not changed.
- NOTE 5: EAB capable UEs maintain an up to date SystemInformationBlockType14 in RRC_IDLE.
- 1> if the UE is capable of sidelink communication and is configured by upper layers to receive or transmit sidelink communication:
 - 2> if the cell used for sidelink communication meets the S-criteria as defined in TS 36.304 [4]; and
 - 2> if *schedulingInfoList* indicates that *SystemInformationBlockType18* is present and the UE does not have stored a valid version of this system information block:
 - 3> acquire SystemInformationBlockType18;
- 1> if the UE is capable of sidelink discovery and is configured by upper layers to receive or transmit sidelink discovery announcements on the primary frequency:

- 2> if *schedulingInfoList* of the serving cell/ PCell indicates that *SystemInformationBlockType19* is present and the UE does not have stored a valid version of this system information block:
 - 3> acquire SystemInformationBlockType19;
- 1> if the UE is capable of sidelink discovery and, for each of the one or more frequencies included in *discInterFreqList*, if included in *SystemInformationBlockType19* and for which the UE is configured by upper layers to receive sidelink discovery announcements on:
 - 2> if SystemInformationBlockType19 of the serving cell/ PCell does not provide the corresponding reception resources; and
 - 2> if *schedulingInfoList* of the cell on the concerned frequency indicates that *SystemInformationBlockType19* is present and the UE does not have stored a valid version of this system information block:
 - 3> acquire SystemInformationBlockType19;
- 1> if the UE is capable of sidelink discovery and, for each of the one or more frequencies included in *discInterFreqList*, if included in *SystemInformationBlockType19* and for which the UE is configured by upper layers to transmit sidelink discovery announcements on:
 - 2> if SysemInformationBlockType19 of the serving cell/ PCell includes discTxResourcesInterFreq which is set to acquireSI-FromCarrier; and
 - 2> if *schedulingInfoList* of the cell on the concerned frequency indicates that *SystemInformationBlockType19* is present and the UE does not have stored a valid version of this system information block:
 - 3> acquire SystemInformationBlockType19;
- 1> if the UE is a NB-IoT UE and if ab-Enabled included in MasterInformationBlock-NB is set to TRUE:
 - 2> not initiate the RRC connection establishment/resume procedure for all access causes except mobile terminating calls until the UE has acquired the *SystemInformationBlockType14-NB*;
- 1> if the UE is capable of V2X sidelink communication and is configured by upper layers to receive or transmit V2X sidelink communication on a frequency:
 - 2> if the concerned frequency is primary frequency; or if *SysemInformationBlockType21* of the serving cell/PCell does not provide transmission or reception resource pool for V2X sidelink communication for the concerned frequency; and
 - 2> if the cell used for V2X sidelink communication meets the S-criteria as defined in TS 36.304 [4]; and
 - 2> if *schedulingInfoList* on the concerned frequency indicates that *SystemInformationBlockType21* is present and the UE does not have stored a valid version of this system information block:
 - 3> acquire *SystemInformationBlockType21*;

The UE may apply the received SIBs immediately, i.e. the UE does not need to delay using a SIB until all SI messages have been received. The UE may delay applying the received SIBs until completing lower layer procedures associated with a received or a UE originated RRC message, e.g. an ongoing random access procedure.

NOTE 6: While attempting to acquire a particular SIB, if the UE detects from *schedulingInfoList* that it is no longer present, the UE should stop trying to acquire the particular SIB.

5.2.2.5 Essential system information missing

The UE shall:

- 1> if in RRC IDLE or in RRC CONNECTED while T311 is running:
 - 2> if the UE is unable to acquire the MasterInformationBlock (MasterInformationBlock-NB in NB-IoT); or
 - 2> if the UE is neither a BL UE nor in CE nor in NB-IoT and the UE is unable to acquire the *SystemInformationBlockType1*; or

- 2> if the BL UE or UE in CE is unable to acquire *SystemInformationBlockType1-BR* or *SystemInformationBlockType1-BR* is not scheduled; or
- 2> if the NB-IoT UE is unable to acquire the *SystemInformationBlockType1-NB*:
 - 3> consider the cell as barred in accordance with TS 36.304 [4]; and
 - 3> perform barring as if intraFreqReselection is set to allowed, and as if the csg-Indication is set to FALSE;
- 2> else if the UE is unable to acquire the *SystemInformationBlockType2* (or *SystemInformationBlockType2-NB* in NB-IoT) and for NB-IoT, *SystemInformationBlockType22-NB* if scheduled:
 - 3> treat the cell as barred in accordance with TS 36.304 [4];

5.2.2.6 Actions upon reception of the *MasterInformationBlock* message

Upon receiving the *MasterInformationBlock* message the UE shall:

- 1> apply the radio resource configuration included in the *phich-Config*;
- 1> if the UE is in RRC_IDLE or if the UE is in RRC_CONNECTED while T311 is running:
 - 2> if the UE has no valid system information stored according to 5.2.2.3 for the concerned cell:
 - 3> apply the received value of *dl-Bandwidth* to the *ul-Bandwidth* until *SystemInformationBlockType2* is received;

Upon receiving the *MasterInformationBlock-NB* message the UE shall:

1> apply the radio resource configuration included in accordance with the *operationModeInfo*.

No UE requirements related to the contents of *MasterInformationBlock-MBMS* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.7 Actions upon reception of the *SystemInformationBlockType1* message

Upon receiving the *SystemInformationBlockType1* or *SystemInformationBlockType1-BR* either via broadcast or via dedicated signalling, the UE shall:

- 1> if the cellAccessRelatedInfoList contains an entry with the PLMN-Identity of the selected PLMN:
 - 2> in the remainder of the procedures use *plmn-IdentityList*, *trackingAreaCode*, and *cellIdentity* for the cell as received in the corresponding *cellAccessRelatedInfoList* containing the selected PLMN;
- 1> if in RRC_IDLE or in RRC_CONNECTED while T311 is running; and
- 1> if the UE is a category 0 UE according to TS 36.306 [5]; and
- 1> if *category0Allowed* is not included in *SystemInformationBlockType1*:
 - 2> consider the cell as barred in accordance with TS 36.304 [4];
- 1> if in RRC_CONNECTED while T311 is not running, and the UE supports multi-band cells as defined by bit 31 in featureGroupIndicators:
 - 2> disregard the freqBandIndicator and multiBandInfoList, if received, while in RRC_CONNECTED;
 - 2> forward the *cellIdentity* to upper layers;
 - 2> forward the *trackingAreaCode* to upper layers;
- 1> else:
 - 2> if the frequency band indicated in the *freqBandIndicator* is part of the frequency bands supported by the UE and it is not a downlink only band; or

- 2> if the UE supports *multiBandInfoList*, and if one or more of the frequency bands indicated in the *multiBandInfoList* are part of the frequency bands supported by the UE and they are not downlink only bands:
 - 3> forward the *cellIdentity* to upper layers;
 - 3> forward the *trackingAreaCode* to upper layers;
 - 3> forward the *ims-EmergencySupport* to upper layers, if present;
 - 3> forward the *eCallOverIMS-Support* to upper layers, if present;
 - 3> if, for the frequency band selected by the UE (from freqBandIndicator or multiBandInfoList), the freqBandInfo or the multiBandInfoList-v10j0 is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo or multiBandInfoList-v10j0:
 - 4> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NS-PmaxList* within *freqBandInfo* or *multiBandInfolist-v10j0*;
 - 4> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NS-PmaxList*:
 - 5> apply the *additionalPmax*;
 - 4> else:
 - 5> apply the p-Max;
 - 3> else:
 - 4> apply the additional Spectrum Emission in System Information Block Type 2 and the p-Max;
- 2> else:
 - 3> consider the cell as barred in accordance with TS 36.304 [4]; and
 - 3> perform barring as if *intraFreqReselection* is set to *notAllowed*, and as if the *csg-Indication* is set to *FALSE*;

Upon receiving the SystemInformationBlockType1-NB, the UE shall:

- 1> if the frequency band indicated in the freqBandIndicator is part of the frequency bands supported by the UE; or
- 1> if one or more of the frequency bands indicated in the *multiBandInfoList* are part of the frequency bands supported by the UE:
 - 2> forward the *cellIdentity* to upper layers;
 - 2> forward the *trackingAreaCode* to upper layers;
 - 2> if attachWithoutPDN-Connectivity is received for the selected PLMN:
 - 3> forward the attachWithoutPDN-Connectivity to upper layers;
 - 2> else
 - 3> indicate to upper layers that attachWithoutPDN-Connectivity is not present;
 - 2> if, for the frequency band selected by the UE (from freqBandIndicator or multiBandInfoList), the freqBandInfo is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo:
 - 3> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NS-PmaxList* within *freqBandInfo*;

- 3> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NS-PmaxList*:
 - 4> apply the additionalPmax;
- 3> else:
 - 4> apply the p-Max;
- 2> else:
 - 3> apply the additional Spectrum Emission in System Information Block Type 2-NB and the p-Max;
- 1> else:
 - 2> consider the cell as barred in accordance with TS 36.304 [4]; and
 - 2> perform barring as if *intraFreqReselection* is set to *notAllowed*.

No UE requirements related to the contents of *SystemInformationBlockType1-MBMS* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.8 Actions upon reception of SystemInformation messages

No UE requirements related to the contents of the *SystemInformation* messages apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.9 Actions upon reception of *SystemInformationBlockType2*

Upon receiving *SystemInformationBlockType2*, the UE shall:

- 1> apply the configuration included in the *radioResourceConfigCommon*;
- 1> if upper layers indicate that a (UE specific) paging cycle is configured:
 - 2> apply the shortest of the (UE specific) paging cycle and the *defaultPagingCycle* included in the *radioResourceConfigCommon*;
- 1> if the *mbsfn-SubframeConfigList* is included:
 - 2> consider that DL assignments may occur in the MBSFN subframes indicated in the *mbsfn-SubframeConfigList* under the conditions specified in [23, 7.1];
- 1> apply the specified PCCH configuration defined in 9.1.1.3;
- 1> not apply the *timeAlignmentTimerCommon*;
- 1> if in RRC_CONNECTED and UE is configured with RLF timers and constants values received within *rlf-TimersAndConstants*:
 - 2> not update its values of the timers and constants in *ue-TimersAndConstants* except for the value of timer T300:
- 1> if in RRC_CONNECTED while T311 is not running; and the UE supports multi-band cells as defined by bit 31 in *featureGroupIndicators* or *multipleNS-Pmax*:
 - 2> disregard the additional Spectrum Emission and ul-Carrier Freq, if received, while in RRC_CONNECTED;
- 1> if attachWithoutPDN-Connectivity is received for the selected PLMN:
 - 2> forward attachWithoutPDN-Connectivity to upper layers;
- 1> else

- 2> indicate to upper layers that attachWithoutPDN-Connectivity is not present;
- 1> if cp-CIoT-EPS-Optimisation is received for the selected PLMN:
 - 2> forward *cp-CIoT-EPS-Optimisation* to upper layers;
- 1> else
 - 2> indicate to upper layers that *cp-CIoT-EPS-Optimisation* is not present;
- 1> if *up-CIoT-EPS-Optimisation is* received for the selected PLMN:
 - 2> forward up-CIoT-EPS-Optimisation to upper layers;
- 1> else
 - 2> indicate to upper layers that *up-CIoT-EPS-Optimisation* is not present;

Upon receiving SystemInformationBlockType2-NB, the UE shall:

- 1> apply the configuration included in the *radioResourceConfigCommon*;
- 1> apply the *defaultPagingCycle* included in the *radioResourceConfigCommon*;
- 1> if *SystemInformationBlockType22-NB* is scheduled:
 - 2> read and act on information sent in SystemInformationBlockType22-NB;
- 1> apply the specified PCCH configuration defined in 9.1.1.3.
- 1> if in RRC_CONNECTED and UE is configured with RLF timers and constants values received within *rlf-TimersAndConstants*:
 - 2> not update its values of the timers and constants in *ue-TimersAndConstants* except for the value of timer T300;

5.2.2.10 Actions upon reception of SystemInformationBlockType3

Upon receiving SystemInformationBlockType3, the UE shall:

- 1> if in RRC_IDLE, the redistributionServingInfo is included and the UE is redistribution capable:
 - 2> perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10];
- 1> if in RRC_IDLE, or in RRC_CONNECTED while T311 is running:
 - 2> if, for the frequency band selected by the UE (from the procedure in Section 5.2.2.7) to represent the serving cell's carrier frequency, the *freqBandInfo* or the *multiBandInfoList-v10j0* is present in *SystemInformationBlockType3* and the UE capable of *multiNS-Pmax* supports at least one *additionalSpectrumEmission* in the NS-PmaxList within the *freqBandInfo* or *multiBandInfoList-v10j0*:
 - 3> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NS-PmaxList* within *freqBandInfo* or *multiBandInfoList-v10j0*;
 - 3> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NS-PmaxList*:
 - 4> apply the additionalPmax;
 - 3> else:
 - 4> apply the p-Max;
 - 2> else:
 - 3> apply the p-Max;

Upon receiving *SystemInformationBlockType3-NB*, the UE shall:

- 1> if in RRC_IDLE, or in RRC_CONNECTED while T311 is running:
 - 2> if, for the frequency band selected by the UE (from the procedure in subclause 5.2.2.7) to represent the serving cell's carrier frequency, the *freqBandInfo* or the *multiBandInfoList* is present in *SystemInformationBlockType3-NB* and the UE capable of *multiNS-Pmax* supports at least one *additionalSpectrumEmission* in the *NS-PmaxList* within the *freqBandInfo* or the *multiBandInfoList*:
 - 3> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NS-PmaxList* within *freqBandInfo* or *multiBandInfoList*;
 - 3> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NS-PmaxList*:
 - 4> apply the additionalPmax;
 - 3> else:
 - 4> apply the *p-Max*;
 - 2> else:
 - 3> apply the *p-Max*;

5.2.2.11 Actions upon reception of SystemInformationBlockType4

No UE requirements related to the contents of this *SystemInformationBlock* (*SystemInformationBlockType4* or *SystemInformationBlockType4-NB*) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.12 Actions upon reception of SystemInformationBlockType5

Upon receiving SystemInformationBlockType5, the UE shall:

- 1> if in RRC_IDLE, the redistributionInterFreqInfo is included and the UE is redistribution capable:
 - 2> perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10];
- 1> if in RRC IDLE, or in RRC CONNECTED while T311 is running:
 - 2> if the frequency band selected by the UE to represent a non-serving E UTRA carrier frequency is not a downlink only band:
 - 3> if, for the selected frequency band, the *freqBandInfo* or the *multiBandInfoList-v10j0* is present and the UE capable of *multiNS-Pmax* supports at least one *additionalSpectrumEmission* in the *NS-PmaxList* within *freqBandInfo* or *multiBandInfoList-v10j0*:
 - 4> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NS-PmaxList* within *freqBandInfo* or *multiBandInfoList-v10j0*;
 - 4> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NS-PmaxList*:
 - 5> apply the additionalPmax;
 - 4> else:
 - 5> apply the p-Max;
 - 3> else:
 - 4> apply the *p-Max*;

Upon receiving SystemInformationBlockType5-NB, the UE shall:

- 1> if in RRC_IDLE, or in RRC_CONNECTED while T311 is running:
 - 2> if, for the frequency band selected by the UE (from *multiBandInfoList*) to represent a non-serving NB-IoT carrier frequency, the *freqBandInfo* is present and the UE capable of *multiNS-Pmax* supports at least one *additionalSpectrumEmission* in the *NS-PmaxList* within the *freqBandInfo*:
 - 3> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *NS-PmaxList* within *freqBandInfo*;
 - 3> if the *additionalPmax* is present in the same entry of the selected *additionalSpectrumEmission* within *NS-PmaxList*:
 - 4> apply the additionalPmax;
 - 3> else:
 - 4> apply the p-Max;
 - 2> else:
 - 3> apply the p-Max;

5.2.2.13 Actions upon reception of SystemInformationBlockType6

No UE requirements related to the contents of this *SystemInformationBlock* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.14 Actions upon reception of SystemInformationBlockType7

No UE requirements related to the contents of this *SystemInformationBlock* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.15 Actions upon reception of SystemInformationBlockType8

Upon receiving SystemInformationBlockType8, the UE shall:

- 1> if sib8-PerPLMN-List is included and the UE is capable of network sharing for CDMA2000:
 - 2> apply the CDMA2000 parameters below corresponding to the RPLMN;
- 1> if the systemTimeInfo is included:
 - 2> forward the systemTimeInfo to CDMA2000 upper layers;
- 1> if the UE is in RRC_IDLE and if searchWindowSize is included:
 - 2> forward the searchWindowSize to CDMA2000 upper layers;
- 1> if *parametersHRPD* is included:
 - 2> forward the *preRegistrationInfoHRPD* to CDMA2000 upper layers only if the UE has not received the *preRegistrationInfoHRPD* within an *RRCConnectionReconfiguration* message after entering this cell;
 - 2> if the cellReselectionParametersHRPD is included:
 - 3> forward the *neighCellList* to the CDMA2000 upper layers;
- 1> if the *parameters1XRTT* is included:
 - 2> if the *csfb-RegistrationParam1XRTT* is included:
 - 3> forward the *csfb-RegistrationParam1XRTT* to the CDMA2000 upper layers which will use this information to determine if a CS registration/re-registration towards CDMA2000 1xRTT in the EUTRA cell is required;
 - 2> else:

- 3> indicate to CDMA2000 upper layers that CSFB Registration to CDMA2000 1xRTT is not allowed;
- 2> if the *longCodeState1XRTT* is included:
 - 3> forward the *longCodeState1XRTT* to CDMA2000 upper layers;
- 2> if the *cellReselectionParameters1XRTT* is included:
 - 3> forward the *neighCellList* to the CDMA2000 upper layers;
- 2> if the *csfb-SupportForDualRxUEs* is included:
 - 3> forward *csfb-SupportForDualRxUEs* to the CDMA2000 upper layers;
- 2> else:
 - 3> forward csfb-SupportForDualRxUEs, with its value set to FALSE, to the CDMA2000 upper layers;
- 2> if ac-BarringConfig1XRTT is included:
 - 3> forward ac-BarringConfig1XRTT to the CDMA2000 upper layers;
- 2> if the *csfb-DualRxTxSupport* is included:
 - 3> forward *csfb-DualRxTxSupport* to the CDMA2000 upper layers;
- 2> else:
 - 3> forward csfb-DualRxTxSupport, with its value set to FALSE, to the CDMA2000 upper layers;

5.2.2.16 Actions upon reception of SystemInformationBlockType9

Upon receiving *SystemInformationBlockType9*, the UE shall:

1> if *hnb-Name* is included, forward the *hnb-Name* to upper layers;

5.2.2.17 Actions upon reception of SystemInformationBlockType10

Upon receiving SystemInformationBlockType10, the UE shall:

1> forward the received warning Type, message Identifier and serial Number to upper layers;

5.2.2.18 Actions upon reception of SystemInformationBlockType11

Upon receiving *SystemInformationBlockType11*, the UE shall:

- 1> if there is no current value for messageIdentifier and serialNumber for SystemInformationBlockType11; or
- 1> if either the received value of *messageIdentifier* or of serialNumber or of both are different from the current values of *messageIdentifier* and *serialNumber* for *SystemInformationBlockType11*:
 - 2> use the received values of *messageIdentifier* and *serialNumber* for *SystemInformationBlockType11* as the current values of *messageIdentifier* and *serialNumber* for *SystemInformationBlockType11*;
 - 2> discard any previously buffered warningMessageSegment;
 - 2> if all segments of a warning message have been received:
 - 3> assemble the warning message from the received warningMessageSegment;
 - 3> forward the received warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;
 - 3> stop reception of *SystemInformationBlockType11*;
 - 3> discard the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;

- 2> else:
 - 3> store the received warningMessageSegment;
 - 3> continue reception of SystemInformationBlockType11;
- 1> else if all segments of a warning message have been received:
 - 2> assemble the warning message from the received warningMessageSegment;
 - 2> forward the received complete warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;
 - 2> stop reception of SystemInformationBlockType11;
 - 2> discard the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;
- 1> else:
 - 2> store the received warningMessageSegment;
 - 2> continue reception of SystemInformationBlockType11;

The UE should discard any stored *warningMessageSegment* and the current value of *messageIdentifier* and *serialNumber* for *SystemInformationBlockType11* if the complete warning message has not been assembled within a period of 3 hours.

5.2.2.19 Actions upon reception of SystemInformationBlockType12

Upon receiving SystemInformationBlockType12, the UE shall:

- 1> if the *SystemInformationBlockType12* contains a complete warning message:
 - 2> forward the received warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;
 - 2> continue reception of SystemInformationBlockType12;
- 1> else:
 - 2> if the received values of *messageIdentifier* and *serialNumber* are the same (each value is the same) as a pair for which a warning message is currently being assembled:
 - 3> store the received warningMessageSegment;
 - 3> if all segments of a warning message have been received:
 - 4> assemble the warning message from the received warningMessageSegment;
 - 4> forward the received warning message, *messageIdentifier*, *serialNumber* and *dataCodingScheme* to upper layers;
 - 4> stop assembling a warning message for this *messageIdentifier* and *serialNumber* and delete all stored information held for it;
 - 3> continue reception of SystemInformationBlockType12;
 - 2> else if the received values of *messageIdentifier* and/or *serialNumber* are not the same as any of the pairs for which a warning message is currently being assembled:
 - 3> start assembling a warning message for this messageIdentifier and serialNumber pair;
 - 3> store the received warningMessageSegment;
 - 3> continue reception of SystemInformationBlockType12;

The UE should discard *warningMessageSegment* and the associated values of *messageIdentifier* and *serialNumber* for *SystemInformationBlockType12* if the complete warning message has not been assembled within a period of 3 hours.

NOTE: The number of warning messages that a UE can re-assemble simultaneously is a function of UE implementation.

5.2.2.20 Actions upon reception of SystemInformationBlockType13

No UE requirements related to the contents of this *SystemInformationBlock* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.21 Actions upon reception of SystemInformationBlockType14

No UE requirements related to the contents of this *SystemInformationBlock* (*SystemInformationBlockType14* or *SystemInformationBlockType14-NB*) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.22 Actions upon reception of SystemInformationBlockType15

No UE requirements related to the contents of this *SystemInformationBlock* (*SystemInformationBlockType15* or *SystemInformationBlockType15-NB*) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.23 Actions upon reception of SystemInformationBlockType16

No UE requirements related to the contents of this *SystemInformationBlock* (*SystemInformationBlockType16* or *SystemInformationBlockType16-NB*) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.24 Actions upon reception of SystemInformationBlockType17

Upon receiving *SystemInformationBlockType17*, the UE shall:

- 1> if wlan-OffloadConfigCommon corresponding to the RPLMN is included:
 - 2> if the UE is not configured with rclwi-Configuration with command set to steerToWLAN:
 - 3> apply the wlan-Id-List corresponding to the RPLMN;
 - 2> if not configured with the wlan-OffloadConfigDedicated:
 - 3> apply the wlan-OffloadConfigCommon corresponding to the RPLMN;

5.2.2.25 Actions upon reception of SystemInformationBlockType18

Upon receiving SystemInformationBlockType18, the UE shall:

- 1> if SystemInformationBlockType18 message includes the commConfig:
 - 2> if configured to receive sidelink communication:
 - 3> from the next SC period, as defined by *sc-Period*, use the resource pool indicated by *commRxPool* for sidelink communication monitoring, as specified in 5.10.3;
 - 2> if configured to transmit sidelink communication:
 - 3> from the next SC period, as defined by *sc-Period*, use the resource pool indicated by *commTxPoolNormalCommon*, *commTxPoolNormalCommonExt* or by *commTxPoolExceptional* for sidelink communication transmission, as specified in 5.10.4;

5.2.2.26 Actions upon reception of SystemInformationBlockType19

Upon receiving SystemInformationBlockType19, the UE shall:

- 1> if SystemInformationBlockType19 message includes the discConfig or discConfigPS:
 - 2> from the next discovery period, as defined by *discPeriod*, use the resources indicated by *discRxPool*, *discRxResourcesInterFreq* or *discRxPoolPS* for sidelink discovery monitoring, as specified in 5.10.5;
 - 2> if *SystemInformationBlockType19* message includes the *discTxPoolCommon* or *discTxPoolPS-Common*; and the UE is in RRC_IDLE:
 - 3> from the next discovery period, as defined by *discPeriod*, use the resources indicated by *discTxPoolCommon* or *discTxPoolPS-Common* for sidelink discovery announcement, as specified in 5.10.6:
 - 2> if the SystemInformationBlockType19 message includes the discTxPowerInfo:
 - 3> use the power information included in *discTxPowerInfo* for sidelink discovery transmission on the serving frequency, as specified in TS 36.213 [23];
- 1> if SystemInformationBlockType19 message includes the discConfigRelay:
 - 2> if the *SystemInformationBlockType19* message includes the *txPowerInfo*:
 - 3> use the power information included in *txPowerInfo* for sidelink discovery transmission on the corresponding non-serving frequency, as specified in TS 36.213 [23];

5.2.2.27 Actions upon reception of SystemInformationBlockType20

No UE requirements related to the contents of this *SystemInformationBlock* (*SystemInformationBlockType20* or *SystemInformationBlockType20-NB*) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.28 Actions upon reception of SystemInformationBlockType21

Upon receiving SystemInformationBlockType21, the UE shall:

- 1> if SystemInformationBlockType21 message includes sl-V2X-ConfigCommon:
 - 2> if configured to receive V2X sidelink communication:
 - 3> use the resource pool indicated by *v2x-CommRxPool* in *sl-V2X-ConfigCommon* for V2X sidelink communication monitoring, as specified in 5.10.12;
 - 2> if configured to transmit V2X sidelink communication:
 - 3> use the resource pool indicated by v2x-CommTxPoolNormalCommon, p2x-CommTxPoolNormalCommon, v2x-CommTxPoolNormal, p2x-CommTxPoolNormal or by v2x-CommTxPoolExceptional for V2X sidelink communication transmission, as specified in 5.10.13;
 - 3> perform CBR measurement on the transmission resource pool(s) indicated by v2x-CommTxPoolNormalCommon, v2x-CommTxPoolNormal and v2x-CommTxPoolExceptional for V2X sidelink communication transmission, as specified in 5.5.3;

5.2.2.29 Actions upon reception of SystemInformationBlockType22-NB

No UE requirements related to the contents of this *SystemInformationBlock* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.3 Acquisition of an SI message

When acquiring an SI message, the UE shall:

- 1> determine the start of the SI-window for the concerned SI message as follows:
 - 2> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the list of SI messages configured by *schedulingInfoList* in *SystemInformationBlockType1*;
 - 2> determine the integer value x = (n-1)*w, where w is the si-WindowLength;
 - 2> the SI-window starts at the subframe #a, where $a = x \mod 10$, in the radio frame for which SFN mod T = FLOOR(x/10), where T is the *si-Periodicity* of the concerned SI message;
- NOTE: E-UTRAN should configure an SI-window of 1 ms only if all SIs are scheduled before subframe #5 in radio frames for which SFN mod 2 = 0.
- 1> receive DL-SCH using the SI-RNTI from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by *si-WindowLength*, or until the SI message was received, excluding the following subframes:
 - 2> subframe #5 in radio frames for which SFN mod 2 = 0;
 - 2> any MBSFN subframes;
 - 2> any uplink subframes in TDD;
- 1> if the SI message was not received by the end of the SI-window, repeat reception at the next SI-window occasion for the concerned SI message;

5.2.3a Acquisition of an SI message by BL UE or UE in CE or a NB-IoT UE

When acquiring an SI message, the BL UE or UE in CE or NB-IoT UE shall:

- 1> determine the start of the SI-window for the concerned SI message as follows:
 - 2> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the list of SI messages configured by *schedulingInfoList* in *SystemInformationBlockType1-BR* (or *SystemInformationBlockType1-NB* in NB-IoT);
 - 2> determine the integer value x = (n-1)*w, where w is the si-WindowLength-BR (or si-WindowLength in NB-IoT);
 - 2> if the UE is a NB-IoT UE:
 - 3> the SI-window starts at the subframe #0 in the radio frame for which (H-SFN * 1024 + SFN) mod T = FLOOR(x/10) + Offset, where T is the si-Periodicity of the concerned SI message and, Offset is the offset of the start of the SI-Window (si-RadioFrameOffset);
 - 2> else:
 - 3> the SI-window starts at the subframe #0 in the radio frame for which SFN mod T = FLOOR(x/10), where T is the si-Periodicity of the concerned SI message;

1> if the UE is a NB-IoT UE:

2> receive and accumulate SI message transmissions on DL-SCH from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by si-WindowLength, starting from the radio frames as provided in si-RepetitionPattern and in subframes as provided in downlinkBitmap, or until successful decoding of the accumulated SI message transmissions excluding the subframes used for transmission of NPSS, NSSS, MasterInformationBlock-NB and SystemInformationBlockType1-NB. If there are not enough subframes for one SI message transmission in the radio frames as provided in si-RepetitionPattern, the UE shall continue to receive the SI message transmission in the radio frames following the radio frame indicated in si-RepetitionPattern;

1> else:

2> receive and accumulate SI message transmissions on DL-SCH on narrowband provided by *si-Narrowband*, from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is

given by *si-WindowLength-BR*, only in radio frames as provided in *si-RepetitionPattern* and subframes as provided in *fdd-DownlinkOrTddSubframeBitmapBR* in *bandwidthReducedAccessRelatedInfo*, or until successful decoding of the accumulated SI message transmissions;

1> if the SI message was not possible to decode from the accumulated SI message transmissions by the end of the SI-window, continue reception and accumulation of SI message transmissions on DL-SCH in the next SIwindow occasion for the concerned SI message;

5.2.3b Acquisition of an SI message from MBMS-dedicated cell

When acquiring an SI message, the UE shall:

- 1> determine the start of the SI-window for the concerned SI message as follows:
 - 2> for the concerned SI message, determine the number *n* which corresponds to the order of entry in the list of SI messages configured by *schedulingInfoList* in *SystemInformationBlockType1-MBMS*;
 - 2> determine the integer value x = (n-1)*w, where w is the si-WindowLength;
 - 2> the SI-window starts always at the subframe #a, where $a = x \mod 10$, in the radio frame for which SFN mod T = FLOOR(x/10), where T is the *si-Periodicity* of the concerned SI message;
- 1> receive DL-SCH using SI-RNTI with value in accordance with 36.321 [6] from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by *si-WindowLength*, or until the SI message was received, excluding the following subframes:
 - 2> any MBSFN subframes;
- 1> if the SI message was not received by the end of the SI-window, repeat reception at the next SI-window occasion for the concerned SI message;

5.3 Connection control

5.3.1 Introduction

5.3.1.1 RRC connection control

RRC connection establishment involves the establishment of SRB1. E-UTRAN completes RRC connection establishment prior to completing the establishment of the S1 connection, i.e. prior to receiving the UE context information from the EPC. Consequently, AS security is not activated during the initial phase of the RRC connection. During this initial phase of the RRC connection, the E-UTRAN may configure the UE to perform measurement reporting, but the UE only sends the corresponding measurement reports after successful security activation. However, the UE only accepts a handover message when security has been activated.

NOTE: In case the serving frequency broadcasts multiple overlapping bands, E-UTRAN can only configure measurements after having obtained the UE capabilities, as the measurement configuration needs to be set according to the band selected by the UE.

Upon receiving the UE context from the EPC, E-UTRAN activates security (both ciphering and integrity protection) using the initial security activation procedure. The RRC messages to activate security (command and successful response) are integrity protected, while ciphering is started only after completion of the procedure. That is, the response to the message used to activate security is not ciphered, while the subsequent messages (e.g. used to establish SRB2 and DRBs) are both integrity protected and ciphered.

After having initiated the initial security activation procedure, E-UTRAN initiates the establishment of SRB2 and DRBs, i.e. E-UTRAN may do this prior to receiving the confirmation of the initial security activation from the UE. In any case, E-UTRAN will apply both ciphering and integrity protection for the RRC connection reconfiguration messages used to establish SRB2 and DRBs. E-UTRAN should release the RRC connection if the initial security activation and/ or the radio bearer establishment fails (i.e. security activation and DRB establishment are triggered by a joint S1-procedure, which does not support partial success).

For SRB2 and DRBs, security is always activated from the start, i.e. the E-UTRAN does not establish these bearers prior to activating security.

For some radio configuration fields, a critical extension has been defined. A switch from the original version of the field to the critically extended version is allowed using any connection reconfiguration. The UE reverts to the original version of some critically extended fields upon handover and re-establishment as specified elsewhere in this specification. Otherwise, switching a field from the critically extended version to the original version is only possible using the handover or re-establishment procedure with the full configuration option. This also applies for fields that are critically extended within a release (i.e. original and extended version defined in same release).

After having initiated the initial security activation procedure, E-UTRAN may configure a UE that supports CA, with one or more SCells in addition to the PCell that was initially configured during connection establishment. The PCell is used to provide the security inputs and upper layer system information (i.e. the NAS mobility information e.g. TAI). SCells are used to provide additional downlink and optionally uplink radio resources. When not configured with DC all SCells the UE is configured with, if any, are part of the MCG. When configured with DC however, some of the SCells are part of a SCG. In this case, user data carried by a DRB may either be transferred via MCG (i.e. MCG-DRB), via SCG (SCG-DRB) or via both MCG and SCG in DL while E-UTRAN configures the CG used in UL (split DRB). An RRC connection reconfiguration message may be used to change the DRB type from MCG-DRB to SCG-DRB or to split DRB, as well as from SCG-DRB or split DRB to MCG-DRB.

SCG change is a synchronous SCG reconfiguration procedure (i.e. involving RA to the PSCell) including reset/reestablishment of layer 2 and, if SCG DRBs are configured, refresh of security. The procedure is used in a number of different scenarios e.g. SCG establishment, PSCell change, Key refresh, change of DRB type. The UE performs the SCG change related actions upon receiving an *RRCConnectionReconfiguration* message including *mobilityControlInfoSCG*, see 5.3.10.10.

The release of the RRC connection normally is initiated by E-UTRAN. The procedure may be used to re-direct the UE to an E-UTRA frequency or an inter-RAT carrier frequency. Only in exceptional cases, as specified within this specification, TS 36.300 [9], TS 36.304 [4] or TS 24.301 [35], may the UE abort the RRC connection, i.e. move to RRC_IDLE without notifying E-UTRAN.

The suspension of the RRC connection is initiated by E-UTRAN. When the RRC connection is suspended, the UE stores the UE AS context and the *resumeIdentity*, and transitions to RRC_IDLE state. The RRC message to suspend the RRC connection is integrity protected and ciphered. Suspension can only be performed when at least 1 DRB is successfully established.

The resumption of a suspended RRC connection is initiated by upper layers when the UE has a stored UE AS context, RRC connection resume is permitted by E-UTRAN and the UE needs to transit from RRC_IDLE state to RRC_CONNECTED state. When the RRC connection is resumed, RRC configures the UE according to the RRC connection resume procedure based on the stored UE AS context and any RRC configuration received from E-UTRAN. The RRC connection resume procedure re-activates security and re-establishes SRB(s) and DRB(s). The request to resume the RRC connection includes the *resumeIdentity*. The request is not ciphered, but protected with a message authentication code.

In response to a request to resume the RRC connection, E-UTRAN may resume the suspended RRC connection, reject the request to resume and instruct the UE to either keep or discard the stored context, or setup a new RRC connection.

5.3.1.2 Security

AS security comprises of the integrity protection of RRC signalling (SRBs) as well as the ciphering of RRC signalling (SRBs) and user data (DRBs).

RRC handles the configuration of the security parameters which are part of the AS configuration: the integrity protection algorithm, the ciphering algorithm and two parameters, namely the *keyChangeIndicator* and the *nextHopChainingCount*, which are used by the UE to determine the AS security keys upon handover, connection reestablishment and/ or connection resume.

The integrity protection algorithm is common for signalling radio bearers SRB1 and SRB2. The ciphering algorithm is common for all radio bearers (i.e. SRB1, SRB2 and DRBs). Neither integrity protection nor ciphering applies for SRB0.

RRC integrity and ciphering are always activated together, i.e. in one message/ procedure. RRC integrity and ciphering are never de-activated. However, it is possible to switch to a 'NULL' ciphering algorithm (eea0).

The 'NULL' integrity protection algorithm (eia0) is used only for the UE in limited service mode [32, TS33.401]. In case the 'NULL' integrity protection algorithm is used, 'NULL' ciphering algorithm is also used.

NOTE 1: Lower layers discard RRC messages for which the integrity check has failed and indicate the integrity verification check failure to RRC.

The AS applies three different security keys: one for the integrity protection of RRC signalling (K_{RRCint}), one for the ciphering of RRC signalling (K_{RRCenc}) and one for the ciphering of user data (K_{UPenc}). All three AS keys are derived from the K_{eNB} key. The K_{eNB} is based on the K_{ASME} key, which is handled by upper layers.

Upon connection establishment new AS keys are derived. No AS-parameters are exchanged to serve as inputs for the derivation of the new AS keys at connection establishment.

The integrity and ciphering of the RRC message used to perform handover is based on the security configuration used prior to the handover and is performed by the source eNB.

The integrity and ciphering algorithms can only be changed upon handover. The four AS keys (K_{eNB} , K_{RRCint} , K_{RRCenc} and K_{UPenc}) change upon every handover, connection re-establishment and connection resume. The *keyChangeIndicator* is used upon handover and indicates whether the UE should use the keys associated with the K_{ASME} key taken into use with the latest successful NAS SMC procedure. The *nextHopChainingCount* parameter is used upon handover, connection re-establishment and connection resume by the UE when deriving the new K_{eNB} that is used to generate K_{RRCint} , K_{RRCenc} and K_{UPenc} (see TS 33.401 [32]). An intra cell handover procedure may be used to change the keys in RRC_CONNECTED.

For each radio bearer an independent counter (COUNT, as specified in TS 36.323 [8]) is maintained for each direction. For each DRB, the COUNT is used as input for ciphering. For each SRB, the COUNT is used as input for both ciphering and integrity protection. It is not allowed to use the same COUNT value more than once for a given security key. At connection resume the COUNT is reset. In order to limit the signalling overhead, individual messages/ packets include a short sequence number (PDCP SN, as specified in TS 36.323 [8]). In addition, an overflow counter mechanism is used: the hyper frame number (TX_HFN and RX_HFN, as specified in TS 36.323 [8]). The HFN needs to be synchronized between the UE and the eNB. The eNB is responsible for avoiding reuse of the COUNT with the same RB identity and with the same K_{eNB} , e.g. due to the transfer of large volumes of data, release and establishment of new RBs. In order to avoid such re-use, the eNB may e.g. use different RB identities for successive RB establishments, trigger an intra cell handover or an RRC_CONNECTED to RRC_IDLE to RRC_CONNECTED transition.

For each SRB, the value provided by RRC to lower layers to derive the 5-bit BEARER parameter used as input for ciphering and for integrity protection is the value of the corresponding *srb-Identity* with the MSBs padded with zeroes.

In case of DC, a separate K_{eNB} is used for SCG-DRBs (S- K_{eNB}). This key is derived from the key used for the MCG (K_{eNB}) and an SCG counter that is used to ensure freshness. To refresh the S- K_{eNB} e.g. when the COUNT will wrap around, E-UTRAN employs an SCG change, i.e. an *RRCConnectionReconfiguration* message including *mobilityControlInfoSCG*. When performing handover, while at least one SCG-DRB remains configured, both K_{eNB} and S- K_{eNB} are refreshed. In such case E-UTRAN performs handover with SCG change i.e. an *RRCConnectionReconfiguration* message including both *mobilityControlInfo* and *mobilityControlInfoSCG*. The ciphering algorithm is common for all radio bearers within a CG but may be different between MCG and SCG. The ciphering algorithm for SCG DRBs can only be changed upon SCG change.

5.3.1.2a RN security

For RNs, AS security follows the procedures in 5.3.1.2. Furthermore, E-UTRAN may configure per DRB whether or not integrity protection is used. The use of integrity protection may be configured only upon DRB establishment and reconfigured only upon handover or upon the first reconfiguration following RRC connection re-establishment.

To provide integrity protection on DRBs between the RN and the E-UTRAN, the K_{UPint} key is derived from the K_{eNB} key as described in TS33.401 [32]. The same integrity protection algorithm used for SRBs also applies to the DRBs. The K_{UPint} changes at every handover and RRC connection re-establishment and is based on an updated K_{eNB} which is derived by taking into account the *nextHopChainingCount*. The COUNT value maintained for DRB ciphering is also used for integrity protection, if the integrity protection is configured for the DRB.

5.3.1.3 Connected mode mobility

In RRC_CONNECTED, the network controls UE mobility, i.e. the network decides when the UE shall connect to which E-UTRA cell(s), or inter-RAT cell. For network controlled mobility in RRC_CONNECTED, the PCell can be

changed using an *RRCConnectionReconfiguration* message including the *mobilityControlInfo* (handover), whereas the SCell(s) can be changed using the *RRCConnectionReconfiguration* message either with or without the *mobilityControlInfo*.

An SCG can be established, reconfigured or released by using an *RRCConnectionReconfiguration* message with or without the *mobilityControlInfo*. In case Random Access to the PSCell or initial PUSCH transmission to the PSCell if *rach-SkipSCG* is configured is required upon SCG reconfiguration, E-UTRAN employs the SCG change procedure (i.e. an *RRCConnectionReconfiguration* message including the *mobilityControlInfoSCG*). The PSCell can only be changed using the SCG change procedure and by release and addition of the PSCell.

The network triggers the handover procedure e.g. based on radio conditions, load. To facilitate this, the network may configure the UE to perform measurement reporting (possibly including the configuration of measurement gaps). The network may also initiate handover blindly, i.e. without having received measurement reports from the UE.

Before sending the handover message to the UE, the source eNB prepares one or more target cells. The source eNB selects the target PCell. The source eNB may also provide the target eNB with a list of best cells on each frequency for which measurement information is available, in order of decreasing RSRP. The source eNB may also include available measurement information for the cells provided in the list. The target eNB decides which SCells are configured for use after handover, which may include cells other than the ones indicated by the source eNB. If an SCG is configured, handover involves either SCG release or SCG change. In case the UE was configured with DC, the target eNB indicates in the handover message whether the UE shall release the entire SCG configuration. Upon connection re-establishment, the UE releases the entire SCG configuration except for the DRB configuration, while E-UTRAN in the first reconfiguration message following the re-establishment either releases the DRB(s) or reconfigures the DRB(s) to MCG DRB(s).

The target eNB generates the message used to perform the handover, i.e. the message including the AS-configuration to be used in the target cell(s). The source eNB transparently (i.e. does not alter values/ content) forwards the handover message/ information received from the target to the UE. When appropriate, the source eNB may initiate data forwarding for (a subset of) the DRBs.

After receiving the handover message, the UE attempts to access the target PCell at the first available RACH occasion according to Random Access resource selection defined in TS 36.321 [6], i.e. the handover is asynchronous, or at the first available PUSCH occasion if *rach-Skip* is configured. Consequently, when allocating a dedicated preamble for the random access in the target PCell, E-UTRA shall ensure it is available from the first RACH occasion the UE may use. The first available PUSCH occasion is provided by *ul-ConfigInfo*, if configured, otherwise UE shall monitor the PDCCH of target eNB. Upon successful completion of the handover, the UE sends a message used to confirm the handover.

If the target eNB does not support the release of RRC protocol which the source eNB used to configure the UE, the target eNB may be unable to comprehend the UE configuration provided by the source eNB. In this case, the target eNB should use the full configuration option to reconfigure the UE for Handover and Re-establishment. Full configuration option includes an initialization of the radio configuration, which makes the procedure independent of the configuration used in the source cell(s) with the exception that the security algorithms are continued for the RRC re-establishment.

After the successful completion of handover, PDCP SDUs may be re-transmitted in the target cell(s). This only applies for DRBs using RLC-AM mode and for handovers not involving full configuration option. The further details are specified in TS 36.323 [8]. After the successful completion of handover not involving full configuration option, the SN and the HFN are reset except for the DRBs using RLC-AM mode (for which both SN and HFN continue). For reconfigurations involving the full configuration option, the PDCP entities are newly established (SN and HFN do not continue) for all DRBs irrespective of the RLC mode. The further details are specified in TS 36.323 [8].

One UE behaviour to be performed upon handover is specified, i.e. this is regardless of the handover procedures used within the network (e.g. whether the handover includes X2 or S1 signalling procedures).

The source eNB should, for some time, maintain a context to enable the UE to return in case of handover failure. After having detected handover failure, the UE attempts to resume the RRC connection either in the source PCell or in another cell using the RRC re-establishment procedure. This connection resumption succeeds only if the accessed cell is prepared, i.e. concerns a cell of the source eNB or of another eNB towards which handover preparation has been performed. The cell in which the re-establishment procedure succeeds becomes the PCell while SCells and STAGs, if configured, are released.

Normal measurement and mobility procedures are used to support handover to cells broadcasting a CSG identity. In addition, E-UTRAN may configure the UE to report that it is entering or leaving the proximity of cell(s) included in its

CSG whitelist. Furthermore, E-UTRAN may request the UE to provide additional information broadcast by the handover candidate cell e.g. global cell identity, CSG identity, CSG membership status.

NOTE: E-UTRAN may use the 'proximity report' to configure measurements as well as to decide whether or not to request additional information broadcast by the handover candidate cell. The additional information is used to verify whether or not the UE is authorised to access the target PCell and may also be needed to identify handover candidate cell (*PCI confusion* i.e. when the physical layer identity that is included in the measurement report does not uniquely identify the cell).

5.3.1.4 Connection control in NB-IoT

In NB-IoT, during the RRC connection establishment procedure, SRB1bis is established implicitly with SRB1. SRB1bis uses the logical channel identity defined in 9.1.2a, with the same configuration as SRB1 but no PDCP entity. SRB1bis is used until security is activated. The RRC messages to activate security (command and successful response) are sent over SRB1 being integrity protected and ciphering is started after completion of the procedure. Once security is activated, new RRC messages shall be transmitted using SRB1. A NB-IoT UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]) only establishes SRB1bis.

A NB-IoT UE only supports 0, 1 or 2 DRBs, depending on its capability. A NB-IoT UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]) does not need to support any DRBs and associated procedures.

Table 5.3.1.4-1 lists the procedures that are applicable for NB-IoT. All other procedures are not applicable; this is not further stated in the corresponding procedures.

Sub-clause	Procedures
5.3.2	Paging
5.3.3	RRC connection establishment
	RRC connection resume (see NOTE)
5.3.4	Initial security activation (see NOTE)
5.3.5	RRC connection reconfiguration (see NOTE)
5.3.7	RRC connection re-establishment
5.3.8	RRC connection release
5.3.9	RRC connection release requested by upper layers
5.3.10	Radio resource configuration
5.3.11	Radio link failure related actions
5.3.12	UE actions upon leaving RRC_CONNECTED

Table 5.3.1.4-1: Connection control procedures applicable to a NB-IoT UE

NOTE: Not applicable for a UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]).

5.3.2 Paging

5.3.2.1 General

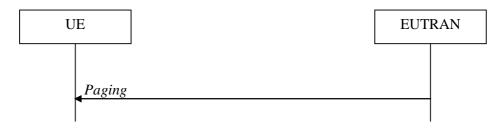


Figure 5.3.2.1-1: Paging

The purpose of this procedure is:

- to transmit paging information to a UE in RRC_IDLE and/or;

- to inform UEs in RRC_IDLE and UEs other than NB-IoT UEs in RRC_CONNECTED about a system information change and/ or;
- to inform UEs other than NB-IoT UEs about an ETWS primary notification and/ or ETWS secondary notification and/ or;
- to inform UEs other than NB-IoT UEs about a CMAS notification and/or;
- to inform UEs other than NB-IoT UEs in RRC_IDLE about an EAB parameters modification and/or;
- to inform UEs other than NB-IoT UEs in RRC_IDLE to perform E-UTRAN inter-frequency redistribution procedure.

The paging information is provided to upper layers, which in response may initiate RRC connection establishment, e.g. to receive an incoming call.

5.3.2.2 Initiation

E-UTRAN initiates the paging procedure by transmitting the *Paging* message at the UE's paging occasion as specified in TS 36.304 [4]. E-UTRAN may address multiple UEs within a *Paging* message by including one *PagingRecord* for each UE. E-UTRAN may also indicate a change of system information, and/ or provide an ETWS notification or a CMAS notification in the *Paging* message.

5.3.2.3 Reception of the *Paging* message by the UE

Upon receiving the *Paging* message, the UE shall:

- 1> if in RRC_IDLE, for each of the *PagingRecord*, if any, included in the *Paging* message:
 - 2> if the *ue-Identity* included in the *PagingRecord* matches one of the UE identities allocated by upper layers:
 - 3> forward the *ue-Identity* and, except for NB-IoT, the *cn-Domain* to the upper layers;
- 1> if the UE is not configured with a DRX cycle longer than the modification period and the *systemInfoModification* is included; or
- 1> if the UE is configured with a DRX cycle longer than the modification period and the *systemInfoModification-eDRX* is included:
 - 2> re-acquire the required system information using the system information acquisition procedure as specified in 5.2.2.
- 1> if the etws-Indication is included and the UE is ETWS capable:
 - 2> re-acquire *SystemInformationBlockType1* immediately, i.e., without waiting until the next system information modification period boundary;
 - 2> if the *schedulingInfoList* indicates that *SystemInformationBlockType10* is present:
 - 3> acquire SystemInformationBlockType10;

NOTE: If the UE is in CE, it is up to UE implementation when to start acquiring SystemInformationBlockType10.

- 2> if the *schedulingInfoList* indicates that *SystemInformationBlockType11* is present:
 - 3> acquire SystemInformationBlockType11;
- 1> if the *cmas-Indication* is included and the UE is CMAS capable:
 - 2> re-acquire *SystemInformationBlockType1* immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.5;
 - 2> if the *schedulingInfoList* indicates that *SystemInformationBlockType12* is present:
 - 3> acquire *SystemInformationBlockType12*;
- 1> if in RRC_IDLE, the *eab-ParamModification* is included and the UE is EAB capable:

- 2> consider previously stored SystemInformationBlockType14 as invalid;
- 2> re-acquire *SystemInformationBlockType1* immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.6;
- 2> re-acquire *SystemInformationBlockType14* using the system information acquisition procedure as specified in 5.2.2.4;
- 1> if in RRC_IDLE, the *redistributionIndication* is included and the UE is redistribution capable:
 - 2> Perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 (5.2.4.10, [4]);

5.3.3 RRC connection establishment

5.3.3.1 General

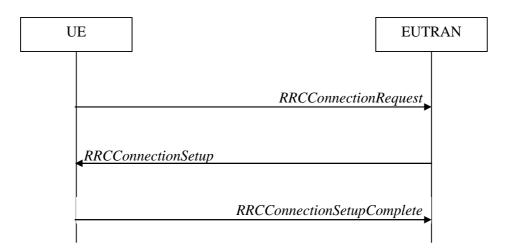


Figure 5.3.3.1-1: RRC connection establishment, successful

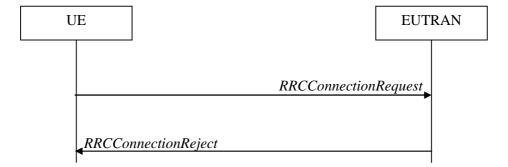


Figure 5.3.3.1-2: RRC connection establishment, network reject

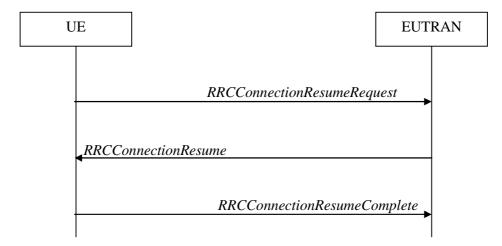


Figure 5.3.3.1-3: RRC connection resume, successful

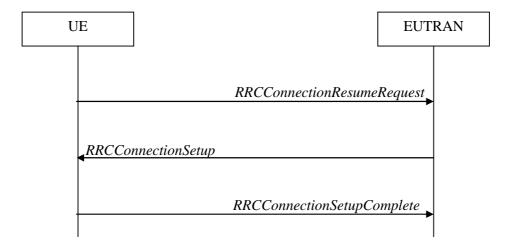


Figure 5.3.3.1-4: RRC connection resume fallback to RRC connection establishment, successful

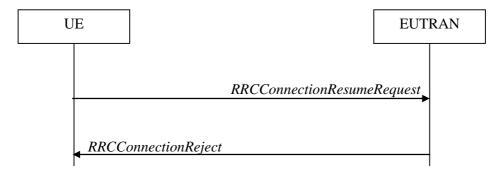


Figure 5.3.3.1-5: RRC connection resume, network reject or release

The purpose of this procedure is to establish or resume an RRC connection. RRC connection establishment involves SRB1 (and SRB1bis for NB-IoT) establishment. The procedure is also used to transfer the initial NAS dedicated information/ message from the UE to E-UTRAN.

E-UTRAN applies the procedure as follows:

- When establishing an RRC connection:
 - to establish SRB1 and, for NB-IoT, SRB1bis;
- When resuming an RRC connection:
 - to restore the AS configuration from a stored context including resuming SRB(s) and DRB(s).

5.3.3.1a Conditions for establishing RRC Connection for sidelink communication/ discovery/ V2X sidelink communication

For sidelink communication an RRC connection is initiated only in the following case:

- 1> if configured by upper layers to transmit non-relay related sidelink communication and related data is available for transmission:
 - 2> if *SystemInformationBlockType18* is broadcast by the cell on which the UE camps; and if the valid version of *SystemInformationBlockType18* does not include *commTxPoolNormalCommon*;
- 1> if configured by upper layers to transmit relay related sidelink communication:
 - 2> if the UE is acting as sidelink relay UE; and if SystemInformationBlockType18 is broadcast by the cell on which the UE camps; or
 - 2> if the UE has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met and if *SystemInformationBlockType18* is broadcast by the cell on which the UE camps; and if the valid version of *SystemInformationBlockType18* does not include *commTxPoolNormalCommon* or *commTxAllowRelayCommon*;

For V2X sidelink communication an RRC connection is initiated only in the following case:

- 1> if configured by upper layers to transmit non-P2X related V2X sidelink communication and related data is available for transmission:
 - 2> if the frequency on which the UE is configured to transmit non-P2X related V2X sidelink communication concerns the camped frequency; and if *SystemInformationBlockType21* is broadcast by the cell on which the UE camps; and if the valid version of *SystemInformationBlockType21* includes *sl-V2X-ConfigCommon*; and *sl-V2X-ConfigCommon* does not include *v2x-CommTxPoolNormalCommon*; or
 - 2> if the frequency on which the UE is configured to transmit non-P2X related V2X sidelink communication is included in v2x-InterFreqInfoList within SystemInformationBlockType21 broadcast by the cell on which the UE camps; and if the valid version of SystemInformationBlockType21 does not include v2x-CommTxPoolNormal for the concerned frequency;
- 1> if configured by upper layers to transmit P2X related V2X sidelink communication and related data is available for transmission:
 - 2> if the frequency on which the UE is configured to transmit P2X related V2X sidelink communication concerns the camped frequency; and if *SystemInformationBlockType21* is broadcast by the cell on which the UE camps; and if the valid version of *SystemInformationBlockType21* includes *sl-V2X-ConfigCommon*; and *sl-V2X-ConfigCommon* does not include *p2x-CommTxPoolNormalCommon*; or
 - 2> if the frequency on which the UE is configured to transmit P2X related V2X sidelink communication is included in *v2x-InterFreqInfoList* within *SystemInformationBlockType21* broadcast by the cell on which the UE camps; and if the valid version of *SystemInformationBlockType21* does not include *p2x-CommTxPoolNormal* for the concerned frequency;

For sidelink discovery an RRC connection is initiated only in the following case:

- 1> if configured by upper layers to transmit non-PS related sidelink discovery announcements:
 - 2> if the frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements concerns the camped frequency; and *SystemInformationBlockType19* of the cell on which the UE camps does not include *discTxPoolCommon-r12*; or
 - 2> if the frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements is included in *discInterFreqList* in *SystemInformationBlockType19* broadcast by the cell on which the UE camps, with *discTxResourcesInterFreq* included within *discResourcesNonPS* and set to *requestDedicated*;
- 1> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:

- 2> if the frequency on which the UE is configured to transmit non-relay PS related sidelink discovery announcements concerns the camped frequency; and *SystemInformationBlockType19* of the cell on which the UE camps includes *discConfigPS* but does not include *discTxPoolPS-Common*; or
- 2> if the frequency on which the UE is configured to transmit non-relay PS related sidelink discovery announcements (e.g. group member discovery) is included in *discInterFreqList* in *SystemInformationBlockType19* broadcast by the cell on which the UE camps, with *discTxResourcesInterFreq* within *discResourcesPS* included and set to *requestDedicated*;
- 1> if configured by upper layers to transmit relay PS related sidelink discovery announcements:
 - 2> if the UE is acting as sidelink relay UE; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or
 - 2> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:
 - 3> if the frequency on which the UE is configured to transmit relay PS related sidelink discovery announcements concerns the camped frequency; and *SystemInformationBlockType19* of the cell on which the UE camps includes *discConfigRelay* and *discConfigPS* but does not include *discTxPoolPS-Common*;

NOTE: Upper layers initiate an RRC connection. The interaction with NAS is left to UE implementation.

5.3.3.2 Initiation

The UE initiates the procedure when upper layers request establishment or resume of an RRC connection while the UE is in RRC_IDLE.

Except for NB-IoT, upon initiation of the procedure, the UE shall:

- 1> if SystemInformationBlockType2 includes ac-BarringPerPLMN-List and the ac-BarringPerPLMN-List contains an AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):
 - 2> select the AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;
 - 2> in the remainder of this procedure, use the selected *AC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in *SystemInformationBlockType2*;

1> else

- 2> in the remainder of this procedure use the common access barring parameters (i.e. presence or absence of these parameters) included in *SystemInformationBlockType2*;
- 1> if SystemInformationBlockType2 contains acdc-BarringPerPLMN-List and the acdc-BarringPerPLMN-List contains an ACDC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):
 - 2> select the *ACDC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;
 - 2> in the remainder of this procedure, use the selected ACDC-BarringPerPLMN entry for ACDC barring check (i.e. presence or absence of access barring parameters in this entry) irrespective of the acdc-BarringForCommon parameters included in SystemInformationBlockType2;

1> else:

- 2> in the remainder of this procedure use the *acdc-BarringForCommon* (i.e. presence or absence of these parameters) included in *SystemInformationBlockType2* for ACDC barring check;
- 1> if upper layers indicate that the RRC connection is subject to EAB (see TS 24.301 [35]):
 - 2> if the result of the EAB check, as specified in 5.3.3.12, is that access to the cell is barred:

- 3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that EAB is applicable, upon which the procedure ends;
- 1> if upper layers indicate that the RRC connection is subject to ACDC (see TS 24.301 [35]), SystemInformationBlockType2 contains BarringPerACDC-CategoryList, and acdc-HPLMNonly indicates that ACDC is applicable for the UE:
 - 2> if the *BarringPerACDC-CategoryList* contains a *BarringPerACDC-Category* entry corresponding to the ACDC category selected by upper layers:
 - 3> select the *BarringPerACDC-Category* entry corresponding to the ACDC category selected by upper layers;
 - 2> else:
 - 3> select the last BarringPerACDC-Category entry in the BarringPerACDC-CategoryList;
 - 2> stop timer T308, if running;
 - 2> perform access barring check as specified in 5.3.3.13, using T308 as "Tbarring" and *acdc-BarringConfig* in the *BarringPerACDC-Category* as "ACDC barring parameter";
 - 2> if access to the cell is barred:
 - 3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring is applicable due to ACDC, upon which the procedure ends;
- 1> else if the UE is establishing the RRC connection for mobile terminating calls:
 - 2> if timer T302 is running:
 - 3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile terminating calls is applicable, upon which the procedure ends;
- 1> else if the UE is establishing the RRC connection for emergency calls:
 - 2> if SystemInformationBlockType2 includes the ac-BarringInfo:
 - 3> if the *ac-BarringForEmergency* is set to *TRUE*:
 - 4> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11]:
- NOTE 1: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/EHPLMN.
 - 5> if the *ac-BarringInfo* includes *ac-BarringForMO-Data*, and for all of these valid Access Classes for the UE, the corresponding bit in the *ac-BarringForSpecialAC* contained in *ac-BarringForMO-Data* is set to *one*:
 - 6> consider access to the cell as barred;
 - 4> else:
 - 5> consider access to the cell as barred;
 - 2> if access to the cell is barred:
 - 3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication, upon which the procedure ends;
- 1> else if the UE is establishing the RRC connection for mobile originating calls:
 - 2> perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and *ac-BarringForMO-Data* as "AC barring parameter";

- 2> if access to the cell is barred:
 - 3> if SystemInformationBlockType2 includes ac-BarringForCSFB or the UE does not support CS fallback:
 - 4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls is applicable, upon which the procedure ends;
 - 3> else (*SystemInformationBlockType2* does not include *ac-BarringForCSFB* and the UE supports CS fallback):
 - 4> if timer T306 is not running, start T306 with the timer value of T303;
 - 4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls and mobile originating CS fallback is applicable, upon which the procedure ends;
- 1> else if the UE is establishing the RRC connection for mobile originating signalling:
 - 2> perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and *ac-BarringForMO-Signalling* as "AC barring parameter";
 - 2> if access to the cell is barred:
 - 3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating signalling is applicable, upon which the procedure ends;
- 1> else if the UE is establishing the RRC connection for mobile originating CS fallback:
 - 2> if *SystemInformationBlockType2* includes *ac-BarringForCSFB*:
 - 3> perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and *ac-BarringForCSFB* as "AC barring parameter";
 - 3> if access to the cell is barred:
 - 4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating CS fallback is applicable, due to *ac-BarringForCSFB*, upon which the procedure ends;

2> else:

- 3> perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and *ac-BarringForMO-Data* as "AC barring parameter";
- 3> if access to the cell is barred:
 - 4> if timer T303 is not running, start T303 with the timer value of T306;
 - 4> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating CS fallback and mobile originating calls is applicable, due to ac-BarringForMO-Data, upon which the procedure ends;
- 1> else if the UE is establishing the RRC connection for mobile originating MMTEL voice, mobile originating MMTEL video, mobile originating SMSoIP or mobile originating SMS:
 - 2> if the UE is establishing the RRC connection for mobile originating MMTEL voice and *SystemInformationBlockType2* includes *ac-BarringSkipForMMTELVoice*; or
 - 2> if the UE is establishing the RRC connection for mobile originating MMTEL video and *SystemInformationBlockType2* includes *ac-BarringSkipForMMTELVideo*; or
 - 2> if the UE is establishing the RRC connection for mobile originating SMSoIP or SMS and *SystemInformationBlockType2* includes *ac-BarringSkipForSMS*:
 - 3> consider access to the cell as not barred;

2> else:

- 3> if establishmentCause received from higher layers is set to mo-Signalling (including the case that mo-Signalling is replaced by highPriorityAccess according to 3GPP TS 24.301 [35] or by mo-VoiceCall according to the subclause 5.3.3.3):
 - 4> perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and *ac-BarringForMO-Signalling* as "AC barring parameter";
 - 4> if access to the cell is barred:
 - 5> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating signalling is applicable, upon which the procedure ends;
- 3> if establishmentCause received from higher layers is set to mo-Data (including the case that mo-Data is replaced by highPriorityAccess according to 3GPP TS 24.301 [35] or by mo-VoiceCall according to the subclause 5.3.3.3):
 - 4> perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and *ac-BarringForMO-Data* as "AC barring parameter";
 - 4> if access to the cell is barred:
 - 5> if SystemInformationBlockType2 includes ac-BarringForCSFB or the UE does not support CS fallback:
 - 6> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls is applicable, upon which the procedure ends;
 - 5> else (*SystemInformationBlockType2* does not include *ac-BarringForCSFB* and the UE supports CS fallback):
 - 6> if timer T306 is not running, start T306 with the timer value of T303;
 - 6> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls and mobile originating CS fallback is applicable, upon which the procedure ends;
- 1> if the UE is resuming an RRC connection:
 - 2> release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;
 - 2> release powerPrefIndicationConfig, if configured and stop timer T340, if running;
 - 2> release reportProximityConfig and clear any associated proximity status reporting timer;
 - 2> release *obtainLocationConfig*, if configured;
 - 2> release idc-Config, if configured;
 - 2> release measSubframePatternPCell, if configured;
 - 2> release the entire SCG configuration, if configured, except for the DRB configuration (as configured by *drb-ToAddModListSCG*);
 - 2> release *naics-Info* for the PCell, if configured;
 - 2> release the LWA configuration, if configured, as described in 5.6.14.3;
 - 2> release the LWIP configuration, if configured, as described in 5.6.17.3;
 - 2> release bw-PreferenceIndicationTimer, if configured and stop timer T341, if running;
 - 2> release delayBudgetReportingConfig, if configured and stop timer T342, if running;

- 1> apply the default physical channel configuration as specified in 9.2.4;
- 1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;
- 1> apply the default MAC main configuration as specified in 9.2.2;
- 1> apply the CCCH configuration as specified in 9.1.1.2;
- 1> apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;
- 1> start timer T300;
- 1> if the UE is resuming an RRC connection:
 - 2> initiate transmission of the RRCConnectionResumeRequest message in accordance with 5.3.3.3a;
- 1> else:
 - 2> if stored, discard the UE AS context and resumeIdentity;
 - 2> initiate transmission of the RRCConnectionRequest message in accordance with 5.3.3.3;
- NOTE 2: Upon initiating the connection establishment procedure, the UE is not required to ensure it maintains up to date system information applicable only for UEs in RRC_IDLE state. However, the UE needs to perform system information acquisition upon cell re-selection.

For NB-IoT, upon initiation of the procedure, the UE shall:

- 1> if the UE is establishing or resuming the RRC connection for mobile originating exception data; or
- 1> if the UE is establishing or resuming the RRC connection for mobile originating data; or
- 1> if the UE is establishing or resuming the RRC connection for delay tolerant access; or
- 1> if the UE is establishing or resuming the RRC connection for mobile originating signalling;
 - 2> perform access barring check as specified in 5.3.3.14;
 - 2> if access to the cell is barred:
 - 3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring is applicable, upon which the procedure ends;
- 1> apply the default physical channel configuration as specified in 9.2.4;
- 1> apply the default MAC main configuration as specified in 9.2.2;
- 1> apply the CCCH configuration as specified in 9.1.1.2;
- 1> start timer T300;
- 1> if the UE is establishing an RRC connection:
 - 2> initiate transmission of the RRCConnectionRequest message in accordance with 5.3.3.3;
- 1> else if the UE is resuming an RRC connection:
 - 2> initiate transmission of the RRCConnectionResumeRequest message in accordance with 5.3.3.3a;
- NOTE 3: Upon initiating the connection establishment or resumption procedure, the UE is not required to ensure it maintains up to date system information applicable only for UEs in RRC_IDLE state. However, the UE needs to perform system information acquisition upon cell re-selection.

5.3.3.3 Actions related to transmission of *RRCConnectionRequest* message

The UE shall set the contents of RRCConnectionRequest message as follows:

1> set the *ue-Identity* as follows:

- 2> if upper layers provide an S-TMSI:
 - 3> set the *ue-Identity* to the value received from upper layers;
- 2> else:
 - 3> draw a random value in the range 0 .. 2^{40} -1 and set the *ue-Identity* to this value;
- NOTE 1: Upper layers provide the S-TMSI if the UE is registered in the TA of the current cell.
- 1> if the UE supports *mo-VoiceCall* establishment cause and UE is establishing the RRC connection for mobile originating MMTEL voice and *SystemInformationBlockType2* includes *voiceServiceCauseIndication*:
 - 2> set the *establishmentCause* to *mo-VoiceCall*;
- 1> else if the UE supports *mo-VoiceCall* establishment cause for mobile originating MMTEL video and UE is establishing the RRC connection for mobile originating MMTEL video and *SystemInformationBlockType2* includes *videoServiceCauseIndication*:
 - 2> set the *establishmentCause* to *mo-VoiceCall*;
- 1> else:
 - 2> set the establishmentCause in accordance with the information received from upper layers;
- 1> if the UE is a NB-IoT UE:
 - 2> if the UE supports multi-tone transmission, include *multiToneSupport*;
 - 2> if the UE supports multi-carrier operation, include *multiCarrierSupport*;

The UE shall submit the RRCConnectionRequest message to lower layers for transmission.

The UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.5.

5.3.3.3a Actions related to transmission of RRCConnectionResumeRequest message

The UE shall set the contents of RRCConnectionResumeRequest message as follows:

- 1> if the UE is a NB-IoT UE; or
- 1> if field *useFullResumeID* is signalled in *SystemInformationBlockType2*:
 - 2> set the resumeID to the stored resumeIdentity;
- 1> else
 - 2> set the *truncatedResumeID* to include bits in bit position 9 to 20 and 29 to 40 from the left in the stored *resumeIdentity*.
- 1> if the UE supports *mo-VoiceCall* establishment cause and UE is resuming the RRC connection for mobile originating MMTEL voice and *SystemInformationBlockType2* includes *voiceServiceCauseIndication*:
 - 2> set the *resumeCause* to *mo-VoiceCall*;
- 1> else if the UE supports *mo-VoiceCall* establishment cause for mobile originating MMTEL video and UE is resuming the RRC connection for mobile originating MMTEL video and *SystemInformationBlockType2* includes *videoServiceCauseIndication*:
 - 2> set the *resumeCause* to *mo-VoiceCall*;
- 1> else
 - 2> set the resumeCause in accordance with the information received from upper layers;
- 1> set the *shortResumeMAC-I* to the 16 least significant bits of the MAC-I calculated:

- 2> over the ASN.1 encoded as per section 8 (i.e., a multiple of 8 bits) *VarShortResumeMAC-Input* (or *VarShortResumeMAC-Input-NB* in NB-IoT);
- 2> with the K_{RRCint} key and the previously configured integrity protection algorithm; and
- 2> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;
- 1> restore the RRC configuration and security context from the stored UE AS context:
- 1> restore the PDCP state and re-establish PDCP entities for SRB1;
- 1> resume SRB1;

NOTE: Until successful connection resumption, SRB1 is used only for the transfer *RRCConnectionResume* message.

The UE shall submit the RRCConnectionResumeRequest message to lower layers for transmission.

The UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.5.

5.3.3.4 Reception of the *RRCConnectionSetup* by the UE

NOTE: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

- 1> if the RRCConnectionSetup is received in response to an RRCConnectionResumeRequest:
 - 2> discard the stored UE AS context and resumeIdentity;
 - 2> indicate to upper layers that the RRC connection resume has been fallbacked;
- 1> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;
- 1> if stored, discard the cell reselection priority information provided by the *idleModeMobilityControlInfo* or inherited from another RAT;
- 1> if stored, discard the dedicated offset provided by the redirectedCarrierOffsetDedicated;
- 1> stop timer T300;
- 1> stop timer T302, if running;
- 1> stop timer T303, if running;
- 1> stop timer T305, if running;
- 1> stop timer T306, if running;
- 1> stop timer T308, if running;
- 1> perform the actions as specified in 5.3.3.7;
- 1> stop timer T320, if running;
- 1> stop timer T350, if running;
- 1> perform the actions as specified in 5.6.12.4;
- 1> release rclwi-Configuration, if configured, as specified in 5.6.16.2;
- 1> stop timer T360, if running;
- 1> stop timer T322, if running;
- 1> enter RRC_CONNECTED;

- 1> stop the cell re-selection procedure;
- 1> consider the current cell to be the PCell;
- 1> set the content of RRCConnectionSetupComplete message as follows:
 - 2> if the RRCConnectionSetup is received in response to an RRCConnectionResumeRequest:
 - 3> if upper layers provide an S-TMSI:
 - 4> set the s-TMSI to the value received from upper layers;
 - 2> set the *selectedPLMN-Identity* to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the *plmn-IdentityList* in *SystemInformationBlockType1* (or *SystemInformationBlockType1-NB* in NB-IoT);
 - 2> if upper layers provide the 'Registered MME', include and set the registeredMME as follows:
 - 3> if the PLMN identity of the 'Registered MME' is different from the PLMN selected by the upper layers:
 - 4> include the *plmnIdentity* in the *registeredMME* and set it to the value of the PLMN identity in the 'Registered MME' received from upper layers;
 - 3> set the *mmegi* and the *mmec* to the value received from upper layers;
 - 2> if upper layers provided the 'Registered MME':
 - 3> include and set the *gummei-Type* to the value provided by the upper layers;
 - 2> if the UE supports CIoT EPS optimisation(s):
 - 3> include attachWithoutPDN-Connectivity if received from upper layers;
 - 3> include *up-CIoT-EPS-Optimisation* if received from upper layers;
 - 3> except for NB-IoT, include *cp-CIoT-EPS-Optimisation* if received from upper layers;
 - 2> if connecting as an RN:
 - 3> include the rn-SubframeConfigReq;
 - 2> set the *dedicatedInfoNAS* to include the information received from upper layers;
 - 2> except for NB-IoT:
 - 3> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 4> include rlf-InfoAvailable;
 - 3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 4> include logMeasAvailableMBSFN;
 - 3> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 4> include logMeasAvailable;
 - 3> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:
 - 4> include connEstFailInfoAvailable;
 - 3> include the *mobilityState* and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC_CONNECTED state;

- 3> if the UE supports storage of mobility history information and the UE has mobility history information available in *VarMobilityHistoryReport*:
 - 4> include the *mobilityHistoryAvail*;
- 2> include dcn-ID if a DCN-ID value (see TS 23.401 [41]) is received from upper layers;
- 2> if UE needs UL gaps during continuous uplink transmission:
 - 3> include ue-CE-NeedULGaps;
- 2> submit the *RRCConnectionSetupComplete* message to lower layers for transmission, upon which the procedure ends;

5.3.3.4a Reception of the RRCConnectionResume by the UE

- 1> stop timer T300;
- 1> restore the PDCP state and re-establish PDCP entities for SRB2 and all DRBs;
- 1> if *drb-ContinueROHC* is included:
 - 2> indicate to lower layers that stored UE AS context is used and that drb-ContinueROHC is configured;
 - 2> continue the header compression protocol context for the DRBs configured with the header compression protocol;
- 1> else:
 - 2> indicate to lower layers that stored UE AS context is used;
 - 2> reset the header compression protocol context for the DRBs configured with the header compression protocol;
- 1> discard the stored UE AS context and resumeIdentity;
- 1> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;
- 1> resume SRB2 and all DRBs;
- 1> if stored, discard the cell reselection priority information provided by the *idleModeMobilityControlInfo* or inherited from another RAT;
- 1> if stored, discard the dedicated offset provided by the redirectedCarrierOffsetDedicated;
- 1> if the RRCConnectionResume message includes the measConfig:
 - 2> perform the measurement configuration procedure as specified in 5.5.2;
- 1> stop timer T302, if running;
- 1> stop timer T303, if running;
- 1> stop timer T305, if running;
- 1> stop timer T306, if running;
- 1> stop timer T308, if running;
- 1> perform the actions as specified in 5.3.3.7;
- 1> stop timer T320, if running;
- 1> stop timer T350, if running;

- 1> perform the actions as specified in 5.6.12.4;
- 1> stop timer T360, if running;
- 1> stop timer T322, if running;
- 1> update the K_{eNB} key based on the K_{ASME} key to which the current K_{eNB} is associated, using the *nextHopChainingCount* value indicated in the *RRCConnectionResume* message, as specified in TS 33.401 [32];
- 1> store the *nextHopChainingCount* value;
- 1> derive the K_{RRCint} key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];
- 1> request lower layers to verify the integrity protection of the *RRCConnectionResume* message, using the previously configured algorithm and the K_{RRCint} key;
- 1> if the integrity protection check of the RRCConnectionResume message fails:
 - 2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other', upon which the procedure ends;
- 1> derive the K_{RRCenc} key and the K_{UPenc} key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];
- 1> configure lower layers to resume integrity protection using the previously configured algorithm and the K_{RRCint} key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE;
- 1> configure lower layers to resume ciphering and to apply the ciphering algorithm, the K_{RRCenc} key and the K_{UPenc} key, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE;
- 1> enter RRC CONNECTED;
- 1> indicate to upper layers that the suspended RRC connection has been resumed;
- 1> stop the cell re-selection procedure;
- 1> consider the current cell to be the PCell;
- 1> set the content of RRCConnectionResumeComplete message as follows:
 - 2> set the *selectedPLMN-Identity* to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the *plmn-IdentityList* in *SystemInformationBlockType1*;
 - 2> set the *dedicatedInfoNAS* to include the information received from upper layers;
 - 2> except for NB-IoT:
 - 3> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 4> include rlf-InfoAvailable;
 - 3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 4> include logMeasAvailableMBSFN;
 - 3> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 4> include logMeasAvailable;
 - 3> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:

- 4> include connEstFailInfoAvailable;
- 3> include the *mobilityState* and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC_CONNECTED state;
- 3> if the UE supports storage of mobility history information and the UE has mobility history information available in *VarMobilityHistoryReport*:
 - 4> include mobilityHistoryAvail;
- 1> submit the RRCConnectionResumeComplete message to lower layers for transmission;
- 1> the procedure ends.

5.3.3.5 Cell re-selection while T300, T302, T303, T305, T306, or T308 is running

The UE shall:

- 1> if cell reselection occurs while T300, T302, T303, T305, T306, or T308 is running:
 - 2> if timer T302, T303, T305, T306, and/or T308 is running:
 - 3> stop timer T302, T303, T305, T306, and T308, whichever ones were running;
 - 3> perform the actions as specified in 5.3.3.7;
 - 2> if timer T300 is running:
 - 3> stop timer T300;
 - 3> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;
 - 3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication;

5.3.3.6 T300 expiry

- 1> if timer T300 expires:
 - 2> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;
 - 2> if the UE is a NB-IoT UE:
 - 3> if *connEstFailOffset* is included in *SystemInformationBlockType2-NB*:
 - 4> use *connEstFailOffset* for the parameter Qoffset_{temp} for the concerned cell when performing cell selection and reselection according to TS 36.304 [4];
 - 3> else:
 - 4> use value of infinity for the parameter Qoffsettemp for the concerned cell when performing cell selection and reselection according to TS 36.304 [4];
- NOTE 0: For NB-IoT, the number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset and the amount of time that the UE applies connEstFailOffset before removing the offset from evaluation of the cell is up to UE implementation.
 - 2> else if the UE supports RRC Connection Establishment failure temporary Qoffset and T300 has expired a consecutive *connEstFailCount* times on the same cell for which *txFailParams* is included in *SystemInformationBlockType2*:
 - 3> for a period as indicated by connEstFailOffsetValidity:

- 4> use *connEstFailOffset* for the parameter Qoffset_{temp} for the concerned cell when performing cell selection and reselection according to TS 36.304 [4] and TS 25.304 [40];
- NOTE 1: When performing cell selection, if no suitable or acceptable cell can be found, it is up to UE implementation whether to stop using *connEstFailOffset* for the parameter Qoffset_{temp} during *connEstFailOffsetValidity* for the concerned cell.
 - 2> except for NB-IoT, store the following connection establishment failure information in the *VarConnEstFailReport* by setting its fields as follows:
 - 3> clear the information included in VarConnEstFailReport, if any;
 - 3> set the *plmn-Identity* to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the *plmn-IdentityList* in *SystemInformationBlockType1*;
 - 3> set the *failedCellId* to the global cell identity of the cell where connection establishment failure is detected:
 - 3> set the *measResultFailedCell* to include the RSRP and RSRQ, if available, of the cell where connection establishment failure is detected and based on measurements collected up to the moment the UE detected the failure:
 - 3> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell reselection, to include neighbouring cell measurements for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/set of frequencies (GERAN) per RAT and according to the following:
 - 4> for each neighbour cell included, include the optional fields that are available;
- NOTE 2: The UE includes the latest results of the available measurements as used for cell reselection evaluation, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].
 - 3> if detailed location information is available, set the content of the *locationInfo* as follows:
 - 4> include the *locationCoordinates*;
 - 4> include the *horizontalVelocity*, if available;
 - 3> set the *numberOfPreamblesSent* to indicate the number of preambles sent by MAC for the failed random access procedure;
 - 3> set *contentionDetected* to indicate whether contention resolution was not successful as specified in TS 36.321 [6] for at least one of the transmitted preambles for the failed random access procedure;
 - 3> set *maxTxPowerReached* to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6];
 - 2> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication, upon which the procedure ends;

The UE may discard the connection establishment failure information, i.e. release the UE variable *VarConnEstFailReport*, 48 hours after the failure is detected, upon power off or upon detach.

5.3.3.7 T302, T303, T305, T306, or T308 expiry or stop

- 1> if timer T302 expires or is stopped:
 - 2> inform upper layers about barring alleviation for mobile terminating access;
 - 2> if timer T303 is not running:
 - 3> inform upper layers about barring alleviation for mobile originating calls;
 - 2> if timer T305 is not running:

- 3> inform upper layers about barring alleviation for mobile originating signalling;
- 2> if timer T306 is not running:
 - 3> inform upper layers about barring alleviation for mobile originating CS fallback;
- 2> if timer T308 is not running:
 - 3> inform upper layers about barring alleviation for ACDC;
- 1> if timer T303 expires or is stopped:
 - 2> if timer T302 is not running:
 - 3> inform upper layers about barring alleviation for mobile originating calls;
- 1> if timer T305 expires or is stopped:
 - 2> if timer T302 is not running:
 - 3> inform upper layers about barring alleviation for mobile originating signalling;
- 1> if timer T306 expires or is stopped:
 - 2> if timer T302 is not running:
 - 3> inform upper layers about barring alleviation for mobile originating CS fallback;
- 1> if timer T308 expires or is stopped:
 - 2> if timer T302 is not running:
 - 3> inform upper layers about barring alleviation for ACDC;

5.3.3.8 Reception of the *RRCConnectionReject* by the UE

- 1> stop timer T300;
- 1> reset MAC and release the MAC configuration;
- 1> except for NB-IoT, start timer T302, with the timer value set to the *waitTime*;
- 1> if the UE is a NB-IoT UE; or
- 1> if the extendedWaitTime is present and the UE supports delay tolerant access:
 - 2> forward the extendedWaitTime to upper layers;
- 1> if deprioritisationReq is included and the UE supports RRC Connection Reject with deprioritisation:
 - 2> start or restart timer T325 with the timer value set to the *deprioritisationTimer* signalled;
 - 2> store the deprioritisationReq until T325 expiry;
- NOTE: The UE stores the deprioritisation request irrespective of any cell reselection absolute priority assignments (by dedicated or common signalling) and regardless of RRC connections in E-UTRAN or other RATs unless specified otherwise.
- 1> if the RRCConnectionReject is received in response to an RRCConnectionResumeRequest:
 - 2> *if* the *rrc-SuspendIndication* is not present:
 - 3> discard the stored UE AS context and resumeIdentity;

3> inform upper layers about the failure to resume the RRC connection without suspend indication and that access barring for mobile originating calls, mobile originating signalling, mobile terminating access and except for NB-IoT for mobile originating CS fallback is applicable, upon which the procedure ends;

2> else:

- 3> suspend SRB1;
- 3> inform upper layers about the failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls, mobile originating signalling, mobile terminating access and except for NB-IoT for mobile originating CS fallback is applicable, upon which the procedure ends;
- 1> else
 - 2> inform upper layers about the failure to establish the RRC connection and that access barring for mobile originating calls, mobile originating signalling, mobile terminating access and except for NB-IoT, for mobile originating CS fallback is applicable, upon which the procedure ends;

5.3.3.9 Abortion of RRC connection establishment

If upper layers abort the RRC connection establishment procedure while the UE has not yet entered RRC CONNECTED, the UE shall:

- 1> stop timer T300, if running;
- 1> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;

5.3.3.10 Handling of SSAC related parameters

Upon request from the upper layers, the UE shall:

- 1> if SystemInformationBlockType2 includes ac-BarringPerPLMN-List and the ac-BarringPerPLMN-List contains an AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):
 - 2> select the *AC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;
 - 2> in the remainder of this procedure, use the selected AC-BarringPerPLMN entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in SystemInformationBlockType2;

1> else:

- 2> in the remainder of this procedure use the common access barring parameters (i.e. presence or absence of these parameters) included in *SystemInformationBlockType2*;
- 1> set the local variables BarringFactorForMMTEL-Voice and BarringTimeForMMTEL-Voice as follows:
 - 2> if *ssac-BarringForMMTEL-Voice* is present:
 - 3> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and
- NOTE: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/EHPLMN.
 - 3> if, for at least one of these Access Classes, the corresponding bit in the *ac-BarringForSpecialAC* contained in *ssac-BarringForMMTEL-Voice* is set to zero:
 - 4> set BarringFactorForMMTEL-Voice to one and BarringTimeForMMTEL-Voice to zero;
 - 3> else:

- 4> set BarringFactorForMMTEL-Voice and BarringTimeForMMTEL-Voice to the value of ac-BarringFactor and ac-BarringTime included in ssac-BarringForMMTEL-Voice, respectively;
- 2> else set BarringFactorForMMTEL-Voice to one and BarringTimeForMMTEL-Voice to zero;
- 1> set the local variables BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video as follows:
 - 2> if *ssac-BarringForMMTEL-Video* is present:
 - 3> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and
 - 3> if, for at least one of these Access Classes, the corresponding bit in the *ac-BarringForSpecialAC* contained in *ssac-BarringForMMTEL-Video* is set to zero:
 - 4> set BarringFactorForMMTEL-Video to one and BarringTimeForMMTEL-Video to zero;
 - 3> else:
 - 4> set BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video to the value of ac-BarringFactor and ac-BarringTime included in ssac-BarringForMMTEL-Video, respectively;
 - 2> else set BarringFactorForMMTEL-Video to one and BarringTimeForMMTEL-Video to zero;
- 1> forward the variables BarringFactorForMMTEL-Voice, BarringTimeForMMTEL-Voice, BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video to the upper layers;

5.3.3.11 Access barring check

- 1> if timer T302 or "Tbarring" is running:
 - 2> consider access to the cell as barred;
- 1> else if *SystemInformationBlockType2* includes "AC barring parameter":
 - 2> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and
- NOTE: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.
 - 2> for at least one of these valid Access Classes the corresponding bit in the *ac-BarringForSpecialAC* contained in "AC barring parameter" is set to *zero*:
 - 3> consider access to the cell as not barred;
 - 2> else:
 - 3> draw a random number 'rand' uniformly distributed in the range: $0 \le rand < 1$;
 - 3> if 'rand' is lower than the value indicated by ac-BarringFactor included in "AC barring parameter":
 - 4> consider access to the cell as not barred;
 - 3> else:
 - 4> consider access to the cell as barred;
- 1> else:
 - 2> consider access to the cell as not barred;
- 1> if access to the cell is barred and both timers T302 and "Tbarring" are not running:
 - 2> draw a random number 'rand' that is uniformly distributed in the range $0 \le rand < 1$;

2> start timer "Tbarring" with the timer value calculated as follows, using the *ac-BarringTime* included in "AC barring parameter":

"Tbarring" = (0.7 + 0.6 * rand) * ac-BarringTime;

5.3.3.12 EAB check

The UE shall:

- 1> if *SystemInformationBlockType14* is present and includes the *eab-Param*:
 - 2> if the *eab-Common* is included in the *eab-Param*:
 - 3> if the UE belongs to the category of UEs as indicated in the eab-Category contained in eab-Common; and
 - 3> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the *eab-BarringBitmap* contained in *eab-Common* is set to *one*:
 - 4> consider access to the cell as barred;
 - 3> else:
 - 4> consider access to the cell as not barred due to EAB;
 - 2> else (the *eab-PerPLMN-List* is included in the *eab-Param*):
 - 3> select the entry in the *eab-PerPLMN-List* corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]);
 - 3> if the *eab-Config* for that PLMN is included:
 - 4> if the UE belongs to the category of UEs as indicated in the eab-Category contained in eab-Config; and
 - 4> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the *eab-BarringBitmap* contained in *eab-Config* is set to *one*:
 - 5> consider access to the cell as barred;
 - 4> else:
 - 5> consider access to the cell as not barred due to EAB;
 - 3> else:
 - 4> consider access to the cell as not barred due to EAB;
- 1> else:
 - 2> consider access to the cell as not barred due to EAB;

5.3.3.13 Access barring check for ACDC

- 1> if timer T302 is running:
 - 2> consider access to the cell as barred;
- 1> else if *SystemInformationBlockType2* includes "ACDC barring parameter":
 - 2> draw a random number 'rand' uniformly distributed in the range: $0 \le rand < 1$;
 - 2> if 'rand' is lower than the value indicated by ac-BarringFactor included in "ACDC barring parameter":
 - 3> consider access to the cell as not barred;

- 2> else:
 - 3> consider access to the cell as barred;
- 1> else:
 - 2> consider access to the cell as not barred:
- 1> if access to the cell is barred and timer T302 is not running:
 - 2> draw a random number 'rand' that is uniformly distributed in the range $0 \le rand < 1$;
 - 2> start timer "Tbarring" with the timer value calculated as follows, using the *ac-BarringTime* included in "ACDC barring parameter":
 - "Tbarring" = (0.7+0.6*rand)*ac-BarringTime.

5.3.3.14 Access Barring check for NB-IoT

- 1> if ab-Enabled included in MasterInformationBlock-NB is set to TRUE and SystemInformationBlockType14-NB is broadcast:
 - 2> if the *ab-Common* is included in *ab-Param*:
 - 3> if the UE belongs to the category of UEs as indicated in the ab-Category contained in ab-Common; and
 - 3> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the *ab-BarringBitmap* contained in *ab-Common* is set to *one*:
 - 4> if the *establishmentCause* received from higher layers is set to *mo-ExceptionData* and *ab-BarringForExceptionData* is set to *FALSE* in the *ab-Common*:
 - 5> consider access to the cell as not barred;
 - 4> else:
 - 5> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11] and for at least one of these valid Access Classes for the UE, the corresponding bit in the *ab-BarringForSpecialAC* contained in *ab-Common* is set to *zero*:
- NOTE 1: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.
 - 6> consider access to the cell as not barred;
 - 5> else:
 - 6> consider access to the cell as barred;
 - 3> else;
 - 4> consider access to the cell as not barred;
 - 2> else (the *ab-PerPLMN-List* is included in the *ab-Param*):
 - 3> select the *ab-PerPLMN* entry in *ab-PerPLMN-List* corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]);
 - 3> if the *ab-Config* for that PLMN is included:
 - 4> if the UE belongs to the category of UEs as indicated in the ab-Category contained in ab-Config; and
 - 4> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the *ab-BarringBitmap* contained in *ab-Config* is set to *one*:

- 5> if the *establishmentCause* received from higher layers is set to *mo-ExceptionData* and *ab-BarringForExceptionData* is set to *FALSE* in the *ab-Config*:
 - 6> consider access to the cell as not barred;
- 5> else:
 - 6> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11] and for at least one of these valid Access Classes for the UE, the corresponding bit in the *ab-BarringForSpecialAC* contained in *ab-Config* is set to *zero*:
- NOTE 2: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/EHPLMN.
 - 7> consider access to the cell as not barred;
 - 6> else:
 - 7> consider access to the cell as barred;
 - 4> else:
 - 5> consider access to the cell as not barred;
 - 3> else:
 - 4> consider access to the cell as not barred;
- 1> else:
 - 2> consider access to the cell as not barred:

5.3.3.15 Failure to deliver NAS information in RRCConnectionSetupComplete message

The UE shall:

- 1> if the UE is a NB-IoT UE and radio link failure occurs before the successful delivery of *RRCConnectionSetupComplete* message has been confirmed by lower layers:
 - 2> inform upper layers about the possible failure to deliver the NAS information contained in the *RRCConnectionSetupComplete* message;

5.3.4 Initial security activation

5.3.4.1 General

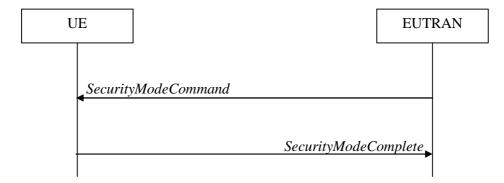


Figure 5.3.4.1-1: Security mode command, successful

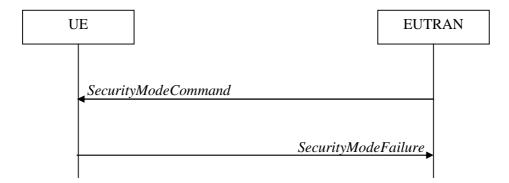


Figure 5.3.4.1-2: Security mode command, failure

The purpose of this procedure is to activate AS security upon RRC connection establishment.

5.3.4.2 Initiation

E-UTRAN initiates the security mode command procedure to a UE in RRC_CONNECTED. Moreover, E-UTRAN applies the procedure as follows:

 when only SRB1, or for NB-IoT SRB1 and SRB1bis, is established, i.e. prior to establishment of SRB2 and/ or DRBs.

5.3.4.3 Reception of the SecurityModeCommand by the UE

- 1> derive the K_{eNB} key, as specified in TS 33.401 [32];
- 1> derive the K_{RRCint} key associated with the *integrityProtAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.401 [32];
- 1> request lower layers to verify the integrity protection of the *SecurityModeCommand* message, using the algorithm indicated by the *integrityProtAlgorithm* as included in the *SecurityModeCommand* message and the K_{RRCint} key;
- 1> if the SecurityModeCommand message passes the integrity protection check:
 - 2> derive the K_{RRCenc} key and the K_{UPenc} key associated with the *cipheringAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.401 [32];
 - 2> if connected as an RN:
 - 3> derive the K_{UPint} key associated with the *integrityProtAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.401 [32];
 - 2> configure lower layers to apply integrity protection using the indicated algorithm and the K_{RRCint} key immediately, i.e. integrity protection shall be applied to all subsequent messages received and sent by the UE, including the *SecurityModeComplete* message;
 - 2> configure lower layers to apply ciphering using the indicated algorithm, the K_{RRCenc} key and the K_{UPenc} key after completing the procedure, i.e. ciphering shall be applied to all subsequent messages received and sent by the UE, except for the *SecurityModeComplete* message which is sent unciphered;
 - 2> if connected as an RN:
 - 3> configure lower layers to apply integrity protection using the indicated algorithm and the K_{UPint} key, for DRBs that are subsequently configured to apply integrity protection, if any;
 - 2> consider AS security to be activated;
 - 2> upon RRC connection establishment, if UE does not need UL gaps during continuous uplink transmission:

- 3> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for SecurityModeComplete message and subsequent uplink transmission in RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];
- 2> submit the SecurityModeComplete message to lower layers for transmission, upon which the procedure ends;

1> else:

- 2> continue using the configuration used prior to the reception of the *SecurityModeCommand* message, i.e. neither apply integrity protection nor ciphering.
- 2> submit the SecurityModeFailure message to lower layers for transmission, upon which the procedure ends;

5.3.5 RRC connection reconfiguration

5.3.5.1 General

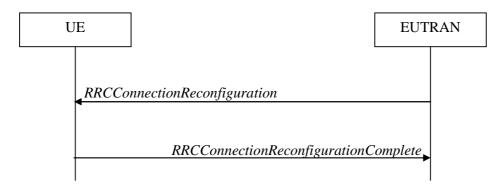


Figure 5.3.5.1-1: RRC connection reconfiguration, successful

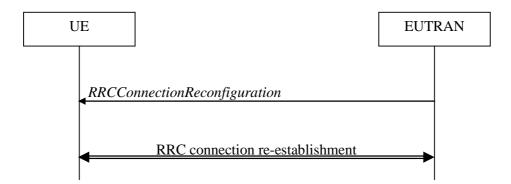


Figure 5.3.5.1-2: RRC connection reconfiguration, failure

The purpose of this procedure is to modify an RRC connection, e.g. to establish/ modify/ release RBs, to perform handover, to setup/ modify/ release measurements, to add/ modify/ release SCells. As part of the procedure, NAS dedicated information may be transferred from E-UTRAN to the UE.

5.3.5.2 Initiation

E-UTRAN may initiate the RRC connection reconfiguration procedure to a UE in RRC_CONNECTED. E-UTRAN applies the procedure as follows:

- the *mobilityControlInfo* is included only when AS-security has been activated, and SRB2 with at least one DRB are setup and not suspended;
- the establishment of RBs (other than SRB1, that is established during RRC connection establishment) is included only when AS security has been activated;
- the addition of SCells is performed only when AS security has been activated;

5.3.5.3 Reception of an *RRCConnectionReconfiguration* not including the *mobilityControlInfo* by the UE

If the *RRCConnectionReconfiguration* message does not include the *mobilityControlInfo* and the UE is able to comply with the configuration included in this message, the UE shall:

- 1> if this is the first *RRCConnectionReconfiguration* message after successful completion of the RRC connection re-establishment procedure:
 - 2> re-establish PDCP for SRB2 and for all DRBs that are established, if any;
 - 2> re-establish RLC for SRB2 and for all DRBs that are established, if any;
 - 2> if the *RRCConnectionReconfiguration* message includes the *fullConfig*:
 - 3> perform the radio configuration procedure as specified in 5.3.5.8;
 - 2> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
 - 3> perform the radio resource configuration procedure as specified in 5.3.10;
 - 2> resume SRB2 and all DRBs that are suspended, if any;
- NOTE 1: The handling of the radio bearers after the successful completion of the PDCP re-establishment, e.g. the re-transmission of unacknowledged PDCP SDUs (as well as the associated status reporting), the handling of the SN and the HFN, is specified in TS 36.323 [8].
- NOTE 2: The UE may discard SRB2 messages and data that it receives prior to completing the reconfiguration used to resume these bearers.

1> else:

- 2> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
 - 3> perform the radio resource configuration procedure as specified in 5.3.10;
- NOTE 3: If the *RRCConnectionReconfiguration* message includes the establishment of radio bearers other than SRB1, the UE may start using these radio bearers immediately, i.e. there is no need to wait for an outstanding acknowledgment of the *SecurityModeComplete* message.
- 1> if the received RRCConnectionReconfiguration includes the sCellToReleaseList:
 - 2> perform SCell release as specified in 5.3.10.3a;
- 1> if the received RRCConnectionReconfiguration includes the sCellToAddModList:
 - 2> perform SCell addition or modification as specified in 5.3.10.3b;
- 1> if the received RRCConnectionReconfiguration includes the scg-Configuration; or
- 1> if the current UE configuration includes one or more split DRBs and the received RRCConnectionReconfiguration includes radioResourceConfigDedicated including drb-ToAddModList:
 - 2> perform SCG reconfiguration as specified in 5.3.10.10;
- 1> if the received RRCConnectionReconfiguration includes the systemInformationBlockType1Dedicated:
 - 2> perfom the actions upon reception of the SystemInformationBlockType1 message as specified in 5.2.2.7;
- 1> if the RRCConnectionReconfiguration message includes the dedicatedInfoNASList:
 - 2> forward each element of the *dedicatedInfoNASList* to upper layers in the same order as listed;
- 1> if the RRCConnectionReconfiguration message includes the measConfig:
 - 2> perform the measurement configuration procedure as specified in 5.5.2;
- 1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;

- 1> if the RRCConnectionReconfiguration message includes the otherConfig:
 - 2> perform the other configuration procedure as specified in 5.3.10.9;
- 1> if the RRCConnectionReconfiguration message includes the sl-DiscConfig or sl-CommConfig:
 - 2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;
- 1> if the RRCConnectionReconfiguration message includes the sl-V2X-ConfigDedicated:
 - 2> perform the V2X sidelink communication dedicated configuration procedure as specified in 5.3.10.15a;
- 1> if the RRCConnectionReconfiguration message includes wlan-OffloadInfo:
 - 2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;
- 1> if the RRCConnectionReconfiguration message includes rclwi-Configuration:
 - 2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;
- 1> if the RRCConnectionReconfiguration message includes lwa-Configuration:
 - 2> perform the LWA configuration procedure as specified in 5.6.14.2;
- 1> if the RRCConnectionReconfiguration message includes lwip-Configuration:
 - 2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;
- 1> upon RRC connection establishment, if UE does not need UL gaps during continuous uplink transmission:
 - 2> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for RRCConnectionReconfigurationComplete message and subsequent uplink transmission in RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];
- 1> set the content of RRCConnectionReconfigurationComplete message as follows:
 - 2> if the RRCConnectionReconfiguration message includes perCC-GapIndicationRequest:
 - 3> include perCC-GapIndicationList and numFreqEffective;
 - 2> if the frequencies are configured for reduced measurement performance:
 - 3> include *numFreqEffectiveReduced*;
- 1> submit the *RRCConnectionReconfigurationComplete* message to lower layers for transmission using the new configuration, upon which the procedure ends;

5.3.5.4 Reception of an *RRCConnectionReconfiguration* including the *mobilityControlInfo* by the UE (handover)

If the *RRCConnectionReconfiguration* message includes the *mobilityControlInfo* and the UE is able to comply with the configuration included in this message, the UE shall:

- 1> stop timer T310, if running;
- 1> stop timer T312, if running;
- 1> start timer T304 with the timer value set to t304, as included in the mobilityControlInfo;
- 1> stop timer T370, if running;
- 1> if the *carrierFreq* is included:
 - 2> consider the target PCell to be one on the frequency indicated by the *carrierFreq* with a physical cell identity indicated by the *targetPhysCellId*;
- 1> else:

- 2> consider the target PCell to be one on the frequency of the source PCell with a physical cell identity indicated by the *targetPhysCellId*;
- 1> start synchronising to the DL of the target PCell;
- NOTE 1: The UE should perform the handover as soon as possible following the reception of the RRC message triggering the handover, which could be before confirming successful reception (HARQ and ARQ) of this message.
- 1> if BL UE or UE in CE:
 - 2> if *sameSFN-Indication* is not present in *mobilityControlInfo*:
 - 3> acquire the *MasterInformationBlock* in the target PCell;
- 1> if makeBeforeBreak is configured:
 - 2> perform the remainder of this procedure including and following resetting MAC after the UE has stopped the uplink transmission/downlink reception with the source cell(s);
- NOTE 1a: It is up to UE implementation when to stop the uplink transmission/ downlink reception with the source cell(s) to initiate re-tuning for connection to the target cell [16], if *makeBeforeBreak* is configured.
- 1> reset MCG MAC and SCG MAC, if configured;
- 1> re-establish PDCP for all RBs that are established;
- NOTE 2: The handling of the radio bearers after the successful completion of the PDCP re-establishment, e.g. the re-transmission of unacknowledged PDCP SDUs (as well as the associated status reporting), the handling of the SN and the HFN, is specified in TS 36.323 [8].
- 1> re-establish MCG RLC and SCG RLC, if configured, for all RBs that are established;
- 1> configure lower layers to consider the SCell(s) other than the PSCell, if configured, to be in deactivated state;
- 1> apply the value of the *newUE-Identity* as the C-RNTI;
- 1> if the RRCConnectionReconfiguration message includes the fullConfig:
 - 2> perform the radio configuration procedure as specified in 5.3.5.8;
- 1> configure lower layers in accordance with the received *radioResourceConfigCommon*;
- 1> if the received RRCConnectionReconfiguration message includes the rach-Skip:
 - 2> configure lower layers to apply the *rach-Skip* for the target MCG, as specified in TS 36.213 [23] and 36.321 [6];
- 1> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received mobilityControlInfo;
- 1> if the received RRCConnectionReconfiguration includes the sCellToReleaseList:
 - 2> perform SCell release as specified in 5.3.10.3a;
- 1> if the received RRCConnectionReconfiguration includes the scg-Configuration; or
- 1> if the current UE configuration includes one or more split DRBs and the received RRCConnectionReconfiguration includes radioResourceConfigDedicated including drb-ToAddModList:
 - 2> perform SCG reconfiguration as specified in 5.3.10.10;
- 1> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
 - 2> perform the radio resource configuration procedure as specified in 5.3.10;
- 1> if the *keyChangeIndicator* received in the *securityConfigHO* is set to *TRUE*:

2> update the K_{eNB} key based on the K_{ASME} key taken into use with the latest successful NAS SMC procedure, as specified in TS 33.401 [32];

1> else:

- 2> update the K_{eNB} key based on the current K_{eNB} or the NH, using the *nextHopChainingCount* value indicated in the *securityConfigHO*, as specified in TS 33.401 [32];
- 1> store the *nextHopChainingCount* value;
- 1> if the securityAlgorithmConfig is included in the securityConfigHO:
 - 2> derive the K_{RRCint} key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];
 - 2> if connected as an RN:
 - 3> derive the K_{UPint} key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];
 - 2> derive the K_{RRCenc} key and the K_{UPenc} key associated with the *cipheringAlgorithm*, as specified in TS 33.401 [32];

1> else:

- 2> derive the K_{RRCint} key associated with the current integrity algorithm, as specified in TS 33.401 [32];
- 2> if connected as an RN:
 - 3> derive the K_{UPint} key associated with the current integrity algorithm, as specified in TS 33.401 [32];
- 2> derive the K_{RRCenc} key and the K_{UPenc} key associated with the current ciphering algorithm, as specified in TS 33.401 [32];
- 1> configure lower layers to apply the integrity protection algorithm and the K_{RRCint} key, i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 1> configure lower layers to apply the ciphering algorithm, the K_{RRCenc} key and the K_{UPenc} key, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 1> if connected as an RN:
 - 2> configure lower layers to apply the integrity protection algorithm and the K_{UPint} key, for current or subsequently established DRBs that are configured to apply integrity protection, if any;
- 1> if the received RRCConnectionReconfiguration includes the sCellToAddModList:
 - 2> perform SCell addition or modification as specified in 5.3.10.3b;
- $1> if the \ received \ \textit{RRCConnectionReconfiguration} \ includes \ the \ \textit{systemInformationBlockType1Dedicated}:$
 - 2> perfom the actions upon reception of the SystemInformationBlockType1 message as specified in 5.2.2.7;
- 1> perform the measurement related actions as specified in 5.5.6.1;
- 1> if the RRCConnectionReconfiguration message includes the measConfig:
 - 2> perform the measurement configuration procedure as specified in 5.5.2;
- 1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;
- 1> release reportProximityConfig and clear any associated proximity status reporting timer;
- 1> if the *RRCConnectionReconfiguration* message includes the *otherConfig*:
 - 2> perform the other configuration procedure as specified in 5.3.10.9;
- 1> if the RRCConnectionReconfiguration message includes the sl-DiscConfig or sl-CommConfig:

- 2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;
- 1> if the RRCConnectionReconfiguration message includes wlan-OffloadInfo:
 - 2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;
- 1> if handoverWithoutWT-Change is not configured:
 - 2> release the LWA configuration, if configured, as described in 5.6.14.3;
- 1> release the LWIP configuration, if configured, as described in 5.6.17.3;
- 1> if the RRCConnectionReconfiguration message includes rclwi-Configuration:
 - 2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;
- 1> if the *RRCConnectionReconfiguration* message includes *lwa-Configuration*:
 - 2> perform the LWA configuration procedure as specified in 5.6.14.2;
- 1> if the RRCConnectionReconfiguration message includes lwip-Configuration:
 - 2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;
- 1> if the *RRCConnectionReconfiguration* message includes the *sl-V2X-ConfigDedicated* or *mobilityControlInfoV2X*:
 - 2> perform the V2X sidelink communication dedicated configuration procedure as specified in 5.3.10.15a;
- 1> set the content of RRCConnectionReconfigurationComplete message as follows:
 - 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 3> include *rlf-InfoAvailable*;
 - 2> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport* and if T330 is not running:
 - 3> include logMeasAvailableMBSFN;
 - 2> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 3> include the *logMeasAvailable*;
 - 2> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:
 - 3> include connEstFailInfoAvailable;
 - 2> if the RRCConnectionReconfiguration message includes perCC-GapIndicationRequest:
 - 3> include *perCC-GapIndicationList* and *numFreqEffective*;
 - 2> if the frequencies are configured for reduced measurement performance:
 - 3> include *numFreqEffectiveReduced*;
- 1> submit the RRCConnectionReconfigurationComplete message to lower layers for transmission;
- 1> if MAC successfully completes the random access procedure; or
- 1> if MAC indicates the successful reception of a PDCCH transmission addressed to C-RNTI and if *rach-Skip* is configured:
 - 2> stop timer T304;

- 2> release *ul-ConfigInfo*, if configured;
- 2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;
- 2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;
- NOTE 3: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.
 - 2> if the UE is configured to provide IDC indications:
 - 3> if the UE has transmitted an *InDeviceCoexIndication* message during the last 1 second preceding reception of the *RRCConnectionReconfiguration* message including *mobilityControlInfo*:
 - 4> initiate transmission of the InDeviceCoexIndication message in accordance with 5.6.9.3;
 - 2> if the UE is configured to provide power preference indications, SPS assistance information, delay budget report or maximum bandwidth preference indications:
 - 3> if the UE has transmitted a *UEAssistanceInformation* message during the last 1 second preceding reception of the *RRCConnectionReconfiguration* message including *mobilityControlInfo*:
 - 4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;
 - 2> if *SystemInformationBlockType15* is broadcast by the PCell:
 - 3> if the UE has transmitted a *MBMSInterestIndication* message during the last 1 second preceding reception of the *RRCConnectionReconfiguration* message including *mobilityControlInfo*:
 - 4> ensure having a valid version of *SystemInformationBlockType15* for the PCell;
 - 4> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;
 - 4> determine the set of MBMS services of interest in accordance with 5.8.5.3a;
 - 4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;
 - 2> if SystemInformationBlockType18 is broadcast by the target PCell; and the UE transmitted a SidelinkUEInformation message indicating a change of sidelink communication related parameters relevant in target PCell (i.e. change of commRxInterestedFreq or commTxResourceReq, commTxResourceReqUC if SystemInformationBlockType18 includes commTxResourceUC-ReqAllowed or commTxResourceInfoReqRelay if PCell broadcasts SystemInformationBlockType19 including discConfigRelay) during the last 1 second preceding reception of the RRCConnectionReconfiguration message including mobilityControlInfo; or
 - 2> if SystemInformationBlockType19 is broadcast by the target PCell; and the UE transmitted a SidelinkUEInformation message indicating a change of sidelink discovery related parameters relevant in target PCell (i.e. change of discRxInterest or discTxResourceReq, discTxResourceReqPS if SystemInformationBlockType19 includes discConfigPS or discRxGapReq or discTxGapReq if the UE is configured with gapRequestsAllowedDedicated set to true or if the UE is not configured with gapRequestsAllowedDedicated and SystemInformationBlockType19 includes gapRequestsAllowedCommon) during the last 1 second preceding reception of the RRCConnectionReconfiguration message including mobilityControlInfo; or
 - 2> if *SystemInformationBlockType21* is broadcast by the target PCell; and the UE transmitted a *SidelinkUEInformation* message indicating a change of V2X sidelink communication related parameters relevant in target PCell (i.e. change of *v2x-CommRxInterestedFreqList* or *v2x-CommTxResourceReq*) during the last 1 second preceding reception of the *RRCConnectionReconfiguration* message including *mobilityControlInfo*:
 - 3> initiate transmission of the SidelinkUEInformation message in accordance with 5.10.2.3;
 - 2> the procedure ends;

NOTE 4: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell, except for BL UEs or UEs in CE when *sameSFN-Indication* is not present in *mobilityControlInfo*.

5.3.5.5 Reconfiguration failure

The UE shall:

- 1> if the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration* message:
 - 2> continue using the configuration used prior to the reception of RRCConnectionReconfiguration message;
 - 2> if security has not been activated:
 - 3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause other;
 - 2> else:
 - 3> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the connection reconfiguration procedure ends;
- NOTE 1: The UE may apply above failure handling also in case the *RRCConnectionReconfiguration* message causes a protocol error for which the generic error handling as defined in 5.7 specifies that the UE shall ignore the message.
- NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/ failure.

5.3.5.6 T304 expiry (handover failure)

- 1> if T304 expires (handover failure):
- NOTE 1: Following T304 expiry any dedicated preamble, if provided within the *rach-ConfigDedicated*, is not available for use by the UE anymore.
 - 2> revert back to the configuration used in the source PCell, excluding the configuration configured by the *physicalConfigDedicated*, the *mac-MainConfig* and the *sps-Config*;
- NOTE 1a: In the context above, "the configuration" includes state variables and parameters of each radio bearer.

 PDCP entities associtated with RLC UM and SRB bearers are reset after the successful RRC connection re-establishment procedure according to Section 5.2 in TS 36.323 [8].
 - 2> store the following handover failure information in VarRLF-Report by setting its fields as follows:
 - 3> clear the information included in *VarRLF-Report*, if any;
 - 3> set the plmn-IdentityList to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);
 - 3> set the *measResultLastServCell* to include the RSRP and RSRQ, if available, of the source PCell based on measurements collected up to the moment the UE detected handover failure and in accordance with the following;
 - 4> if the UE includes *rsrqResult*, include the *lastServCellRSRQ-Type*;
 - 3> set the *measResultNeighCells* to include the best measured cells, other than the source PCell, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected handover failure, and set its fields as follows;
 - 4> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the *measResultListEUTRA*;
 - 4> if the UE includes *rsrqResult*, include the *rsrq-Type*;

- 4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the *measResultListUTRA*;
- 4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN frequencies, include the *measResultListGERAN*;
- 4> if the UE was configured to perform measurement reporting for one or more neighbouring CDMA2000 frequencies, include the *measResultsCDMA2000*;
- 4> for each neighbour cell included, include the optional fields that are available;
- NOTE 2: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.
 - 3> if detailed location information is available, set the content of the *locationInfo* as follows:
 - 4> include the *locationCoordinates*;
 - 4> include the *horizontalVelocity*, if available;
 - 3> set the *failedPCellId* to the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of the target PCell of the failed handover;
 - 3> include *previousPCellId* and set it to the global cell identity of the PCell where the last *RRCConnectionReconfiguration* message including *mobilityControlInfo* was received;
 - 3> set the *timeConnFailure* to the elapsed time since reception of the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo*;
 - 3> set the *connectionFailureType* to 'hof';
 - 3> set the *c-RNTI* to the C-RNTI used in the source PCell;
 - 2> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the RRC connection reconfiguration procedure ends;

The UE may discard the handover failure information, i.e. release the UE variable *VarRLF-Report*, 48 hours after the failure is detected, upon power off or upon detach.

NOTE 3: E-UTRAN may retrieve the handover failure information using the UE information procedure with *rlf-ReportReq* set to *true*, as specified in 5.6.5.3.

5.3.5.7 Void

5.3.5.7a T307 expiry (SCG change failure)

The UE shall:

1> if T307 expires:

NOTE 1: Following T307 expiry any dedicated preamble, if provided within the *rach-ConfigDedicatedSCG*, is not available for use by the UE anymore.

2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG change failure;

5.3.5.8 Radio Configuration involving full configuration option

The UE shall:

1> release/ clear all current dedicated radio configurations except the MCG C-RNTI, the MCG security configuration and the PDCP, RLC, logical channel configurations for the RBs and the logged measurement configuration;

- NOTE 1: Radio configuration is not just the resource configuration but includes other configurations like *MeasConfig* and *OtherConfig*.
- 1> if the RRCConnectionReconfiguration message includes the mobilityControlInfo:
 - 2> release/ clear all current common radio configurations;
 - 2> use the default values specified in 9.2.5 for timer T310, T311 and constant N310, N311;
- 1> else:
 - 2> use values for timers T301, T310, T311 and constants N310, N311, as included in *ue-TimersAndConstants* received in *SystemInformationBlockType2* (or *SystemInformationBlockType2-NB* in NB-IoT);
- 1> apply the default physical channel configuration as specified in 9.2.4;
- 1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;
- 1> apply the default MAC main configuration as specified in 9.2.2;
- 1> if the UE is a NB-IoT UE; or
- 1> for each *srb-Identity* value included in the *srb-ToAddModList* (SRB reconfiguration):
 - 2> apply the specified configuration defined in 9.1.2 for the corresponding SRB;
 - 2> apply the corresponding default RLC configuration for the SRB specified in 9.2.1.1 for SRB1 or in 9.2.1.2 for SRB2;
 - 2> apply the corresponding default logical channel configuration for the SRB as specified in 9.2.1.1 for SRB1 or in 9.2.1.2 for SRB2;
- NOTE 2: This is to get the SRBs (SRB1 and SRB2 for handover and SRB2 for reconfiguration after reestablishment) to a known state from which the reconfiguration message can do further configuration.
- 1> for each *eps-BearerIdentity* value included in the *drb-ToAddModList* that is part of the current UE configuration:
 - 2> release the PDCP entity;
 - 2> release the RLC entity or entities;
 - 2> release the DTCH logical channel;
 - 2> release the *drb-identity*;
- NOTE 3: This will retain the *eps-bearerIdentity* but remove the DRBs including *drb-identity* of these bearers from the current UE configuration and trigger the setup of the DRBs within the AS in Section 5.3.10.3 using the new configuration. The *eps-bearerIdentity* acts as the anchor for associating the released and re-setup DRB. In the AS the DRB re-setup is equivalent with a new DRB setup (including new PDCP and logical channel configurations).
- 1> for each *eps-BearerIdentity* value that is part of the current UE configuration but not part of the *drb-ToAddModList*:
 - 2> perform DRB release as specified in 5.3.10.2;

5.3.6 Counter check

5.3.6.1 General

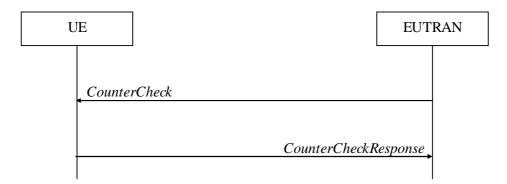


Figure 5.3.6.1-1: Counter check procedure

The counter check procedure is used by E-UTRAN to request the UE to verify the amount of data sent/ received on each DRB. More specifically, the UE is requested to check if, for each DRB, the most significant bits of the COUNT match with the values indicated by E-UTRAN.

NOTE: The procedure enables E-UTRAN to detect packet insertion by an intruder (a 'man in the middle').

5.3.6.2 Initiation

E-UTRAN initiates the procedure by sending a *CounterCheck* message.

NOTE: E-UTRAN may initiate the procedure when any of the COUNT values reaches a specific value.

5.3.6.3 Reception of the *CounterCheck* message by the UE

Upon receiving the *CounterCheck* message, the UE shall:

- 1> for each DRB that is established:
 - 2> if no COUNT exists for a given direction (uplink or downlink) because it is a uni-directional bearer configured only for the other direction:
 - 3> assume the COUNT value to be 0 for the unused direction;
 - 2> if the *drb-Identity* is not included in the *drb-CountMSB-InfoList*:
 - 3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of the corresponding COUNT;
 - 2> else if, for at least one direction, the most significant bits of the COUNT are different from the value indicated in the *drb-CountMSB-InfoList*:
 - 3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of the corresponding COUNT;
- 1> for each DRB that is included in the *drb-CountMSB-InfoList* in the *CounterCheck* message that is not established:
 - 2> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* with the most significant bits set identical to the corresponding values in the *drb-CountMSB-InfoList* and the least significant bits set to zero;
- 1> submit the CounterCheckResponse message to lower layers for transmission upon which the procedure ends;

5.3.7 RRC connection re-establishment

5.3.7.1 General

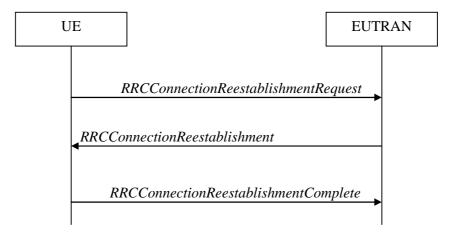


Figure 5.3.7.1-1: RRC connection re-establishment, successful

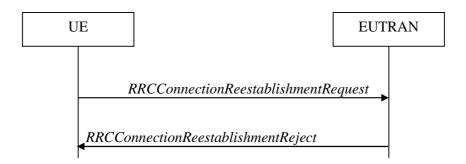


Figure 5.3.7.1-2: RRC connection re-establishment, failure

The purpose of this procedure is to re-establish the RRC connection, which involves the resumption of SRB1 (SRB1bis for a NB-IoT UE for which AS security has not been activated) operation, the re-activation of security (except for a NB-IoT UE for which AS security has not been activated) and the configuration of only the PCell.

Except for a NB-IoT UE for which AS security has not been activated, a UE in RRC_CONNECTED, for which security has been activated, may initiate the procedure in order to continue the RRC connection. The connection reestablishment succeeds only if the concerned cell is prepared i.e. has a valid UE context. In case E-UTRAN accepts the re-establishment, SRB1 operation resumes while the operation of other radio bearers remains suspended. If AS security has not been activated, the UE does not initiate the procedure but instead moves to RRC_IDLE directly.

When AS security has not been activated, a NB-IoT UE supporting RRC connection re-establishment for the Control Plane CIoT EPS optimisation in RRC_CONNECTED may initiate the procedure in order to continue the RRC connection.

E-UTRAN applies the procedure as follows:

- When AS security has been activated:
 - to reconfigure SRB1 and to resume data transfer only for this RB;
 - to re-activate AS security without changing algorithms.
- For a NB-IoT UE supporting RRC connection re-establishment for the Control Plane CIoT EPS optimisation, when AS security has not been activated:
 - to re-establish SRB1bis and to continue data transfer for this RB.

5.3.7.2 Initiation

The UE shall only initiate the procedure either when AS security has been activated or for a NB-IoT UE supporting RRC connection re-establishment for the Control Plane CIoT EPS optimisation. The UE initiates the procedure when one of the following conditions is met:

- 1> upon detecting radio link failure, in accordance with 5.3.11; or
- 1> upon handover failure, in accordance with 5.3.5.6; or
- 1> upon mobility from E-UTRA failure, in accordance with 5.4.3.5; or
- 1> upon integrity check failure indication from lower layers; or
- 1> upon an RRC connection reconfiguration failure, in accordance with 5.3.5.5;

Upon initiation of the procedure, the UE shall:

- 1> stop timer T310, if running;
- 1> stop timer T312, if running;
- 1> stop timer T313, if running;
- 1> stop timer T307, if running;
- 1> start timer T311;
- 1> stop timer T370, if running;
- 1> suspend all RBs except SRB0;
- 1> reset MAC;
- 1> release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;
- 1> apply the default physical channel configuration as specified in 9.2.4;
- 1> except for NB-IoT, for the MCG, apply the default semi-persistent scheduling configuration as specified in 9.2.3;
- 1> for the MCG, apply the default MAC main configuration as specified in 9.2.2;
- 1> release *powerPrefIndicationConfig*, if configured and stop timer T340, if running;
- 1> release reportProximityConfig, if configured and clear any associated proximity status reporting timer;
- 1> release *obtainLocationConfig*, if configured;
- 1> release idc-Config, if configured;
- 1> release *measSubframePatternPCell*, if configured;
- 1> release the entire SCG configuration, if configured, except for the DRB configuration (as configured by *drb-ToAddModListSCG*);
- 1> release *naics-Info* for the PCell, if configured;
- 1> if connected as an RN and configured with an RN subframe configuration:
 - 2> release the RN subframe configuration;
- 1> release the LWA configuration, if configured, as described in 5.6.14.3;
- 1> release the LWIP configuration, if configured, as described in 5.6.17.3;
- 1> release delayBudgetReportingConfig, if configured and stop timer T342, if running;
- 1> perform cell selection in accordance with the cell selection process as specified in TS 36.304 [4];

1> release bw-PreferenceIndicationTimer, if configured and stop timer T341, if running;

5.3.7.3 Actions following cell selection while T311 is running

Upon selecting a suitable E-UTRA cell, the UE shall:

- 1> stop timer T311;
- 1> start timer T301;
- 1> apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;
- 1> if the UE is a NB-IoT UE supporting RRC connection re-establishment for the Control Plane CIoT EPS optimisation and AS security has not been activated; and
- 1> if *cp-reestablishment* is not included in *SystemInformationBlockType2-NB*:
 - 2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';
- 1> else:
 - 2> initiate transmission of the RRCConnectionReestablishmentRequest message in accordance with 5.3.7.4;

NOTE: This procedure applies also if the UE returns to the source PCell.

Upon selecting an inter-RAT cell, the UE shall:

- 1> if the selected cell is a UTRA cell, and if the UE supports Radio Link Failure Report for Inter-RAT MRO, include *selectedUTRA-CellId* in the *VarRLF-Report* and set it to the physical cell identity and carrier frequency of the selected UTRA cell;
- 1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.4 Actions related to transmission of *RRCConnectionReestablishmentRequest* message

Except for NB-IoT, if the procedure was initiated due to radio link failure or handover failure, the UE shall:

1> set the reestablishmentCellId in the VarRLF-Report to the global cell identity of the selected cell;

The UE shall set the contents of RRCConnectionReestablishmentRequest message as follows:

- 1> except for a NB-IoT UE for which AS security has not been activated, set the *ue-Identity* as follows:
 - 2> set the *c-RNTI* to the C-RNTI used in the source PCell (handover and mobility from E-UTRA failure) or used in the PCell in which the trigger for the re-establishment occurred (other cases);
 - 2> set the *physCellId* to the physical cell identity of the source PCell (handover and mobility from E-UTRA failure) or of the PCell in which the trigger for the re-establishment occurred (other cases);
 - 2> set the *shortMAC-I* to the 16 least significant bits of the MAC-I calculated:
 - 3> over the ASN.1 encoded as per section 8 (i.e., a multiple of 8 bits) *VarShortMAC-Input* (or *VarShortMAC-Input-NB* in NB-IoT);
 - 3> with the K_{RRCint} key and integrity protection algorithm that was used in the source PCell (handover and mobility from E-UTRA failure) or of the PCell in which the trigger for the re-establishment occurred (other cases); and
 - 3> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;
- 1> for a NB-IoT UE for which AS security has not been activated, set the *ue-Identity* as follows:

- 2> request upper layers for calculated ul-NAS-MAC and ul-NAS-Count using the *cellIdentity* of the PCell in which the trigger for the re-establishment occurred;
- 2> set the *s-TMSI* to the S-TMSI provided by upper layers;
- 2> set the *ul-NAS-MAC* to the ul-NAS-MAC value provided by upper layers;
- 2> set the *ul-NAS-Count* to the ul-NAS-Count value provided by upper layers;
- 1> set the reestablishmentCause as follows:
 - 2> if the re-establishment procedure was initiated due to reconfiguration failure as specified in 5.3.5.5 (the UE is unable to comply with the reconfiguration):
 - 3> set the reestablishmentCause to the value reconfigurationFailure;
 - 2> else if the re-establishment procedure was initiated due to handover failure as specified in 5.3.5.6 (intra-LTE handover failure) or 5.4.3.5 (inter-RAT mobility from EUTRA failure):
 - 3> set the reestablishmentCause to the value handoverFailure;
 - 2> else:
 - 3> set the reestablishmentCause to the value otherFailure;

The UE shall submit the RRCConnectionReestablishmentRequest message to lower layers for transmission.

5.3.7.5 Reception of the RRCConnectionReestablishment by the UE

NOTE 1: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

- 1> stop timer T301;
- 1> consider the current cell to be the PCell;
- 1> except for a NB-IoT UE for which AS security has not been activated:
 - 2> re-establish PDCP for SRB1:
 - 2> re-establish RLC for SRB1;
 - 2> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;
 - 2> resume SRB1;
- NOTE 2: E-UTRAN should not transmit any message on SRB1 prior to receiving the *RRCConnectionReestablishmentComplete* message.
 - 2> update the K_{eNB} key based on the K_{ASME} key to which the current K_{eNB} is associated, using the *nextHopChainingCount* value indicated in the *RRCConnectionReestablishment* message, as specified in TS 33.401 [32];
 - 2> store the *nextHopChainingCount* value;
 - 2> derive the K_{RRCint} key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];
 - 2> derive the K_{RRCenc} key and the K_{UPenc} key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];
 - 2> if connected as an RN:
 - 3> derive the K_{UPint} key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

- 2> configure lower layers to activate integrity protection using the previously configured algorithm and the K_{RRCint} key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 2> if connected as an RN:
 - 3> configure lower layers to apply integrity protection using the previously configured algorithm and the K_{UPint} key, for subsequently resumed or subsequently established DRBs that are configured to apply integrity protection, if any;
- 2> configure lower layers to apply ciphering using the previously configured algorithm, the K_{RRCenc} key and the K_{UPenc} key immediately, i.e., ciphering shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 2> if the UE is not a NB-IoT UE:
 - 3> set the content of RRCConnectionReestablishmentComplete message as follows:
 - 4> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 5> include the *rlf-InfoAvailable*;
 - 4> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport* and if T330 is not running:
 - 5> include logMeasAvailableMBSFN;
 - 4> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 5> include the *logMeasAvailable*;
 - 4> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:
 - 5> include the connEstFailInfoAvailable;
 - 3> perform the measurement related actions as specified in 5.5.6.1;
 - 3> perform the measurement identity autonomous removal as specified in 5.5.2.2a;
- 2> submit the RRCConnectionReestablishmentComplete message to lower layers for transmission;
- 2> if *SystemInformationBlockType15* is broadcast by the PCell:
 - 3> if the UE has transmitted an MBMSInterestIndication message during the last 1 second preceding detection of radio link failure:
 - 4> ensure having a valid version of SystemInformationBlockType15 for the PCell;
 - 4> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;
 - 4> determine the set of MBMS services of interest in accordance with 5.8.5.3a;
 - 4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;
- 2> if SystemInformationBlockType18 is broadcast by the PCell; and the UE transmitted a SidelinkUEInformation message indicating a change of sidelink communication related parameters relevant in PCell (i.e. change of commRxInterestedFreq or commTxResourceReq, commTxResourceReqUC if SystemInformationBlockType18 includes commTxResourceUC-ReqAllowed or commTxResourceInfoReqRelay if PCell broadcasts SystemInformationBlockType19 including discConfigRelay) during the last 1 second preceding detection of radio link failure; or
- 2> if SystemInformationBlockType19 is broadcast by the PCell; and the UE transmitted a SidelinkUEInformation message indicating a change of sidelink discovery related parameters relevant in PCell (i.e. change of discRxInterest or discTxResourceReq, discTxResourceReqPS if SystemInformationBlockType19 includes

discConfigPS or discRxGapReq or discTxGapReq if the UE is configured with gapRequestsAllowedDedicated set to true or if the UE is not configured with gapRequestsAllowedDedicated and SystemInformationBlockType19 includes gapRequestsAllowedCommon) during the last 1 second preceding detection of radio link failure; or

- 2> if *SystemInformationBlockType21* including *sl-V2X-ConfigCommon* is broadcast by the PCell; and the UE transmitted a *SidelinkUEInformation* message indicating a change of V2X sidelink communication related parameters relevant in PCell (i.e. change of *v2x-CommRxInterestedFreqList* or *v2x-CommTxResourceReq*) during the last 1 second preceding detection of radio link failure:
 - 3> initiate transmission of the SidelinkUEInformation message in accordance with 5.10.2.3;
- 1> for a NB-IoT UE for which AS security has not been activated:
 - 2> validate *dl-NAS-MAC*, as specified in TS 33.401 [32];
 - 2> if *dl-NAS-MAC* check fails:
 - 3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure', upon which the procedure ends;
 - 2> except for a UE that only supports the Control Plane CIoT EPS optimisation:
 - 3> re-establish PDCP for SRB1;
 - 3> re-establish RLC for SRB1;
 - 2> re-establish RLC for SRB1bis;
 - 2> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;
 - 2> except for a UE that only supports the Control Plane CIoT EPS optimisation:
 - 3> resume SRB1:
 - 2> resume SRB1bis;
- NOTE 3: E-UTRAN should not transmit any message on SRB1bis prior to receiving the *RRCConnectionReestablishmentComplete* message.
 - 2> submit the RRCConnectionReestablishmentComplete message to lower layers for transmission;
- 1> the procedure ends;

5.3.7.6 T311 expiry

Upon T311 expiry, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.7 T301 expiry or selected cell no longer suitable

- 1> if timer T301 expires; or
- 1> if the selected cell becomes no longer suitable according to the cell selection criteria as specified in TS 36.304 [4]:
 - 2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.8 Reception of RRCConnectionReestablishmentReject by the UE

Upon receiving the RRCConnectionReestablishmentReject message, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.8 RRC connection release

5.3.8.1 General



Figure 5.3.8.1-1: RRC connection release, successful

The purpose of this procedure is:

 to release the RRC connection, which includes the release of the established radio bearers as well as all radio resources;

or:

- to suspend the RRC connection, which includes the suspension of the established radio bearers.

5.3.8.2 Initiation

E-UTRAN initiates the RRC connection release procedure to a UE in RRC_CONNECTED.

5.3.8.3 Reception of the *RRCConnectionRelease* by the UE

The UE shall:

- 1> except for NB-IoT, BL UEs or UEs in CE, delay the following actions defined in this sub-clause 60 ms from the moment the *RRCConnectionRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCConnectionRelease* message has been successfully acknowledged, whichever is earlier;
- 1> for BL UEs or UEs in CE, delay the following actions defined in this sub-clause 1.25 seconds from the moment the *RRCConnectionRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCConnectionRelease* message has been successfully acknowledged, whichever is earlier;
- 1> for NB-IoT, delay the following actions defined in this sub-clause 10 seconds from the moment the *RRCConnectionRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCConnectionRelease* message has been successfully acknowledged, whichever is earlier.
- 1> if the RRCConnectionRelease message includes the idleModeMobilityControlInfo:
 - 2> store the cell reselection priority information provided by the *idleModeMobilityControlInfo*;
 - 2> if the t320 is included:
 - 3> start timer T320, with the timer value set according to the value of t320;

1> else:

- 2> apply the cell reselection priority information broadcast in the system information;
- 1> for NB-IoT, if the RRCConnectionRelease message includes the redirectedCarrierInfo:

- 2> if the redirectedCarrierOffsetDedicated is included in the redirectedCarrierInfo:
 - 3> store the dedicated offset for the frequency in redirectedCarrierInfo;
 - 3> start timer T322, with the timer value set according to the value of T322 in redirectedCarrierInfo;
- 1> if the release Cause received in the RRCConnectionRelease message indicates loadBalancingTAURequired:
 - 2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'load balancing TAU required';
- 1> else if the release Cause received in the RRCConnectionRelease message indicates cs-FallbackHighPriority:
 - 2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'CS Fallback High Priority';

1> else:

- 2> if the extendedWaitTime is present; and
- 2> if the UE supports delay tolerant access or the UE is a NB-IoT UE:
 - 3> forward the extendedWaitTime to upper layers;
- 2> if the extendedWaitTime-CPdata is present and the NB-IoT UE only supports the Control Plane CIoT EPS optimisation:
 - 3> forward the extendedWaitTime-CPdata to upper layers;
- 2> if the release Cause received in the RRCConnectionRelease message indicates rrc-Suspend:
 - 3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC suspension';
- 2> else:
 - 3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

5.3.8.4 T320 expiry

The UE shall:

- 1> if T320 expires:
 - 2> if stored, discard the cell reselection priority information provided by the *idleModeMobilityControlInfo* or inherited from another RAT;
 - 2> apply the cell reselection priority information broadcast in the system information;

5.3.8.5 T322 expiry

The UE shall:

- 1> if T322 expires:
 - 2> discard the redirectedCarrierOffsetDedicated provided in RRCConnectionRelease message;

5.3.8.6 UE actions upon receiving the expiry of *DataInactivityTimer*

Upon receiving the expiry of *DataInactivityTimer* from lower layers, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.9 RRC connection release requested by upper layers

5.3.9.1 General

The purpose of this procedure is to release the RRC connection. Access to the current PCell may be barred as a result of this procedure.

NOTE: Upper layers invoke the procedure, e.g. upon determining that the network has failed an authentication check, see TS 24.301 [35].

5.3.9.2 Initiation

The UE initiates the procedure when upper layers request the release of the RRC connection. The UE shall not initiate the procedure for power saving purposes.

The UE shall:

- 1> if the upper layers indicate barring of the PCell:
 - 2> treat the PCell used prior to entering RRC_IDLE as barred according to TS 36.304 [4];
- 1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

5.3.10 Radio resource configuration

5.3.10.0 General

- 1> if the received radioResourceConfigDedicated includes the srb-ToAddModList:
 - 2> perform the SRB addition or reconfiguration as specified in 5.3.10.1;
- 1> if the received radioResourceConfigDedicated includes the drb-ToReleaseList:
 - 2> perform DRB release as specified in 5.3.10.2;
- 1> if the received radioResourceConfigDedicated includes the drb-ToAddModList:
 - 2> perform DRB addition or reconfiguration as specified in 5.3.10.3;
- 1> if the received radioResourceConfigDedicated includes the mac-MainConfig:
 - 2> perform MAC main reconfiguration as specified in 5.3.10.4;
- 1> if the received *radioResourceConfigDedicated* includes *sps-Config*:
 - 2> perform SPS reconfiguration according to 5.3.10.5;
- 1> if the received radioResourceConfigDedicated includes the physicalConfigDedicated:
 - 2> reconfigure the physical channel configuration as specified in 5.3.10.6.
- 1> if the received radioResourceConfigDedicated includes the rlf-TimersAndConstants:
 - 2> reconfigure the values of timers and constants as specified in 5.3.10.7;
- 1> if the received radioResourceConfigDedicated includes the measSubframePatternPCell:
 - 2> reconfigure the time domain measurement resource restriction for the serving cell as specified in 5.3.10.8;
- 1> if the received *radioResourceConfigDedicated* includes the *naics-Info*:
 - 2> perform NAICS neighbour cell information reconfiguration for the PCell as specified in 5.3.10.13;

- 1> if the received *RadioResourceConfigDedicatedPSCell* includes the *naics-Info*:
 - 2> perform NAICS neighbour cell information reconfiguration for the PSCell as specified in 5.3.10.13;
- 1> if the received *RadioResourceConfigDedicatedSCell-r10* includes the *naics-Info*:
 - 2> perform NAICS neighbour cell information reconfiguration for the SCell as specified in 5.3.10.13;

5.3.10.1 SRB addition/ modification

The UE shall:

- 1> if the UE is a NB-IoT UE and SRB1 is not established; or
- 1> for each *srb-Identity* value included in the *srb-ToAddModList* that is not part of the current UE configuration (SRB establishment):
 - 2> if the UE is not a NB-IoT UE that only supports the Control Plane CIoT EPS optimisation:
 - 3> apply the specified configuration defined in 9.1.2 for the corresponding SRB;
 - 3> establish a PDCP entity and configure it with the current (MCG) security configuration, if applicable;
 - 3> establish an (MCG) RLC entity in accordance with the received *rlc-Config*;
 - 3> establish a (MCG) DCCH logical channel in accordance with the received *logicalChannelConfig* and with the logical channel identity set in accordance with 9.1.2;
 - 2> if the UE is a NB-IoT UE:
 - 3> apply the specified configuration defined in 9.1.2 for SRB1bis;
 - 3> establish an (MCG) RLC entity in accordance with the received *rlc-Config*;
 - 3> establish a (MCG) DCCH logical channel in accordance with the received *logicalChannelConfig* and with the logical channel identity set in accordance with 9.1.2.1a;
- 1> if the UE is a NB-IoT UE and SRB1 is established; or
- 1> for each *srb-Identity* value included in the *srb-ToAddModList* that is part of the current UE configuration (SRB reconfiguration):
 - 2> reconfigure the RLC entity in accordance with the received *rlc-Config*;
 - 2> reconfigure the DCCH logical channel in accordance with the received *logicalChannelConfig*;

5.3.10.2 DRB release

- 1> for each *drb-Identity* value included in the *drb-ToReleaseList* that is part of the current UE configuration (DRB release); or
- 1> for each drb-identity value that is to be released as the result of full configuration option according to 5.3.5.8:
 - 2> release the PDCP entity;
 - 2> release the RLC entity or entities;
 - 2> release the DTCH logical channel;
- 1> if the procedure was triggered due to handover:
 - 2> indicate the release of the DRB(s) and the *eps-BearerIdentity* of the released DRB(s) to upper layers after successful handover;
- 1> else:

2> indicate the release of the DRB(s) and the *eps-BearerIdentity* of the released DRB(s) to upper layers immediately.

NOTE: The UE does not consider the message as erroneous if the *drb-ToReleaseList* includes any *drb-Identity* value that is not part of the current UE configuration.

5.3.10.3 DRB addition/ modification

- 1> for each *drb-Identity* value included in the *drb-ToAddModList* that is not part of the current UE configuration (DRB establishment including the case when full configuration option is used):
 - 2> if the concerned entry of drb-ToAddModList includes the drb-TypeLWA set to TRUE (i.e. add LWA DRB):
 - 3> perform the LWA specific DRB addition or reconfiguration as specified in 5.3.10.3a2;
 - 2> if the concerned entry of drb-ToAddModList includes the drb-TypeLWIP (i.e. add LWIP DRB):
 - 3> perform LWIP specific DRB addition or reconfiguration as specified in 5.3.10.3a3;
 - 2> else if *drb-ToAddModListSCG* is not received or does not include the *drb-Identity* value (i.e. add MCG DRB):
 - 3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the received *pdcp-Config*;
 - 3> establish an MCG RLC entity or entities in accordance with the received rlc-Config;
 - 3> establish an MCG DTCH logical channel in accordance with the received *logicalChannelIdentity* and the received *logicalChannelConfig*;
 - 2> if the RRCConnectionReconfiguration message includes the fullConfig IE:
 - 3> associate the established DRB with corresponding included *eps-BearerIdentity*;
 - 2> else:
 - 3> indicate the establishment of the DRB(s) and the *eps-BearerIdentity* of the established DRB(s) to upper layers;
- 1> for each *drb-Identity* value included in the *drb-ToAddModList* that is part of the current UE configuration (DRB reconfiguration):
 - 2> if the DRB indicated by drb-Identity is an LWA DRB (i.e. LWA to LTE only or reconfigure LWA DRB):
 - 3> perform the LWA specific DRB reconfiguration as specified in 5.3.10.3a2;
 - 2> else if the concerned entry of *drb-ToAddModList* includes the *drb-TypeLWA* set to *TRUE* (i.e. LTE only to LWA DRB):
 - 3> perform the LWA specific DRB reconfiguration as specified in 5.3.10.3a2;
 - 2> if the concerned entry of *drb-ToAddModList* includes the *drb-TypeLWIP* (i.e. add or reconfigure LWIP DRB):
 - 3> perform LWIP specific DRB addition or reconfiguration as specified in 5.3.10.3a3;
 - 2> if drb-ToAddModListSCG is not received or does not include the drb-Identity value:
 - 3> if the DRB indicated by *drb-Identity* is an MCG DRB (reconfigure MCG):
 - 4> if the *pdcp-Config* is included:
 - 5> reconfigure the PDCP entity in accordance with the received *pdcp-Config*;
 - 4> if the *rlc-Config* is included:

- 5> reconfigure the RLC entity or entities in accordance with the received *rlc-Config*;
- 4> if the *logicalChannelConfig* is included:
 - 5> reconfigure the DTCH logical channel in accordance with the received *logicalChannelConfig*;

NOTE: Removal and addition of the same *drb-Identity* in a single *radioResourceConfigDedicated* is not supported. In case *drb-Identity* is removed and added due to handover or re-establishment with the full configuration option, the eNB can use the same value of *drb-Identity*.

5.3.10.3a1 DC specific DRB addition or reconfiguration

For the *drb-Identity* value for which this procedure is initiated, the UE shall:

- 1> if *drb-ToAddModListSCG* is received and includes the *drb-Identity* value; and *drb-Identity* value is not part of the current UE configuration (i.e. DC specific DRB establishment):
 - 2> if drb-ToAddModList is received and includes the drb-Identity value (i.e. add split DRB):
 - 3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the *pdcp-Config* included in *drb-ToAddModList*;
 - 3> establish an MCG RLC entity and an MCG DTCH logical channel in accordance with the *rlc-Config, logicalChannelIdentity* and *logicalChannelConfig* included in *drb-ToAddModList*;
 - 3> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the *rlc-ConfigSCG*, *logicalChannelIdentitySCG* and *logicalChannelConfigSCG* included in *drb-ToAddModListSCG*;
 - 2> else (i.e. add SCG DRB):
 - 3> establish a PDCP entity and configure it with the current SCG security configuration and in accordance with the *pdcp-Config* included in *drb-ToAddModListSCG*;
 - 3> establish an SCG RLC entity or entities and an SCG DTCH logical channel in accordance with the *rlc-ConfigSCG*, *logicalChannelIdentitySCG* and *logicalChannelConfigSCG* included in *drb-ToAddModListSCG*;
 - 2> indicate the establishment of the DRB(s) and the *eps-BearerIdentity* of the established DRB(s) to upper layers:
- 1> else (i.e. DC specific DRB modification; drb-ToAddModList and/ or drb-ToAddModListSCG received):
 - 2> if the DRB indicated by *drb-Identity* is a split DRB:
 - 3> if *drb-ToAddModList* is received and includes the *drb-Identity* value, while for this entry *drb-TypeChange* is included and set to *toMCG* (i.e. split to MCG):
 - 4> release the SCG RLC entity and the SCG DTCH logical channel;
 - 4> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
 - 4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the *rlc-Config* and *logicalChannelConfig*, if included in *drb-ToAddModList*;
 - 3> else (i.e. reconfigure split):
 - 4> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
 - 4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the *rlc-Config* and *logicalChannelConfig*, if included in *drb-ToAddModList*;
 - 4> reconfigure the SCG RLC entity and/ or the SCG DTCH logical channel in accordance with the *rlc-ConfigSCG* and *logicalChannelConfigSCG*, if included in *drb-ToAddModListSCG*;
 - 2> if the DRB indicated by *drb-Identity* is an SCG DRB:

- 3> if *drb-ToAddModList* is received and includes the *drb-Identity* value, while for this entry *drb-TypeChange* is included and set to *toMCG* (i.e. SCG to MCG):
 - 4> reconfigure the PDCP entity with the current MCG security configuration and in accordance with the *pdcp-Config*, if included in *drb-ToAddModList*;
 - 4> reconfigure the SCG RLC entity or entities and the SCG DTCH logical channel to be an MCG RLC entity or entities and an MCG DTCH logical channel;
 - 4> reconfigure the MCG RLC entity or entities and/ or the MCG DTCH logical channel in accordance with the *rlc-Config*, *logicalChannelIdentity* and *logicalChannelConfig*, if included in *drb-ToAddModList*;
- 3> else (i.e. drb-ToAddModListSCG is received and includes the drb-Identity value i.e. reconfigure SCG):
 - 4> reconfigure the PDCP entity in accordance with the *pdcp-Config*, if included in *drb-ToAddModListSCG*;
 - 4> reconfigure the SCG RLC entity or entities and/ or the SCG DTCH logical channel in accordance with the *rlc-ConfigSCG* and *logicalChannelConfigSCG*, if included in *drb-ToAddModListSCG*;
- 2> if the DRB indicated by *drb-Identity* is an MCG DRB:
 - 3> if *drb-ToAddModListSCG* is received and includes the *drb-Identity* value, while for this entry *drb-Type* is included and set to *split* (i.e. MCG to split):
 - 4> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
 - 4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the *rlc-Config* and *logicalChannelConfig*, if included in *drb-ToAddModList*;
 - 4> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the rlc-ConfigSCG, logicalChannelIdentitySCG and logicalChannelConfigSCG, included in drb-ToAddModListSCG;
 - 3> else (i.e. *drb-Type* is included and set to *scg* i.e. MCG to SCG):
 - 4> reconfigure the PDCP entity with the current SCG security configuration and in accordance with the *pdcp-Config*, if included in *drb-ToAddModListSCG*;
 - 4> reconfigure the MCG RLC entity or entities and the MCG DTCH logical channel to be an SCG RLC entity or entities and an SCG DTCH logical channel;
 - 4> reconfigure the SCG RLC entity or entities and/ or the SCG DTCH logical channel in accordance with the *rlc-ConfigSCG*, *logicalChannelIdentitySCG* and *logicalChannelConfigSCG*, if included in *drb-ToAddModListSCG*;

5.3.10.3a2 LWA specific DRB addition or reconfiguration

For the *drb-Identity* value for which this procedure is initiated, the UE shall:

- 1> if the *drb-Identity* value is not part of the current UE configuration (i.e. add LWA DRB):
 - 2> establish a PDCP entity and configure it with the current security configuration and in accordance with the *pdcp-Config* included in *drb-ToAddModList*;
 - 2> establish an RLC entity and an DTCH logical channel in accordance with the *rlc-Config, logicalChannelIdentity* and *logicalChannelConfig* included in *drb-ToAddModList*;
 - 2> enable data handling for this DRB at the LWAAP entity;
 - 2> if *lwa-WLAN-AC* is configured:
 - 3> apply the received *lwa-WLAN-AC* when performing transmissions of packets for this DRB over WLAN;
 - 2> indicate the establishment of the DRB and the eps-BearerIdentity of the established DRB to upper layers;

- 1> else if the DRB indicated by *drb-Identity* is not an LWA DRB (i.e. LTE only to LWA DRB):
 - 2> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
 - 2> reconfigure the RLC entity and/ or the DTCH logical channel in accordance with the *rlc-Config* and *logicalChannelConfig*, if included in *drb-ToAddModList*;
 - 2> enable data handling for this DRB at the LWAAP entity;
 - 2> if *lwa-WLAN-AC* is configured:
 - 3> apply the received lwa-WLAN-AC when performing transmissions of packets for this DRB over WLAN;
- 1> else if the concerned entry of *drb-ToAddModList* includes the *drb-TypeLWA* set to *FALSE* (i.e. LWA to LTE only DRB):
 - 2> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
 - 2> reconfigure the RLC entity and/ or the DTCH logical channel in accordance with the *rlc-Config* and *logicalChannelConfig*, if included in *drb-ToAddModList*;
 - 2> perform PDCP data recovery as specified in TS 36.323 [8] if bearer is configured with RLC AM;
 - 2> disable data handling for this DRB at the LWAAP entity;
- 1> else (i.e. reconfigure LWA DRB):
 - 2> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
 - 2> reconfigure the RLC entity and/ or the DTCH logical channel in accordance with the *rlc-Config* and *logicalChannelConfig*, if included in *drb-ToAddModList*;
 - 2> if *lwa-WLAN-AC* is configured:

3>apply the received lwa-WLAN-AC when performing transmissions of packets for this DRB over WLAN;

5.3.10.3a3 LWIP specific DRB addition or reconfiguration

For the *drb-Identity* value for which this procedure is initiated, the UE shall:

- 1> if the *drb-TypeLWIP* is set to *lwip*:
 - 2> indicate to higher layers to use LWIP resources in both UL and DL for the DRB associated with the *drb-Identity*;
 - 2> if *lwip-DL-Aggregation* is set to TRUE:
 - 3> indicate to higher layers to apply decoding of LWIPEP header with GRE sequence number for both LTE and WLAN DL reception for the DRB associated with the *drb-Identity*;
 - 2> if *lwip-DL-Aggregation* is set to FALSE:
 - 3> indicate to higher layers to stop decoding of LWIPEP header with GRE sequence number for both LTE and WLAN DL reception for the DRB associated with the *drb-Identity*;
 - 2> if *lwip-UL-Aggregation* is set to TRUE:
 - 3> indicate to higher layers to insert LWIPEP header with GRE sequence number for both LTE and WLAN UL transmissions for the DRB associated with the *drb-Identity*;
 - 2> if *lwip-UL-Aggregation* is set to FALSE:
 - 3> indicate to higher layers to stop inserting LWIPEP header with GRE sequence number for both LTE and WLAN UL transmissions for the DRB associated with the *drb-Identity*;
- 1> if the *drb-TypeLWIP* is set to *lwip-DL-only*:

- 2> indicate to higher layers to use LWIP resources in the DL only for the DRB associated with the drb-Identity;
- 2> if *lwip-DL-Aggregation* is set to TRUE:
 - 3> indicate to higher layers to apply decoding of LWIPEP header with GRE sequence number for both LTE and WLAN DL reception for the DRB associated with the *drb-Identity*;
- 1> if the *drb-TypeLWIP* is set to *lwip-UL-only*:
 - 2> indicate to higher layers to use LWIP resources in the UL only for the DRB associated with the drb-Identity;
 - 2> if *lwip-UL-Aggregation* is set to TRUE:
 - 3> indicate to higher layers to insert LWIPEP header with GRE sequence number for both LTE and WLAN UL transmissions for the DRB associated with the *drb-Identity*;
- 1> if the *drb-TypeLWIP* is set to *eutran*:
 - 2> indicate to higher layers to stop using LWIP resources for the DRB associated with the *drb-Identity*;

5.3.10.3a SCell release

The UE shall:

- 1> if the release is triggered by reception of the sCellToReleaseList or the sCellToReleaseListSCG:
 - 2> for each sCellIndex value included either in the sCellToReleaseList or in the sCellToReleaseListSCG:
 - 3> if the current UE configuration includes an SCell with value sCellIndex:
 - 4> release the SCell;
- 1> if the release is triggered by RRC connection re-establishment:
 - 2> release all SCells that are part of the current UE configuration;

5.3.10.3b SCell addition/ modification

- 1> for each *sCellIndex* value included either in the *sCellToAddModList* or in the *sCellToAddModListSCG* that is not part of the current UE configuration (SCell addition):
 - 2> add the SCell, corresponding to the *cellIdentification*, in accordance with the radioResourceConfigCommonSCell and radioResourceConfigDedicatedSCell, both included either in the sCellToAddModList or in the sCellToAddModListSCG;
 - 2> configure lower layers to consider the SCell to be in deactivated state;
 - 2> for each measId included in the measIdList within VarMeasConfig:
 - 3> if SCells are not applicable for the associated measurement; and
 - 3> if the concerned SCell is included in *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*:
 - 4> remove the concerned SCell from *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
- 1> for each *sCellIndex* value included either in the *sCellToAddModList* or in the *sCellToAddModListSCG* that is part of the current UE configuration (SCell modification):
 - 2> modify the SCell configuration in accordance with the *radioResourceConfigDedicatedSCell*, included either in the *sCellToAddModList* or in the *sCellToAddModListSCG*;

5.3.10.3c PSCell addition or modification

The UE shall:

- 1> if the PSCell is not part of the current UE configuration (i.e. PSCell addition):
 - 2> add the PSCell, corresponding to the *cellIdentification*, in accordance with the received *radioResourceConfigCommonPSCell* and *radioResourceConfigDedicatedPSCell*;
 - 2> configure lower layers to consider the PSCell to be in activated state;
- 1> if the PSCell is part of the current UE configuration (i.e. PSCell modification):
 - 2> modify the PSCell configuration in accordance with the received radioResourceConfigDedicatedPSCell;

5.3.10.4 MAC main reconfiguration

Except for NB-IoT, the UE shall:

- 1> if the procedure is triggered to perform SCG MAC main reconfiguration:
 - 2> if SCG MAC is not part of the current UE configuration (i.e. SCG establishment):
 - 3> create an SCG MAC entity;
 - 2> reconfigure the SCG MAC main configuration as specified in the following i.e. assuming it concerns the SCG MAC whenever MAC main configuration is referenced and that it is based on the received *mac-MainConfigSCG* instead of *mac-MainConfig*:
- 1> reconfigure the MAC main configuration in accordance with the received *mac-MainConfig* other than *stag-ToReleaseList* and *stag-ToAddModList*;
- 1> if the received mac-MainConfig includes the stag-ToReleaseList:
 - 2> for each STAG-Id value included in the stag-ToReleaseList that is part of the current UE configuration:
 - 3> release the STAG indicated by STAG-Id;
- 1> if the received *mac-MainConfig* includes the *stag-ToAddModList*:
 - 2> for each *stag-Id* value included in *stag-ToAddModList* that is not part of the current UE configuration (STAG addition):
 - 3> add the STAG, corresponding to the *stag-Id*, in accordance with the received *timeAlignmentTimerSTAG*;
 - 2> for each *stag-Id* value included in *stag-ToAddModList* that is part of the current UE configuration (STAG modification):
 - 3> reconfigure the STAG, corresponding to the *stag-Id*, in accordance with the received *timeAlignmentTimerSTAG*;

For NB-IoT, the UE shall:

1> reconfigure the MAC main configuration in accordance with the received *mac-MainConfig*;

5.3.10.5 Semi-persistent scheduling reconfiguration

The UE shall:

1> reconfigure the semi-persistent scheduling in accordance with the received *sps-Config*;

5.3.10.6 Physical channel reconfiguration

Except for NB-IoT, the UE shall:

- 1> if the *antennaInfo-r10* is included in the received *physicalConfigDedicated* and the previous version of this field that was received by the UE was *antennaInfo* (without suffix i.e. the version defined in REL-8):
 - 2> apply the default antenna configuration as specified in 9.2.4;
- 1> if the *cqi-ReportConfig-r10* is included in the received *physicalConfigDedicated* and the previous version of this field that was received by the UE was *cqi-ReportConfig* (without suffix i.e. the version defined in REL-8):
 - 2> apply the default CQI reporting configuration as specified in 9.2.4;
- NOTE: Application of the default configuration involves release of all extensions introduced in REL-9 and later.
- 1> reconfigure the physical channel configuration in accordance with the received physicalConfigDedicated;
- 1> if the *antennalnfo* is included and set to *explicitValue*:
 - 2> if the configured transmissionMode is tm1, tm2, tm5, tm6 or tm7; or
 - 2> if the configured transmissionMode is tm8 and pmi-RI-Report is not present; or
 - 2> if the configured transmissionMode is tm9 and pmi-RI-Report is not present; or
 - 2> if the configured *transmissionMode* is *tm9* and *pmi-RI-Report* is present and *antennaPortsCount* within *csi-RS* is set to *an1*:
 - 3> release ri-ConfigIndex in cqi-ReportPeriodic, if previously configured;
- 1> else if the *antennaInfo* is included and set to *defaultValue*:
 - 2> release *ri-ConfigIndex* in *cqi-ReportPeriodic*, if previously configured;
- 1> if the *pusch-EnhancementsConfig* is included in the received *physicalConfigDedicated*, for the associated serving cell:
 - 2> if PUSCH enhancement mode is previously released or not configured and *pusch-EnhancementsConfig* is set to *setup*, or
 - 2> if PUSCH enhancement mode is previously configured and *pusch-EnhancementConfig* is set to *release*:
 - 3> instruct the associated MAC entity to perform partial reset;
- 1> if the procedure was not triggered due to handover and *ce-Mode* is included in the received *physicalConfigDedicated*, for the associated serving cell:
 - 2> if ce-Mode is not currently configured and ce-Mode is set to setup, or
 - 2> if *ce-Mode* is currently configured and *ce-Mode* is set to *release*:
 - 3> instruct the associated MAC entity to perform partial reset;

For NB-IoT, the UE shall:

- 1> if the *carrierConfigDedicated* is not included in the received *physicalConfigDedicated*:
 - 2> if the UE is configured with a carrier configuration previously received in *carrierConfigDedicated*:
 - 3> use the carrier configuration received in *carrierConfigDedicated*;
 - 2> else:
 - 3> use the carrier configuration received in system information for the uplink and downlink carrier used during the random access procedure;
- 1> else:
 - 2> use the carrier configuration received in *carrierConfigDedicated*;

- 2> start to use the new carrier immediately after the last transport block carrying the RRC message has been acknowledged by the MAC layer, and any subsequent RRC response message sent for the current RRC procedure is therefore sent on the new carrier;
- 1> reconfigure the physical channel configuration in accordance with the received physical Config Dedicated.

5.3.10.7 Radio Link Failure Timers and Constants reconfiguration

The UE shall:

- 1> if the received *rlf-TimersAndConstants* is set to release:
 - 2> use values for timers T301, T310, T311 and constants N310, N311, as included in *ue-TimersAndConstants* received in *SystemInformationBlockType2* (or *SystemInformationBlockType2-NB* in NB-IoT);
- 1> else:
 - 2> reconfigure the value of timers and constants in accordance with received rlf-TimersAndConstants;
- 1> if the received *rlf-TimersAndConstantsSCG* is set to release:
 - 2> stop timer T313, if running, and
 - 2> release the value of timer t313 as well as constants n313 and n314;
- 1> else:
 - 2> reconfigure the value of timers and constants in accordance with received rlf-TimersAndConstantsSCG;

5.3.10.8 Time domain measurement resource restriction for serving cell

The UE shall:

- 1> if the received *measSubframePatternPCell* is set to *release*:
 - 2> release the time domain measurement resource restriction for the PCell, if previously configured
- 1> else:
 - 2> apply the time domain measurement resource restriction for the PCell in accordance with the received *measSubframePatternPCell*;

5.3.10.9 Other configuration

- 1> if the received *otherConfig* includes the *reportProximityConfig*:
 - 2> if *proximityIndicationEUTRA* is set to *enabled*:
 - 3> consider itself to be configured to provide proximity indications for E-UTRA frequencies in accordance with 5.3.14;
 - 2> else:
 - 3> consider itself not to be configured to provide proximity indications for E-UTRA frequencies;
 - 2> if proximityIndicationUTRA is set to enabled:
 - 3> consider itself to be configured to provide proximity indications for UTRA frequencies in accordance with 5.3.14;
 - 2> else:
 - 3> consider itself not to be configured to provide proximity indications for UTRA frequencies;

- 1> if the received *otherConfig* includes the *obtainLocation*:
 - 2> attempt to have detailed location information available for any subsequent measurement report;
- NOTE: The UE is requested to attempt to have valid detailed location information available whenever sending a measurement report for which it is configured to include available detailed location information. The UE may not succeed e.g. because the user manually disabled the GPS hardware, due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.
- 1> if the received *otherConfig* includes the *idc-Config*:
 - 2> if *idc-Indication* is included (i.e. set to *setup*):
 - 3> consider itself to be configured to provide IDC indications in accordance with 5.6.9;
 - 3> if *idc-Indication-UL-CA* is included (i.e. set to *setup*):
 - 4> consider itself to be configured to indicate UL CA related information in IDC indications in accordance with 5.6.9;
 - 2> else:
 - 3> consider itself not to be configured to provide IDC indications;
 - 2> if autonomousDenialParameters is included:
 - 3> consider itself to be allowed to deny any transmission in a particular UL subframe if during the number of subframes indicated by *autonomousDenialValidity*, preceding and including this particular subframe, it autonomously denied fewer UL subframes than indicated by *autonomousDenialSubframes*;
 - 2> else:
 - 3> consider itself not to be allowed to deny any UL transmission;
- 1> if the received *otherConfig* includes the *powerPrefIndicationConfig*:
 - 2> if powerPrefIndicationConfig is set to setup:
 - 3> consider itself to be configured to provide power preference indications in accordance with 5.6.10;
 - 2> else:
 - 3> consider itself not to be configured to provide power preference indications;
- 1> if the received *otherConfig* includes the sps-AssistanceInfoReport:
 - 2> if *sps-AssistanceInfoReport* is set to TRUE:
 - 3> consider itself to be configured to provide SPS assistance information in accordance with 5.6.10;
 - 2> else
 - 3> consider itself not to be configured to provide SPS assistance information;
- 1> if the received *otherConfig* includes the *bw-PreferenceIndicationTimer*.
 - 2> consider itself to be configured to provide maximum PDSCH/PUSCH bandwidth preference indication in accordance with 5.6.10;
- 1> else:
 - 2> consider itself not to be configured to provide maximum PDSCH/PUSCH bandwidth indication preference;
- 1> if the received other Config includes the delay Budget Reporting Config:
 - 2> if delayBudgetReportingConfig is set to setup:
 - 3> consider itself to be configured to send delay budget reports in accordance with 5.6.18;

- 2> else:
 - 3> consider itself not to be configured to send delay budget reports and stop timer T342, if running;
- 1> for BL UEs or UEs in CE, if the received *otherConfig* includes the *rlm-ReportConfig*:
 - 2> if *rlm-ReportConfig* is set to *setup*:
 - 3> consider itself to be configured to detect "early-out-of-sync" and "early-in-sync" RLM events as specified in 5.3.11:
 - 3> if *rlmReportRep-MPDCCH* is set to *setup*:
 - 4> consider itself to be configured to report rlmReportRep-MPDCCH in accordance with 5.6.10;
 - 2> else:
 - 3> consider itself not to be configured to detect "early-out-of-sync" and "early-in-sync" RLM events and stop timer T343, timer T344, timer T314 and timer T315 if running;

5.3.10.10 SCG reconfiguration

- 1> if makeBeforeBreakSCG is configured:
 - 2> stop timer T313, if running;
 - 2> start timer T307 with the timer value set to t307, as included in the mobilityControlInfoSCG;
 - 2> start synchronising to the DL of the target PSCell, if needed;
 - 2> perform the remainder of this procedure including and following resetting MAC after the UE has stopped the uplink transmission/downlink reception with the source SCG cell(s);
- NOTE 0a: It is up to UE implementation when to stop the uplink transmission/ downlink reception with the source SCG cell(s) to initiate re-tuning for the connection to the target cell [16], if *makeBeforeBreakSCG* is configured.
- 1> if the received *scg-Configuration* is set to *release* or includes the *mobilityControlInfoSCG* (i.e. SCG release/change):
 - 2> if *mobilityControlInfo* is not received (i.e. SCG release/ change without HO):
 - 3> reset SCG MAC, if configured;
 - 3> for each drb-Identity value that is part of the current UE configuration:
 - 4> if the DRB indicated by *drb-Identity* is an SCG DRB:
 - 5> re-establish the PDCP entity and the SCG RLC entity or entities;
 - 4> if the DRB indicated by *drb-Identity* is a split DRB:
 - 5> perform PDCP data recovery and re-establish the SCG RLC entity;
 - 4> if the DRB indicated by drb-Identity is an MCG DRB; and
 - 4> drb-ToAddModListSCG is received and includes the drb-Identity value, while for this entry drb-Type is included and set to scg (i.e. MCG to SCG):
 - 5> re-establish the PDCP entity and the MCG RLC entity or entities;
 - 3> configure lower layers to consider the SCG SCell(s), except for the PSCell, to be in deactivated state;
- 1> if the received *scg-Configuration* is set to *release*:

- 2> release the entire SCG configuration, except for the DRB configuration (i.e. as configured by *drb-ToAddModListSCG*);
- 2> if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:
 - 3> reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;
- 2> stop timer T313, if running;
- 2> stop timer T307, if running;

1> else:

- 2> if the received *scg-ConfigPartMCG* includes the *scg-Counter*:
 - 3> update the S-K_{eNB} key based on the K_{eNB} key and using the received *scg-Counter* value, as specified in TS 33.401 [32];
 - 3> derive the K_{UPenc} key associated with the *cipheringAlgorithmSCG* included in *mobilityControlInfoSCG* within the received *scg-ConfigPartSCG*, as specified in TS 33.401 [32];
 - 3> configure lower layers to apply the ciphering algorithm and the K_{UPenc} key;
- 2> if the received scg-ConfigPartSCG includes the radioResourceConfigDedicatedSCG:
 - 3> reconfigure the dedicated radio resource configuration for the SCG as specified in 5.3.10.11;
- 2> if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:
 - 3> reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;
- 2> if the received *scg-ConfigPartSCG* includes the *sCellToReleaseListSCG*:
 - 3> perform SCell release for the SCG as specified in 5.3.10.3a;
- 2> if the received scg-ConfigPartSCG includes the pSCellToAddMod:
 - 3> perform PSCell addition or modification as specified in 5.3.10.3c;
- NOTE 0: This procedure is also used to release the PSCell e.g. PSCell change, SI change for the PSCell.
 - 2> if the received scg-ConfigPartSCG includes the sCellToAddModListSCG:
 - 3> perform SCell addition or modification as specified in 5.3.10.3b;
 - 2> configure lower layers in accordance with mobilityControlInfoSCG, if received;
 - 2> if *rach-SkipSCG* is configured:
 - 3> configure lower layers to apply the *rach-SkipSCG* for the target SCG, as specified in TS 36.213 [23] and TS 36.321 [6];
 - 2> if the received scg-ConfigPartSCG includes the mobilityControlInfoSCG (i.e. SCG change):
 - 3> resume all SCG DRBs and resume SCG transmission for split DRBs, if suspended;
 - 3> stop timer T313, if running;
 - 3> start timer T307 with the timer value set to *t307*, as included in the *mobilityControlInfoSCG*, if *makeBeforeBreakSCG* is not configured;
 - 3> start synchronising to the DL of the target PSCell;

- 3> initiate the random access procedure on the PSCell, as specified in TS 36.321 [6], if *rach-SkipSCG* is not configured:
- NOTE 1: The UE is not required to determine the SFN of the target PSCell by acquiring system information from that cell before performing RACH access in the target PSCell.
 - 3> the procedure ends, except that the following actions are performed when MAC successfully completes the random access procedure on the PSCell or when MAC indicates the successful reception of a PDCCH transmission addressed to C-RNTI and if *rach-skipSCG* is configured:
 - 4> stop timer T307;
 - 4> release *ul-ConfigInfo*, if configured;
 - 4> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PSCell, if any;
 - 4> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PSCell (e.g. periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PSCell;
- NOTE 2: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

5.3.10.11 SCG dedicated resource configuration

The UE shall:

- 1> if the received radioResourceConfigDedicatedSCG includes the drb-ToAddModListSCG:
 - 2> for each *drb-Identity* value included in the *drb-ToAddModListSCG* perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1
- 1> if the received radioResourceConfigDedicatedSCG includes the mac-MainConfigSCG:
 - 2> perform the SCG MAC main reconfiguration as specified in 5.3.10.4;
- 1> if the received *radioResourceConfigDedicatedSCG* includes the *rlf-TimersAndConstantsSCG*:
 - 2> reconfigure the values of timers and constants as specified in 5.3.10.7;

5.3.10.12 Reconfiguration SCG or split DRB by *drb-ToAddModList*

The UE shall:

- 1> for each split or SCG DRBs that is part of the current configuration:
 - 2> if the corresponding drb-Identity value is included in the received drb-ToAddModList; and
 - 2> if the corresponding *drb-Identity* value is not included in the received *drb-ToAddModListSCG* (i.e. reconfigure split, split to MCG or SCG to MCG):
 - 3> perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1;

5.3.10.13 Neighbour cell information reconfiguration

- 1> if the received *naics-Info* is set to *release*:
 - 2> instruct lower layer to release all the NAICS neighbour cell information for the concerned cell, if previously configured;
- 1> if the received *naics-Info* includes the *neighCellsToReleaseList-r12*:

- 2> for each *physCellId-r12* value included in the *neighCellsToReleaseList-r12* that is part of the current NAICS neighbour cell information of the concerned cell:
 - 3> instruct lower layer to release the NAICS neighbour cell information for the concerned cell;
- 1> if the received *naics-Info* includes the *NeighCellsToAddModList-r12*:
 - 2> for each *physCellId-r12* value included in the *neighCellsToAddModList-r12* that is not part of the current NAICS neighbour cell information of the concerned cell:
 - 3> instruct lower layer to add the NAICS neighbour cell information for the concerned cell;
 - 2> for each *physCellId-r12* value included in the *neighCellsToAddModList-r12* that is part of the current NAICS neighbour cell information of the concerned cell:
 - 3> instruct lower layer to modify the NAICS neighbour cell information in accordance with the received *NeighCellsInfo* for the concerned cell;

5.3.10.14 Void

5.3.10.15 Sidelink dedicated configuration

- 1> if the RRCConnectionReconfiguration message includes the sl-CommConfig:
 - 2> if *commTxResources* is included and set to *setup*:
 - 3> from the next SC period use the resources indicated by *commTxResources* for sidelink communication transmission, as specified in 5.10.4;
 - 2> else if *commTxResources* is included and set to *release*:
 - 3> from the next SC period, release the resources allocated for sidelink communication transmission previously configured by *commTxResources*;
- 1> if the RRCConnectionReconfiguration message includes the sl-DiscConfig:
 - 2> if *discTxResources* is included and set to *setup*:
 - 3> from the next discovery period, as defined by *discPeriod*, use the resources indicated by *discTxResources* for sidelink discovery announcement, as specified in 5.10.6;
 - 2> else if *discTxResources* is included and set to *release*:
 - 3> from the next discovery period, as defined by discPeriod, release the resources allocated for sidelink discovery announcement previously configured by discTxResources;
 - 2> if discTxResourcesPS is included and set to setup:
 - 3> from the next discovery period, as defined by *discPeriod*, use the resources indicated by *discTxResourcesPS* for sidelink discovery announcement, as specified in 5.10.6;
 - 2> else if *discTxResourcesPS* is included and set to *release*:
 - 3> from the next discovery period, as defined by discPeriod, release the resources allocated for sidelink discovery announcement previously configured by discTxResourcesPS;
 - 2> if discTxInterFreqInfo is included and set to setup:
 - 3> from the next discovery period, as defined by *discPeriod*, use the resources indicated by *discTxInterFreqInfo* for sidelink discovery announcement, as specified in 5.10.6;
 - 2> else if *discTxInterFreqInfo* is included and set to *release*:

- 3> from the next discovery period, as defined by *discPeriod*, release the resources allocated for sidelink discovery announcement previously configured by *discTxInterFreqInfo*;
- 2> if *discRxGapConfig* is included and set to *setup*:
 - 3> from the next gap period, as defined by *gapPeriod*, use the gaps indicated by *discRxGapConfig* for sidelink discovery monitoring, as specified in 5.10.5;
- 2> else if *discRxGapConfig* is included and set to *release*:
 - 3> from the next gap period, as defined by *gapPeriod*, release the gaps configured for sidelink discovery monitoring previously configured by *discRxGapConfig*;
- 2> if discTxGapConfig is included and set to setup:
 - 3> from the next gap period, as defined by *gapPeriod*, use the gaps indicated by *discTxGapConfig* for sidelink discovery announcement, as specified in 5.10.6;
- 2> else if *discTxGapConfig* is included and set to *release*:
 - 3> from the next gap period, as defined by *gapPeriod*, release the gaps configured for sidelink discovery announcement previously configured by *discTxGapConfig*;
- 2> if *discSysInfoToReportConfig* is included and set to *setup*:
 - 3> start timer T370 with the timer value set to 60s;
- 2> else if *discSysInfoToReportConfig* is included and set to *release*:
 - 3> stop timer T370 and release discSysInfoToReportConfig;

5.3.10.15a V2X sidelink Communication dedicated configuration

- 1> if the RRCConnectionReconfiguration message includes the sl-V2X-ConfigDedicated:
 - 2> if *commTxResources* is included and set to *setup*:
 - 3> use the resources indicated by *commTxResources* for V2X sidelink communication transmission, as specified in 5.10.13;
 - 3> perform CBR measurement on the transmission resource pool indicated in *commTxResources* for V2X sidelink communication transmission, as specified in 5.5.3;
 - 2> else if *commTxResources* is included and set to *release*:
 - 3> release the resources allocated for V2X sidelink communication transmission previously configured by *commTxResources*;
 - 2> if *v2x-InterFreqInfoList* is included:
 - 3> use the synchronization configuration and resource configuration parameters for V2X sidelink communication on frequencies included in *v2x-InterFreqInfoList*, as specified in 5.10.13;
 - 3> perform CBR measurement on the transmission resource pool indicated in *v2x-InterFreqInfoList* for V2X sidelink communication transmission, as specified in 5.5.3;
- 1> if the RRCConnectionReconfiguration message includes the mobilityControlInfoV2X:
 - 2> if *v2x-CommRxPool* is included:
 - 3> use the resources indicated by *v2x-CommRxPool* for V2X sidelink communication reception, as specified in 5.10.12;
 - 2> if *v2x-CommTxPoolExceptional* is included:

- 3> use the resources indicated by *v2x-CommTxPoolExceptional* for V2X sidelink communication transmission, as specified in 5.10.13;
- 3> perform CBR measurement on the transmission resource pool indicated by *v2x-CommTxPoolExceptional* for V2X sidelink communication transmission, as specified in 5.5.3;

5.3.10.16 T370 expiry

The UE shall:

- 1> if T370 expires:
 - 2> release discSysInfoToReportConfig;

5.3.11 Radio link failure related actions

5.3.11.1 Detection of physical layer problems in RRC CONNECTED

The UE shall:

- 1> upon receiving N310 consecutive "out-of-sync" indications for the PCell from lower layers while neither T300, T301, T304 nor T311 is running:
 - 2> start timer T310;
- 1> upon receiving N313 consecutive "out-of-sync" indications for the PSCell from lower layers while T307 is not running:
 - 2> start T313;

NOTE: Physical layer monitoring and related autonomous actions do not apply to SCells except for the PSCell.

5.3.11.1a Early detection of physical layer problems in RRC CONNECTED

The UE shall:

- 1> upon receiving N310 consecutive "early-out-of-sync" indications for the PCell from lower layers:
 - 2> start timer T314 with the timer value set to the value of T310;

5.3.11.1b Detection of physical layer improvements in RRC_CONNECTED

The UE shall:

- 1> upon receiving N311 consecutive "early-in-sync" indications for the PCell from lower layers:
 - 2> start timer T315 with the timer value set to the value of T310;

5.3.11.2 Recovery of physical layer problems

Upon receiving N311 consecutive "in-sync" indications for the PCell from lower layers while T310 is running, the UE shall:

- 1> stop timer T310;
- 1> stop timer T312, if running;
- NOTE 1: In this case, the UE maintains the RRC connection without explicit signalling, i.e. the UE maintains the entire radio resource configuration.
- NOTE 2: Periods in time where neither "in-sync" nor "out-of-sync" is reported by layer 1 do not affect the evaluation of the number of consecutive "in-sync" or "out-of-sync" indications.

Upon receiving N314 consecutive "in-sync" indications for the PSCell from lower layers while T313 is running, the UE shall:

1> stop timer T313;

5.3.11.2a Recovery of early detection of physical layer problems

Upon receiving N311 consecutive "in-sync" indications for the PCell from lower layers while T314 is running, the UE shall:

1> stop timer T314;

5.3.11.2b Cancellation of physical layer improvements in RRC CONNECTED

Upon receiving N311 consecutive "in-sync" indications for the PCell from lower layers while T315 is running, the UE shall:

1> stop timer T315;

5.3.11.3 Detection of radio link failure

- 1> upon T310 expiry; or
- 1> upon T312 expiry; or
- 1> upon random access problem indication from MCG MAC while neither T300, T301, T304 nor T311 is running; or
- 1> upon indication from MCG RLC that the maximum number of retransmissions has been reached for an SRB or for an MCG or split DRB:
 - 2> consider radio link failure to be detected for the MCG i.e. RLF;
 - 2> except for NB-IoT, store the following radio link failure information in the *VarRLF-Report* by setting its fields as follows:
 - 3> clear the information included in VarRLF-Report, if any;
 - 3> set the plmn-IdentityList to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);
 - 3> set the *measResultLastServCell* to include the RSRP and RSRQ, if available, of the PCell based on measurements collected up to the moment the UE detected radio link failure;
 - 3> set the measResultNeighCells to include the best measured cells, other than the PCell, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected radio link failure, and set its fields as follows;
 - 4> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the *measResultListEUTRA*;
 - 4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the *measResultListUTRA*;
 - 4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN frequencies, include the *measResultListGERAN*;
 - 4> if the UE was configured to perform measurement reporting for one or more neighbouring CDMA2000 frequencies, include the *measResultsCDMA2000*;
 - 4> for each neighbour cell included, include the optional fields that are available;

- NOTE 1: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.
 - 3> if detailed location information is available, set the content of the *locationInfo* as follows:
 - 4> include the *locationCoordinates*:
 - 4> include the *horizontalVelocity*, if available;
 - 3> set the *failedPCellId* to the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of the PCell where radio link failure is detected;
 - 3> set the *tac-FailedPCell* to the tracking area code, if available, of the PCell where radio link failure is detected:
 - 3> if an RRCConnectionReconfiguration message including the mobilityControlInfo was received before the connection failure:
 - 4> if the last RRCConnectionReconfiguration message including the mobilityControlInfo concerned an intra E-UTRA handover:
 - 5> include the *previousPCellId* and set it to the global cell identity of the PCell where the last *RRCConnectionReconfiguration* message including *mobilityControlInfo* was received;
 - 5> set the *timeConnFailure* to the elapsed time since reception of the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo*;
 - 4> if the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo* concerned a handover to E-UTRA from UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO:
 - 5> include the *previousUTRA-CellId* and set it to the physical cell identity, the carrier frequency and the global cell identity, if available, of the UTRA Cell in which the last *RRCConnectionReconfiguration* message including *mobilityControlInfo* was received;
 - 5> set the *timeConnFailure* to the elapsed time since reception of the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo*;
 - 3> if the UE supports QCI1 indication in Radio Link Failure Report and has a DRB for which QCI is 1:
 - 4> include the *drb-EstablishedWithQCI-1*;
 - 3> set the *connectionFailureType* to *rlf*;
 - 3> set the *c-RNTI* to the C-RNTI used in the PCell;
 - 3> set the *rlf-Cause* to the trigger for detecting radio link failure;
 - 2> if AS security has not been activated:
 - 3> if the UE is a NB-IoT UE:
 - 4> if the UE supports RRC connection re-establishment for the Control Plane CIoT EPS optimisation:
 - 5> initiate the RRC connection re-establishment procedure as specified in 5.3.7;
 - 4> else:
 - 5> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';
 - 3> else:
 - 4> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

2> else:

3> initiate the connection re-establishment procedure as specified in 5.3.7;

The UE shall:

- 1> upon T313 expiry; or
- 1> upon random access problem indication from SCG MAC; or
- 1> upon indication from SCG RLC that the maximum number of retransmissions has been reached for an SCG or split DRB:
 - 2> consider radio link failure to be detected for the SCG i.e. SCG-RLF;
 - 2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG radio link failure;

The UE may discard the radio link failure information, i.e. release the UE variable *VarRLF-Report*, 48 hours after the radio link failure is detected, upon power off or upon detach.

5.3.11.3a Detection of early-out-of-sync event

The UE shall:

- 1> upon T314 expiry;
 - 2> consider "early-out-of-sync" event to be detected and initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10;

5.3.11.3b Detection of early-in-sync event

The UE shall:

- 1> upon T315 expiry;
 - 2> consider "early-in-sync" event to be detected and initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10;

5.3.12 UE actions upon leaving RRC_CONNECTED

Upon leaving RRC_CONNECTED, the UE shall:

- 1> reset MAC;
- 1> stop all timers that are running except T320, T322, T325, T330;
- 1> if leaving RRC_CONNECTED was triggered by suspension of the RRC:
 - 2> re-establish RLC entities for all SRBs and DRBs;
 - 2> store the UE AS Context including the current RRC configuration, the current security context, the PDCP state including ROHC state, C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell;
 - 2> store the following information provided by E-UTRAN:
 - 3> the resumeIdentity;
 - 2> suspend all SRB(s) and DRB(s), except SRB0;
 - 2> indicate the suspension of the RRC connection to upper layers;
 - 2> configure lower layers to suspend integrity protection and ciphering;
- NOTE 1: Ciphering is not applied for the subsequent *RRCConnectionResume* message used to resume the connection. An integrity check is performed by lower layers, but merely upon request from RRC.

- 1> else:
 - 2> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity for all established RBs;

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- 2> indicate the release of the RRC connection to upper layers together with the release cause;
- 1> if leaving RRC_CONNECTED was triggered neither by reception of the *MobilityFromEUTRACommand* message nor by selecting an inter-RAT cell while T311 was running:
 - 2> if timer T350 is configured:
 - 3> start timer T350;
 - 3> apply *rclwi-Configuration* if configured, otherwise apply the *wlan-Id-List* corresponding to the RPLMN included in *SystemInformationBlockType17*;
 - 2> else:
 - 3> release the wlan-OffloadConfigDedicated, if received;
 - 3> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:
 - 4> apply the *wlan-OffloadConfigCommon* corresponding to the RPLMN included in *SystemInformationBlockType17*;
 - 4> apply *steerToWLAN* if configured, otherwise apply the *wlan-Id-List* corresponding to the RPLMN included in *SystemInformationBlockType17*;
 - 2> enter RRC_IDLE and perform procedures as specified in TS 36.304 [4, 5.2.7];
- 1> else:
 - 2> release the wlan-OffloadConfigDedicated, if received;
- NOTE 2: BL UEs or UEs in CE verifies validity of SI when released to RRC_IDLE.
- 1> release the LWA configuration, if configured, as described in 5.6.14.3;
- 1> release the LWIP configuration, if configured, as described in 5.6.17.3;

5.3.13 UE actions upon PUCCH/ SRS release request

Upon receiving a PUCCH release request from lower layers, for an indicated serving cell the UE shall:

- 1> apply the default physical channel configuration for *cqi-ReportConfig* for the indicated serving cell as specified in 9.2.4 and release *cqi-ReportConfigSCell*, for each SCell that sends HARQ feedback on the indicated serving cell, if any;
- 1> apply the default physical channel configuration for *schedulingRequestConfig* as specified in 9.2.4, for the concerned CG;

Upon receiving an SRS release request from lower layers, for an indicated serving cell the UE shall:

1> apply the default physical channel configuration for soundingRS-UL-ConfigDedicated, as specified in 9.2.4;

NOTE: Upon PUCCH/ SRS release request, the UE does not modify the *soundingRS-UL-ConfigDedicatedAperiodic* i.e. it does not apply the default for this field (release).

5.3.14 Proximity indication

5.3.14.1 General

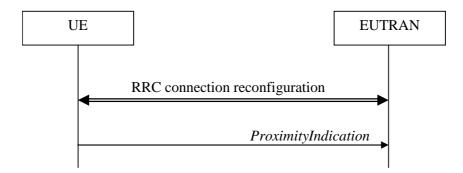


Figure 5.3.14.1-1: Proximity indication

The purpose of this procedure is to indicate that the UE is entering or leaving the proximity of one or more CSG member cells. The detection of proximity is based on an autonomous search function as defined in TS 36.304 [4].

5.3.14.2 Initiation

A UE in RRC_CONNECTED shall:

- 1> if the UE enters the proximity of one or more CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or
- 1> if the UE enters the proximity of one or more CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells; or
- 1> if the UE leaves the proximity of all CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or
- 1> if the UE leaves the proximity of all CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells:
 - 2> if the UE has previously not transmitted a *ProximityIndication* for the RAT and frequency during the current RRC connection, or if more than 5 s has elapsed since the UE has last transmitted a *ProximityIndication* (either entering or leaving) for the RAT and frequency:
 - 3> initiate transmission of the *ProximityIndication* message in accordance with 5.3.14.3;

NOTE: In the conditions above, "if the UE enters the proximity of one or more CSG member cell(s)" includes the case of already being in the proximity of such cell(s) at the time proximity indication for the corresponding RAT is enabled.

5.3.14.3 Actions related to transmission of *ProximityIndication* message

The UE shall set the contents of *ProximityIndication* message as follows:

- 1> if the UE applies the procedure to report entering the proximity of CSG member cell(s):
 - 2> set type to entering;
- 1> else if the UE applies the procedure to report leaving the proximity of CSG member cell(s):
 - 2> set type to leaving;
- 1> if the proximity indication was triggered for one or more CSG member cell(s) on an E-UTRA frequency:
 - 2> set the *carrierFreq* to *eutra* with the value set to the E-ARFCN value of the E-UTRA cell(s) for which proximity indication was triggered;

- 1> else if the proximity indication was triggered for one or more CSG member cell(s) on a UTRA frequency:
 - 2> set the *carrierFreq* to *utra* with the value set to the ARFCN value of the UTRA cell(s) for which proximity indication was triggered;

The UE shall submit the *ProximityIndication* message to lower layers for transmission.

5.3.15 Void

5.4 Inter-RAT mobility

5.4.1 Introduction

The general principles of connected mode mobility are described in 5.3.1.3. The general principles of the security handling upon connected mode mobility are described in 5.3.1.2.

For the (network controlled) inter RAT mobility from E-UTRA for a UE in RRC_CONNECTED, a single procedure is defined that supports both handover, cell change order with optional network assistance (NACC) and enhanced CS fallback to CDMA2000 1xRTT. In case of mobility to CDMA2000, the eNB decides when to move to the other RAT while the target RAT determines to which cell the UE shall move.

5.4.2 Handover to E-UTRA

5.4.2.1 General

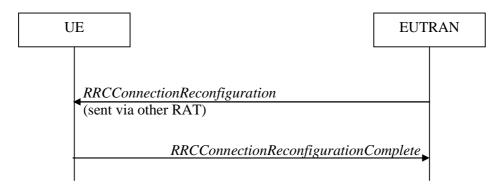


Figure 5.4.2.1-1: Handover to E-UTRA, successful

The purpose of this procedure is to, under the control of the network, transfer a connection between the UE and another Radio Access Network (e.g. GERAN or UTRAN) to E-UTRAN.

The handover to E-UTRA procedure applies when SRBs, possibly in combination with DRBs, are established in another RAT. Handover from UTRAN to E-UTRAN applies only after integrity has been activated in UTRAN.

5.4.2.2 Initiation

The RAN using another RAT initiates the handover to E-UTRA procedure, in accordance with the specifications applicable for the other RAT, by sending the *RRCConnectionReconfiguration* message via the radio access technology from which the inter-RAT handover is performed.

E-UTRAN applies the procedure as follows:

- to activate ciphering, possibly using NULL algorithm, if not yet activated in the other RAT;
- to establish SRB1, SRB2 and one or more DRBs, i.e. at least the DRB associated with the default EPS bearer is established;

5.4.2.3 Reception of the RRCConnectionReconfiguration by the UE

If the UE is able to comply with the configuration included in the *RRCConnectionReconfiguration* message, the UE shall:

- 1> apply the default physical channel configuration as specified in 9.2.4;
- 1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;
- 1> apply the default MAC main configuration as specified in 9.2.2;
- 1> start timer T304 with the timer value set to t304, as included in the mobilityControlInfo;
- 1> consider the target PCell to be one on the frequency indicated by the *carrierFreq* with a physical cell identity indicated by the *targetPhysCellId*;
- 1> start synchronising to the DL of the target PCell;
- 1> set the C-RNTI to the value of the *newUE-Identity*;
- 1> for the target PCell, apply the downlink bandwidth indicated by the *dl-Bandwidth*;
- 1> for the target PCell, apply the uplink bandwidth indicated by (the absence or presence of) the *ul-Bandwidth*;
- 1> configure lower layers in accordance with the received radioResourceConfigCommon;
- 1> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received *mobilityControlInfo*;
- 1> perform the radio resource configuration procedure as specified in 5.3.10;
- 1> forward the *nas-SecurityParamToEUTRA* to the upper layers;
- 1> derive the K_{eNB} key, as specified in TS 33.401 [32];
- 1> derive the K_{RRCint} key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];
- 1> derive the K_{RRCenc} key and the K_{UPenc} key associated with the *cipheringAlgorithm*, as specified in TS 33.401 [32];
- 1> configure lower layers to apply the indicated integrity protection algorithm and the K_{RRCint} key immediately, i.e. the indicated integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 1> configure lower layers to apply the indicated ciphering algorithm, the K_{RRCenc} key and the K_{UPenc} key immediately, i.e. the indicated ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
- 1> if the received RRCConnectionReconfiguration includes the sCellToAddModList:
 - 2> perform SCell addition as specified in 5.3.10.3b;
- 1> if the RRCConnectionReconfiguration message includes the measConfig:
 - 2> perform the measurement configuration procedure as specified in 5.5.2;
- 1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;
- 1> if the RRCConnectionReconfiguration message includes the otherConfig:
 - 2> perform the other configuration procedure as specified in 5.3.10.9;
- 1> if the *RRCConnectionReconfiguration* message includes *wlan-OffloadInfo*:
 - 2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;
- 1> if the RRCConnectionReconfiguration message includes rclwi-Configuration:
 - 2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;

- 1> if the RRCConnectionReconfiguration message includes lwa-Configuration:
 - 2> perform the LWA configuration procedure as specified in 5.6.14.2;
- 1> if the RRCConnectionReconfiguration message includes lwip-Configuration:
 - 2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;
- 1> set the content of RRCConnectionReconfigurationComplete message as follows:
 - 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 3> include rlf-InfoAvailable;
 - 2> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport* and if T330 is not running:
 - 3> include logMeasAvailableMBSFN;
 - 2> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 3> include the *logMeasAvailable*;
 - 2> if the UE has connection establishment failure information available in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:
 - 3> include connEstFailInfoAvailable;
- 1> submit the RRCConnectionReconfigurationComplete message to lower layers for transmission using the new configuration;
- 1> if the RRCConnectionReconfiguration message does not include rlf-TimersAndConstants set to setup:
 - 2> use the default values specified in 9.2.5 for timer T310, T311 and constant N310, N311;
- 1> if MAC successfully completes the random access procedure:
 - 2> stop timer T304;
 - 2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;
 - 2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;
- NOTE 1: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.
 - 2> enter E-UTRA RRC_CONNECTED, upon which the procedure ends;
- NOTE 2: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell.

5.4.2.4 Reconfiguration failure

- 1> if the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration* message:
 - 2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;

- NOTE 1: The UE may apply above failure handling also in case the *RRCConnectionReconfiguration* message causes a protocol error for which the generic error handling as defined in 5.7 specifies that the UE shall ignore the message.
- NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/ failure.

5.4.2.5 T304 expiry (handover to E-UTRA failure)

The UE shall:

- 1> upon T304 expiry (handover to E-UTRA failure):
 - 2> reset MAC;
 - 2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;

5.4.3 Mobility from E-UTRA

5.4.3.1 General

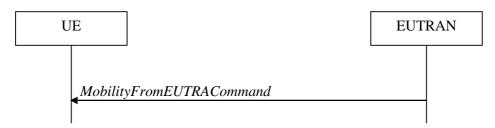


Figure 5.4.3.1-1: Mobility from E-UTRA, successful

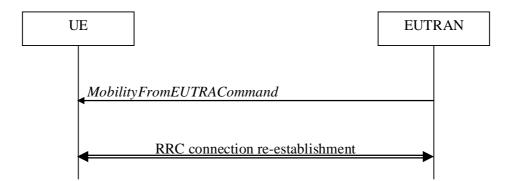


Figure 5.4.3.1-2: Mobility from E-UTRA, failure

The purpose of this procedure is to move a UE in RRC_CONNECTED to a cell using another Radio Access Technology (RAT), e.g. GERAN, UTRA or CDMA2000 systems. The mobility from E-UTRA procedure covers the following type of mobility:

- handover, i.e. the *MobilityFromEUTRACommand* message includes radio resources that have been allocated for the UE in the target cell;
- cell change order, i.e. the *MobilityFromEUTRACommand* message may include information facilitating access of and/ or connection establishment in the target cell, e.g. system information. Cell change order is applicable only to GERAN; and
- enhanced CS fallback to CDMA2000 1xRTT, i.e. the *MobilityFromEUTRACommand* message includes radio resources that have been allocated for the UE in the target cell. The enhanced CS fallback to CDMA2000 1xRTT may be combined with concurrent handover or redirection to CDMA2000 HRPD.

NOTE: For the case of dual receiver/transmitter enhanced CS fallback to CDMA2000 1xRTT, the DLInformationTransfer message is used instead of the MobilityFromEUTRACommand message (see TS 36.300 [9]).

5.4.3.2 Initiation

E-UTRAN initiates the mobility from E-UTRA procedure to a UE in RRC_CONNECTED, possibly in response to a *MeasurementReport* message or in response to reception of CS fallback indication for the UE from MME, by sending a *MobilityFromEUTRACommand* message. E-UTRAN applies the procedure as follows:

- the procedure is initiated only when AS-security has been activated, and SRB2 with at least one DRB are setup and not suspended;

5.4.3.3 Reception of the *MobilityFromEUTRACommand* by the UE

The UE shall be able to receive a *MobilityFromEUTRACommand* message and perform a cell change order to GERAN, even if no prior UE measurements have been performed on the target cell.

- 1> stop timer T310, if running;
- 1> stop timer T312, if running;
- 1> if the MobilityFromEUTRACommand message includes the purpose set to handover:
 - 2> if the *targetRAT-Type* is set to *utra* or *geran*:
 - 3> consider inter-RAT mobility as initiated towards the RAT indicated by the *targetRAT-Type* included in the *MobilityFromEUTRACommand* message;
 - 3> forward the *nas-SecurityParamFromEUTRA* to the upper layers;
 - 3> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT;
 - 3> if the *targetRAT-Type* is set to *geran*:
 - 4> use the contents of *systemInformation*, if provided for PS Handover, as the system information to begin access on the target GERAN cell;
- NOTE 1: If there are DRBs for which no radio bearers are established in the target RAT as indicated in the targetRAT-MessageContainer in the message, the E-UTRA RRC part of the UE does not indicate the release of the concerned DRBs to the upper layers. Upper layers may derive which bearers are not established from information received from the AS of the target RAT.
- NOTE 2: In case of SR-VCC, the DRB to be replaced is specified in [61].
 - 2> else if the *targetRAT-Type* is set to *cdma2000-1XRTT* or *cdma2000-HRPD*:
 - 3> forward the *targetRAT-Type* and the *targetRAT-MessageContainer* to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specifications of the CDMA2000 target-RAT;
- 1> else if the MobilityFromEUTRACommand message includes the purpose set to cellChangeOrder:
 - 2> start timer T304 with the timer value set to t304, as included in the MobilityFromEUTRACommand message;
 - 2> if the *targetRAT-Type* is set to *geran*:
 - 3> if networkControlOrder is included in the MobilityFromEUTRACommand message:
 - 4> apply the value as specified in TS 44.060 [36];
 - 3> else:

- 4> acquire networkControlOrder and apply the value as specified in TS 44.060 [36];
- 3> use the contents of *systemInformation*, if provided, as the system information to begin access on the target GERAN cell;
- 2> establish the connection to the target cell indicated in the CellChangeOrder;
- NOTE 3: The criteria for success or failure of the cell change order to GERAN are specified in TS 44.060[36].
- 1> if the MobilityFromEUTRACommand message includes the purpose set to e-CSFB:
 - 2> if *messageContCDMA2000-1XRTT* is present:
 - 3> forward the *messageContCDMA2000-1XRTT* to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;
 - 2> if *mobilityCDMA2000-HRPD* is present and is set to *handover*:
 - 3> forward the *messageContCDMA2000-HRPD* to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;
 - 2> if mobilityCDMA2000-HRPD is present and is set to redirection:
 - 3> forward the redirectCarrierCDMA2000-HRPD to the CDMA2000 upper layers;
- NOTE 4: When the CDMA2000 upper layers in the UE receive both the *messageContCDMA2000-1XRTT* and *messageContCDMA2000-HRPD* the UE performs concurrent access to both CDMA2000 1xRTT and CDMA2000 HRPD RAT.
- NOTE 5: The UE should perform the handover, the cell change order or enhanced 1xRTT CS fallback as soon as possible following the reception of the RRC message *MobilityFromEUTRACommand*, which could be before confirming successful reception (HARQ and ARQ) of this message.

5.4.3.4 Successful completion of the mobility from E-UTRA

Upon successfully completing the handover, the cell change order or enhanced 1xRTT CS fallback, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

NOTE: If the UE performs enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and the connection to either CDMA2000 1xRTT or CDMA2000 HRPD succeeds, then the mobility from E-UTRA is considered successful.

5.4.3.5 Mobility from E-UTRA failure

- 1> if T304 expires (mobility from E-UTRA failure); or
- 1> if the UE does not succeed in establishing the connection to the target radio access technology; or
- 1> if the UE is unable to comply with (part of) the configuration included in the *MobilityFromEUTRACommand* message; or
- 1> if there is a protocol error in the inter RAT information included in the *MobilityFromEUTRACommand* message, causing the UE to fail the procedure according to the specifications applicable for the target RAT:
 - 2> stop T304, if running;
 - 2> if the *cs-FallbackIndicator* in the *MobilityFromEUTRACommand* message was set to *TRUE* or *e-CSFB* was present:
 - 3> indicate to upper layers that the CS fallback procedure has failed;
 - 2> revert back to the configuration used in the source PCell, excluding the configuration configured by the *physicalConfigDedicated*, *mac-MainConfig* and *sps-Config*;

2> initiate the connection re-establishment procedure as specified in 5.3.7;

NOTE: For enhanced CS fallback to CDMA2000 1xRTT, the above UE behavior applies only when the UE is attempting the enhanced 1xRTT CS fallback and connection to the target radio access technology fails or if the UE is attempting enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and connection to both the target radio access technologies fails.

5.4.4 Handover from E-UTRA preparation request (CDMA2000)

5.4.4.1 General

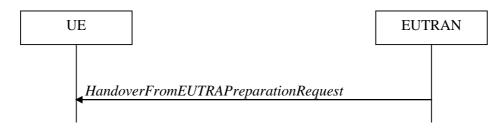


Figure 5.4.4.1-1: Handover from E-UTRA preparation request

The purpose of this procedure is to trigger the UE to prepare for handover or enhanced 1xRTT CS fallback to CDMA2000 by requesting a connection with this network. The UE may use this procedure to concurrently prepare for handover to CDMA2000 HRPD along with preparation for enhanced CS fallback to CDMA2000 1xRTT. This procedure applies to CDMA2000 capable UEs only.

This procedure is also used to trigger the UE which supports dual Rx/Tx enhanced 1xCSFB to redirect its second radio to CDMA2000 1xRTT.

The handover from E-UTRA preparation request procedure applies when signalling radio bearers are established.

5.4.4.2 Initiation

E-UTRAN initiates the handover from E-UTRA preparation request procedure to a UE in RRC_CONNECTED, possibly in response to a *MeasurementReport* message or CS fallback indication for the UE, by sending a *HandoverFromEUTRAPreparationRequest* message. E-UTRA initiates the procedure only when AS security has been activated.

5.4.4.3 Reception of the HandoverFromEUTRAPreparationRequest by the UE

Upon reception of the HandoverFromEUTRAPreparationRequest message, the UE shall:

- 1> if *dualRxTxRedirectIndicator* is present in the received message:
 - 2> forward dualRxTxRedirectIndicator to the CDMA2000 upper layers;
 - 2> forward redirectCarrierCDMA2000-1XRTT to the CDMA2000 upper layers, if included;

1> else:

- 2> indicate the request to prepare handover or enhanced 1xRTT CS fallback and forward the *cdma2000-Type* to the CDMA2000 upper layers;
- 2> if *cdma2000-Type* is set to *type1XRTT*:
 - 3> forward the *rand* and the *mobilityParameters* to the CDMA2000 upper layers;
- 2> if *concurrPrepCDMA2000-HRPD* is present in the received message:
 - 3> forward concurrPrepCDMA2000-HRPD to the CDMA2000 upper layers;
- 2> else:

3> forward concurrPrepCDMA2000-HRPD, with its value set to FALSE, to the CDMA2000 upper layers;

5.4.5 UL handover preparation transfer (CDMA2000)

5.4.5.1 General

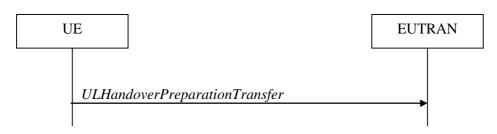


Figure 5.4.5.1-1: UL handover preparation transfer

The purpose of this procedure is to tunnel the handover related CDMA2000 dedicated information or enhanced 1xRTT CS fallback related CDMA2000 dedicated information from UE to E-UTRAN when requested by the higher layers. The procedure is triggered by the higher layers on receipt of *HandoverFromEUTRAPreparationRequest* message. If preparing for enhanced CS fallback to CDMA2000 1xRTT and handover to CDMA2000 HRPD, the UE sends two consecutive *ULHandoverPreparationTransfer* messages to E-UTRAN, one per addressed CDMA2000 RAT Type. This procedure applies to CDMA2000 capable UEs only.

5.4.5.2 Initiation

A UE in RRC_CONNECTED initiates the UL handover preparation transfer procedure whenever there is a need to transfer handover or enhanced 1xRTT CS fallback related non-3GPP dedicated information. The UE initiates the UL handover preparation transfer procedure by sending the *ULHandoverPreparationTransfer* message.

5.4.5.3 Actions related to transmission of the *ULHandoverPreparationTransfer* message

The UE shall set the contents of the *ULHandoverPreparationTransfer* message as follows:

- 1> include the *cdma2000-Type* and the *dedicatedInfo*;
- 1> if the *cdma2000-Type* is set to *type1XRTT*:
 - 2> include the *meid* and set it to the value received from the CDMA2000 upper layers;
- 1> submit the *ULHandoverPreparationTransfer* message to lower layers for transmission, upon which the procedure ends;

5.4.5.4 Failure to deliver the *ULHandoverPreparationTransfer* message

The UE shall:

- 1> if the UE is unable to guarantee successful delivery of *ULHandoverPreparationTransfer* messages:
 - 2> inform upper layers about the possible failure to deliver the information contained in the concerned *ULHandoverPreparationTransfer* message;

5.4.6 Inter-RAT cell change order to E-UTRAN

5.4.6.1 General

The purpose of the inter-RAT cell change order to E-UTRAN procedure is to transfer, under the control of the source radio access technology, a connection between the UE and another radio access technology (e.g. GSM/ GPRS) to E-UTRAN.

5.4.6.2 Initiation

The procedure is initiated when a radio access technology other than E-UTRAN, e.g. GSM/GPRS, using procedures specific for that RAT, orders the UE to change to an E-UTRAN cell. In response, upper layers request the establishment of an RRC connection as specified in subclause 5.3.3.

NOTE: Within the message used to order the UE to change to an E-UTRAN cell, the source RAT should specify the identity of the target E-UTRAN cell as specified in the specifications for that RAT.

The UE shall:

- 1> upon receiving an RRCConnectionSetup message:
 - 2> consider the inter-RAT cell change order procedure to have completed successfully;

5.4.6.3 UE fails to complete an inter-RAT cell change order

If the inter-RAT cell change order fails the UE shall return to the other radio access technology and proceed as specified in the appropriate specifications for that RAT.

The UE shall:

- 1> upon failure to establish the RRC connection as specified in subclause 5.3.3:
 - 2> consider the inter-RAT cell change order procedure to have failed;

NOTE: The cell change was network ordered. Therefore, failure to change to the target PCell should not cause the UE to move to UE-controlled cell selection.

5.5 Measurements

5.5.1 Introduction

The UE reports measurement information in accordance with the measurement configuration as provided by E-UTRAN. E-UTRAN provides the measurement configuration applicable for a UE in RRC_CONNECTED by means of dedicated signalling, i.e. using the *RRCConnectionReconfiguration* or *RRCConnectionResume* message.

The UE can be requested to perform the following types of measurements:

- Intra-frequency measurements: measurements at the downlink carrier frequency(ies) of the serving cell(s).
- Inter-frequency measurements: measurements at frequencies that differ from any of the downlink carrier frequency(ies) of the serving cell(s).
- Inter-RAT measurements of UTRA frequencies.
- Inter-RAT measurements of GERAN frequencies.
- Inter-RAT measurements of CDMA2000 HRPD or CDMA2000 1xRTT or WLAN frequencies.
- CBR measurements.

The measurement configuration includes the following parameters:

- 1. **Measurement objects:** The objects on which the UE shall perform the measurements.
 - For intra-frequency and inter-frequency measurements a measurement object is a single E-UTRA carrier frequency. Associated with this carrier frequency, E-UTRAN can configure a list of cell specific offsets, a list of 'blacklisted' cells and a list of 'whitelisted' cells. Blacklisted cells are not considered in event evaluation or measurement reporting.
 - For inter-RAT UTRA measurements a measurement object is a set of cells on a single UTRA carrier frequency.

- For inter-RAT GERAN measurements a measurement object is a set of GERAN carrier frequencies.
- For inter-RAT CDMA2000 measurements a measurement object is a set of cells on a single (HRPD or 1xRTT) carrier frequency.
- For inter-RAT WLAN measurements a measurement object is a set of WLAN identifiers and optionally a set of WLAN frequencies.
- For CBR measurements a measurement object is a set of transmission resource pools for V2X sidelink communication.
- NOTE 1: Some measurements using the above mentioned measurement objects, only concern a single cell, e.g. measurements used to report neighbouring cell system information, PCell UE Rx-Tx time difference, or a pair of cells, e.g. SSTD measurements between the PCell and the PSCell.
- 2. **Reporting configurations**: A list of reporting configurations where each reporting configuration consists of the following:
 - Reporting criterion: The criterion that triggers the UE to send a measurement report. This can either be periodical or a single event description.
 - Reporting format: The quantities that the UE includes in the measurement report and associated information (e.g. number of cells to report).
- 3. **Measurement identities**: A list of measurement identities where each measurement identity links one measurement object with one reporting configuration. By configuring multiple measurement identities it is possible to link more than one measurement object to the same reporting configuration, as well as to link more than one reporting configuration to the same measurement object. The measurement identity is used as a reference number in the measurement report.
- 4. **Quantity configurations:** One quantity configuration is configured per RAT type. The quantity configuration defines the measurement quantities and associated filtering used for all event evaluation and related reporting of that measurement type. One filter can be configured per measurement quantity.
- 5. **Measurement gaps:** Periods that the UE may use to perform measurements, i.e. no (UL, DL) transmissions are scheduled.

E-UTRAN only configures a single measurement object for a given frequency (except for WLAN and except for CBR measurements), i.e. it is not possible to configure two or more measurement objects for the same frequency with different associated parameters, e.g. different offsets and/or blacklists. E-UTRAN may configure multiple instances of the same event e.g. by configuring two reporting configurations with different thresholds.

The UE maintains a single measurement object list, a single reporting configuration list, and a single measurement identities list. The measurement object list includes measurement objects, that are specified per RAT type, possibly including intra-frequency object(s) (i.e. the object(s) corresponding to the serving frequency(ies)), inter-frequency object(s) and inter-RAT objects. Similarly, the reporting configuration list includes E-UTRA and inter-RAT reporting configurations. Any measurement object can be linked to any reporting configuration of the same RAT type. Some reporting configurations may not be linked to a measurement object. Likewise, some measurement objects may not be linked to a reporting configuration.

The measurement procedures distinguish the following types of cells:

- 1. The serving cell(s) these are the PCell and one or more SCells, if configured for a UE supporting CA.
- 2. Listed cells these are cells listed within the measurement object(s) or, for inter-RAT WLAN, the WLANs matching the WLAN identifiers configured in the measurement object or the WLAN the UE is connected to.
- 3. Detected cells these are cells that are not listed within the measurement object(s) but are detected by the UE on the carrier frequency(ies) indicated by the measurement object(s) or, for inter-RAT WLAN, the WLANs not included in the *measObjectWLAN* but meeting the triggering requirements.

For E-UTRA, the UE measures and reports on the serving cell(s), listed cells, detected cells, transmission resource pools for V2X sidelink communication, and, for RSSI and channel occupancy measurements, the UE measures and reports on any reception on the indicated frequency. For inter-RAT UTRA, the UE measures and reports on listed cells and optionally on cells that are within a range for which reporting is allowed by E-UTRAN. For inter-RAT GERAN,

the UE measures and reports on detected cells. For inter-RAT CDMA2000, the UE measures and reports on listed cells. For inter-RAT WLAN, the UE measures and reports on listed cells.

- NOTE 2: For inter-RAT UTRA and CDMA2000, the UE measures and reports also on detected cells for the purpose of SON.
- NOTE 3: This specification is based on the assumption that typically CSG cells of home deployment type are not indicated within the neighbour list. Furthermore, the assumption is that for non-home deployments, the physical cell identity is unique within the area of a large macro cell (i.e. as for UTRAN).

Whenever the procedural specification, other than contained in sub-clause 5.5.2, refers to a field it concerns a field included in the *VarMeasConfig* unless explicitly stated otherwise i.e. only the measurement configuration procedure covers the direct UE action related to the received *measConfig*.

5.5.2 Measurement configuration

5.5.2.1 General

E-UTRAN applies the procedure as follows:

- to ensure that, whenever the UE has a measConfig, it includes a measObject for each serving frequency;
- to configure at most one measurement identity using a reporting configuration with the *purpose* set to *reportCGI*;
- for serving frequencies, set the EARFCN within the corresponding *measObject* according to the band as used for reception/ transmission;
- to configure at most one measurement identity using a reporting configuration with *ul-DelayConfig*;

- 1> if the received *measConfig* includes the *measObjectToRemoveList*:
 - 2> perform the measurement object removal procedure as specified in 5.5.2.4;
- $1{>} if the received {\it measConfig} includes the {\it measObjectToAddModList}:$
 - 2> perform the measurement object addition/ modification procedure as specified in 5.5.2.5;
- 1> if the received *measConfig* includes the *reportConfigToRemoveList*:
 - 2> perform the reporting configuration removal procedure as specified in 5.5.2.6;
- 1> if the received *measConfig* includes the *reportConfigToAddModList*:
 - 2> perform the reporting configuration addition/ modification procedure as specified in 5.5.2.7;
- 1> if the received *measConfig* includes the *quantityConfig*:
 - 2> perform the quantity configuration procedure as specified in 5.5.2.8;
- 1> if the received *measConfig* includes the *measIdToRemoveList*:
 - 2> perform the measurement identity removal procedure as specified in 5.5.2.2;
- 1> if the received *measConfig* includes the *measIdToAddModList*:
 - 2> perform the measurement identity addition/ modification procedure as specified in 5.5.2.3;
- 1> if the received measConfig includes the measGapConfig or measGapConfigPerCC-List:
 - 2> perform the measurement gap configuration procedure as specified in 5.5.2.9;
- 1> if the received *measConfig* includes the *measGapSharingConfig*:

- 2> perform the measurement gap sharing configuration procedure as specified in 5.5.2.12;
- 1> if the received *measConfig* includes the *s-Measure*:
 - 2> set the parameter *s-Measure* within *VarMeasConfig* to the lowest value of the RSRP ranges indicated by the received value of *s-Measure*;
- 1> if the received *measConfig* includes the *preRegistrationInfoHRPD*:
 - 2> forward the *preRegistrationInfoHRPD* to CDMA2000 upper layers;
- 1> if the received *measConfig* includes the *speedStatePars*:
 - 2> set the parameter speedStatePars within VarMeasConfig to the received value of speedStatePars;
- 1> if the received *measConfig* includes the *allowInterruptions*:
 - 2> set the parameter allowInterruptions within VarMeasConfig to the received value of allowInterruptions;

5.5.2.2 Measurement identity removal

The UE shall:

- 1> for each *measId* included in the received *measIdToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:
 - 2> remove the entry with the matching *measId* from the *measIdList* within the *VarMeasConfig*;
 - 2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 2> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;

NOTE: The UE does not consider the message as erroneous if the *measIdToRemoveList* includes any *measId* value that is not part of the current UE configuration.

5.5.2.2a Measurement identity autonomous removal

- 1> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 2> if the associated *reportConfig* concerns an event involving a serving cell while the concerned serving cell is not configured; or
 - 2> if the associated *reportConfig* concerns an event involving a WLAN mobility set while the concerned WLAN mobility set is not configured; or
 - 2> if the associated *reportConfig* concerns an event involving a transmission resource pool for V2X sidelink communication while the concerned resource pool is not configured:
 - 3> remove the *measId* from the *measIdList* within the *VarMeasConfig*;
 - 3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 3> stop the periodical reporting timer if running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;
- NOTE 1: The above UE autonomous removal of *measId*'s applies only for measurement events A1, A2, A6, and also applies for events A3 and A5 if configured for PSCell and W2 and W3 and V1 and V2, if configured.
- NOTE 2: When performed during re-establishment, the UE is only configured with a primary frequency (i.e. the SCell(s) and WLAN mobility set are released, if configured).

5.5.2.3 Measurement identity addition/ modification

E-UTRAN applies the procedure as follows:

- configure a *measId* only if the corresponding measurement object, the corresponding reporting configuration and the corresponding quantity configuration, are configured;

The UE shall:

- 1> for each measId included in the received measIdToAddModList:
 - 2> if an entry with the matching *measId* exists in the *measIdList* within the *VarMeasConfig*:
 - 3> replace the entry with the value received for this *measId*;
 - 2> else:
 - 3> add a new entry for this *measId* within the *VarMeasConfig*;
 - 2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 2> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;
 - 2> if the *triggerType* is set to *periodical* and the *purpose* is set to *reportCGI* in the *reportConfig* associated with this *measId*:
 - 3> if the *measObject* associated with this *measId* concerns E-UTRA:
 - 4> if the si-RequestForHO is included in the reportConfig associated with this measId:
 - 5> if the UE is a category 0 UE according to TS 36.306 [5]:
 - 6> start timer T321 with the timer value set to 190 ms for this *measId*;
 - 5> else:
 - 6> start timer T321 with the timer value set to 150 ms for this *measId*;
 - 4> else:
 - 5> start timer T321 with the timer value set to 1 second for this *measId*;
 - 3> else if the *measObject* associated with this *measId* concerns UTRA:
 - 4> if the si-RequestForHO is included in the reportConfig associated with this measId:
 - 5> for UTRA FDD, start timer T321 with the timer value set to 2 seconds for this *measId*;
 - 5> for UTRA TDD, start timer T321 with the timer value set to [1 second] for this measId;
 - 4> else:
 - 5> start timer T321 with the timer value set to 8 seconds for this *measId*;
 - 3> else:
 - 4> start timer T321 with the timer value set to 8 seconds for this *measId*;

5.5.2.4 Measurement object removal

- 1> for each *measObjectId* included in the received *measObjectToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:
 - 2> remove the entry with the matching measObjectId from the measObjectList within the VarMeasConfig;

- 2> remove all measId associated with this measObjectId from the measIdList within the VarMeasConfig, if any;
- 2> if a *measId* is removed from the *measIdList*:
 - 3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 3> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;
- NOTE: The UE does not consider the message as erroneous if the *measObjectToRemoveList* includes any *measObjectId* value that is not part of the current UE configuration.

5.5.2.5 Measurement object addition/ modification

- 1> for each measObjectId included in the received measObjectToAddModList:
 - 2> if an entry with the matching *measObjectId* exists in the *measObjectList* within the *VarMeasConfig*, for this entry:
 - 3> reconfigure the entry with the value received for this measObject, except for the fields cellsToAddModList, blackCellsToAddModList, whiteCellsToAddModList, altTTT-CellsToAddModList, cellsToRemoveList, blackCellsToRemoveList, whiteCellsToRemoveList, altTTT-CellsToRemoveList, measSubframePatternConfigNeigh, measDS-Config, wlan-ToAddModList, wlan-ToRemoveList, tx-ResourcePoolToRemoveList and tx-ResourcePoolToAddList;
 - 3> if the received *measObject* includes the *cellsToRemoveList*:
 - 4> for each *cellIndex* included in the *cellsToRemoveList*:
 - 5> remove the entry with the matching *cellIndex* from the *cellsToAddModList*;
 - 3> if the received *measObject* includes the *cellsToAddModList*:
 - 4> for each *cellIndex* value included in the *cellsToAddModList*:
 - 5> if an entry with the matching *cellIndex* exists in the *cellsToAddModList*:
 - 6> replace the entry with the value received for this *cellIndex*;
 - 5> else:
 - 6> add a new entry for the received *cellIndex* to the *cellsToAddModList*;
 - 3> if the received *measObject* includes the *blackCellsToRemoveList*:
 - 4> for each *cellIndex* included in the *blackCellsToRemoveList*:
 - 5> remove the entry with the matching cellIndex from the blackCellsToAddModList;
- NOTE 1: For each *cellIndex* included in the *blackCellsToRemoveList* that concerns overlapping ranges of cells, a cell is removed from the black list of cells only if all cell indexes containing it are removed.
 - 3> if the received *measObject* includes the *blackCellsToAddModList*:
 - 4> for each *cellIndex* included in the *blackCellsToAddModList*:
 - 5> if an entry with the matching *cellIndex* is included in the *blackCellsToAddModList*:
 - 6> replace the entry with the value received for this *cellIndex*;
 - 5> else:
 - 6> add a new entry for the received *cellIndex* to the *blackCellsToAddModList*;
 - 3> if the received *measObject* includes the *whiteCellsToRemoveList*:

- 4> for each *cellIndex* included in the *whiteCellsToRemoveList*:
 - 5> remove the entry with the matching *cellIndex* from the *whiteCellsToAddModList*;
- NOTE 2: For each *cellIndex* included in the *whiteCellsToRemoveList* that concerns overlapping ranges of cells, a cell is removed from the white list of cells only if all cell indexes containing it are removed.
 - 3> if the received *measObject* includes the *whiteCellsToAddModList*:
 - 4> for each cellIndex included in the whiteCellsToAddModList:
 - 5> if an entry with the matching *cellIndex* is included in the *whiteCellsToAddModList*:
 - 6> replace the entry with the value received for this *cellIndex*;
 - 5> else:
 - 6> add a new entry for the received cellIndex to the whiteCellsToAddModList;
 - 3> if the received *measObject* includes the *altTTT-CellsToRemoveList*:
 - 4> for each cellIndex included in the altTTT-CellsToRemoveList:
 - 5> remove the entry with the matching *cellIndex* from the *altTTT-CellsToAddModList*;
- NOTE 3: For each *cellIndex* included in the *altTTT-CellsToRemoveList* that concerns overlapping ranges of cells, a cell is removed from the list of cells only if all cell indexes containing it are removed.
 - 3> if the received measObject includes the altTTT-CellsToAddModList:
 - 4> for each *cellIndex* value included in the *altTTT-CellsToAddModList*:
 - 5> if an entry with the matching *cellIndex* exists in the *altTTT-CellsToAddModList*:
 - 6> replace the entry with the value received for this *cellIndex*;
 - 5> else:
 - 6> add a new entry for the received *cellIndex* to the *altTTT-CellsToAddModList*;
 - 3> if the received *measObject* includes *measSubframePatternConfigNeigh*:
 - 4> set measSubframePatternConfigNeigh within the VarMeasConfig to the value of the received field
 - 3> if the received *measObject* includes *measDS-Config*:
 - 4> if *measDS-Config* is set to *setup*:
 - 5> if the received *measDS-Config* includes the *measCSI-RS-ToRemoveList*:
 - 6> for each measCSI-RS-Id included in the measCSI-RS-ToRemoveList:
 - 7> remove the entry with the matching measCSI-RS-Id from the measCSI-RS-ToAddModList;
 - 5> if the received *measDS-Config* includes the *measCSI-RS-ToAddModList*, for each *measCSI-RS-Id* value included in the *measCSI-RS-ToAddModList*:
 - 6> if an entry with the matching measCSI-RS-Id exists in the measCSI-RS-ToAddModList:
 - 7> replace the entry with the value received for this *measCSI-RS-Id*;
 - 6> else:
 - 7> add a new entry for the received measCSI-RS-Id to the measCSI-RS-ToAddModList;
 - 5> set other fields of the *measDS-Config* within the *VarMeasConfig* to the value of the received fields;

- 5> perform the discovery signals measurement timing configuration procedure as specified in 5.5.2.10;
- 4> else:
 - 5> release the discovery signals measurement configuration;
- 3> for each measId associated with this measObjectId in the measIdList within the VarMeasConfig, if any:
 - 4> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 4> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;
- 3> if the received *measObject* includes the *wlan-ToRemoveList*:
 - 4> for each WLAN-Identifiers included in the wlan-ToRemoveList:
 - 5> remove the entry with the matching WLAN-Identifiers from the wlan-ToAddModList;
- NOTE 3a: Matching of WLAN-Identifiers requires that all WLAN identifier fields should be same.
 - 3> if the received *measObject* includes the *wlan-ToAddModList*:
 - 4> for each WLAN-Identifiers included in the wlan-ToAddModList:
 - 5> add a new entry for the received WLAN-Identifiers to the wlan-ToAddModList;
 - 3> if the received *measObject* includes the *tx-ResourcePoolToRemoveList*:
 - 4> for each transmission resource pool indicated in *tx-ResourcePoolToRemoveList*:
 - 5> remove the entry with the matching identity of the transmission resource pool from the *tx-ResourcePoolToAddList*;
 - 3> if the received *measObject* includes the *tx-ResourcePoolToAddList*:
 - 4> for each transmission resource pool indicated in tx-ResourcePoolToAddList:
 - 5> add a new entry for the received identity of the transmission resource pool to the *tx-ResourcePoolToAddList*;
 - 2> else:
 - 3> add a new entry for the received measObject to the measObjectList within VarMeasConfig;
- NOTE 4: UE does not need to retain cellForWhichToReportCGI in the measObject after reporting cgi-Info.

5.5.2.6 Reporting configuration removal

- 1> for each *reportConfigId* included in the received *reportConfigToRemoveList* that is part of the current UE configuration in *VarMeasConfig*:
 - 2> remove the entry with the matching reportConfigId from the reportConfigList within the VarMeasConfig;
 - 2> remove all measId associated with the reportConfigId from the measIdList within the VarMeasConfig, if any;
 - 2> if a *measId* is removed from the *measIdList*:
 - 3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 3> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;

NOTE: The UE does not consider the message as erroneous if the *reportConfigToRemoveList* includes any *reportConfigId* value that is not part of the current UE configuration.

5.5.2.7 Reporting configuration addition/ modification

The UE shall:

- 1> for each reportConfigId included in the received reportConfigToAddModList:
 - 2> if an entry with the matching reportConfigId exists in the reportConfigList within the VarMeasConfig, for this entry:
 - 3> reconfigure the entry with the value received for this reportConfig;
 - 3> for each *measId* associated with this *reportConfigId* included in the *measIdList* within the *VarMeasConfig*, if any:
 - 4> remove the measurement reporting entry for this measId from in VarMeasReportList, if included;
 - 4> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;

2> else:

3> add a new entry for the received reportConfig to the reportConfigList within the VarMeasConfig;

5.5.2.8 Quantity configuration

The UE shall:

- 1> for each RAT for which the received *quantityConfig* includes parameter(s):
 - 2> set the corresponding parameter(s) in *quantityConfig* within *VarMeasConfig* to the value of the received *quantityConfig* parameter(s);
- 1> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
 - 2> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. *timeToTrigger*) for this *measId*;

5.5.2.9 Measurement gap configuration

The UE shall:

- 1> if measGapConfig is set to setup:
 - 2> if a measurement gap configuration *measGapConfig* or *measGapConfigPerCC-List* is already setup, release the measurement gap configuration;
 - 2> if the gapOffset in *measGapConfig* indicates a non-uniform gap pattern:
 - 3> setup the measurement gap configuration indicated by the *measGapConfig* in accordance with the received *gapOffset*, i.e., the first subframe of the first gap of each non-uniform gap pattern occurs at an SFN and subframe meeting the following condition (SFN and subframe of MCG cells):

```
SFN mod T = \text{FLOOR}(gapOffset/10);

subframe = gapOffset \mod 10;

with T = \text{LMGRP}/10 as defined in TS 36.133 [16];
```

2> else:

3> setup the measurement gap configuration indicated by the *measGapConfig* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition (SFN and subframe of MCG cells):

```
SFN mod T = \text{FLOOR}(gapOffset/10);

subframe = gapOffset mod 10;

with T = \text{MGRP}/10 as defined in TS 36.133 [16];
```

- NOTE 1: The UE applies a single gap, which timing is relative to the MCG cells, even when configured with DC.
- 1> else if *measGapConfig* is set to *release*:
 - 2> release the measurement gap configuration measGapConfig;
- 1> if *measGapConfigPerCC-List* is set to *setup*:
 - 2> if a measurement gap configuration measGapConfig is already setup, release measGapConfig;
 - 2> if *measGapConfigToRemoveList* is included:
 - 3> for each ServCellIndex included in the measGapConfigToRemoveList:
 - 4> release measGapConfigCC for the serving cell indicated by servCellId;
 - 2> if measGapConfigToAddModList is included:
 - 3> for each ServCellIndex included in the measGapConfigToAddModList:
 - 4> store measGapConfigCC for the serving cell indicated by servCellId;
 - 2> for each serving cell with stored *measGapConfigCC* indicating a non-uniform gap pattern, setup the measurement gap configuration indicated by the *measGapConfigCC* in accordance with the received *gapOffset*, i.e., the first subframe of the first gap of each non-uniform gap pattern occurs at an SFN and subframe meeting the following condition (SFN and subframe of MCG cells):

```
SFN mod T = \text{FLOOR}(gapOffset/10);

subframe = gapOffset \mod 10;

with T = \text{LMGRP}/10 as defined in TS 36.133 [16];
```

2> for each serving cell with stored *measGapConfigCC* not indicating a non-uniform gap pattern, setup the measurement gap configuration indicated by the *measGapConfigCC* in accordance with the received *gapOffset*, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition (SFN and subframe of MCG cells):

```
SFN mod T = \text{FLOOR}(gapOffset/10);

subframe = gapOffset \mod 10;

with T = \text{MGRP}/10 as defined in TS 36.133 [16];
```

- NOTE 2: The UE applies gap timing relative to the MCG cells, even when configured with DC.
- 1> else (*measGapConfigPerCC-List* is set to *release*):
 - 2> release the measurement gap configuration measGapConfigPerCC-List;
- NOTE 3: When a SCell is released, the UE is not required to apply a per CC measurement gap configuration associated to the SCell.

5.5.2.10 Discovery signals measurement timing configuration

The UE shall setup the discovery signals measurement timing configuration (DMTC) in accordance with the received *dmtc-PeriodOffset*, i.e., the first subframe of each DMTC occasion occurs at an SFN and subframe of the PCell meeting the following condition:

```
SFN mod T = \text{FLOOR}(dmtc\text{-}Offset/10);

subframe = dmtc\text{-}Offset \mod 10;

with T = dmtc\text{-}Periodicity/10;
```

On the concerned frequency, the UE shall not consider discovery signals transmission in subframes outside the DMTC occasion for measurements including RRM measurements.

5.5.2.11 RSSI measurement timing configuration

The UE shall setup the RSSI measurement timing configuration (RMTC) in accordance with the received *rmtc-Period*, *rmtc-SubframeOffset* if configured otherwise determined by the UE randomly, i.e. the first symbol of each RMTC occasion occurs at first symbol of an SFN and subframe of the PCell meeting the following condition:

```
SFN mod T = \text{FLOOR}(rmtc\text{-}SubframeOffset/10);

subframe = rmtc\text{-}SubframeOffset \mod 10;

with T = rmtc\text{-}Period/10;
```

On the concerned frequency, the UE shall not consider RSSI measurements outside the configured RMTC occasion which lasts for *measDuration* for RSSI and channel occupancy measurements.

5.5.2.12 Measurement gap sharing configuration

The UE shall:

- 1> if *measGapSharingConfig* is set to *setup*:
 - 2> if a measurement gap sharing configuration is already setup, release the measurement gap sharing configuration;
 - 2> setup the measurement gap sharing configuration indicated by the *measGapSharingConfig* in accordance with the received *measGapSharingScheme* as defined in TS 36.133 [16];

1> else:

2> release the measurement gap sharing configuration;

5.5.3 Performing measurements

5.5.3.1 General

For all measurements, except for UE Rx–Tx time difference measurements, RSSI, UL PDCP Packet Delay per QCI measurement, channel occupancy measurements, CBR measurement, and except for WLAN measurements of Band, Carrier Info, Available Admission Capacity, Backhaul Bandwidth, Channel Utilization, and Station Count, the UE applies the layer 3 filtering as specified in 5.5.3.2, before using the measured results for evaluation of reporting criteria or for measurement reporting.

The UE shall:

- 1> whenever the UE has a measConfig, perform RSRP and RSRQ measurements for each serving cell as follows:
 - 2> for the PCell, apply the time domain measurement resource restriction in accordance with *measSubframePatternPCell*, if configured;
 - 2> if the UE supports CRS based discovery signals measurement:

- 3> for each SCell in deactivated state, apply the discovery signals measurement timing configuration in accordance with *measDS-Config*, if configured within the *measObject* corresponding to the frequency of the SCell;
- 1> if the UE has a *measConfig* with *rs-sinr-Config* configured, perform RS-SINR (as indicated in the associated *reportConfig*) measurements as follows:
 - 2> perform the corresponding measurements on the frequency indicated in the associated *measObject* using available idle periods or using autonomous gaps as necessary;
- 1> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 2> if the *purpose* for the associated *reportConfig* is set to *reportCGI*:
 - 3> if *si-RequestForHO* is configured for the associated *reportConfig*:
 - 4> perform the corresponding measurements on the frequency and RAT indicated in the associated *measObject* using autonomous gaps as necessary;
 - 3> else:
 - 4> perform the corresponding measurements on the frequency and RAT indicated in the associated *measObject* using available idle periods or using autonomous gaps as necessary;
- NOTE 1: If autonomous gaps are used to perform measurements, the UE is allowed to temporarily abort communication with all serving cell(s), i.e. create autonomous gaps to perform the corresponding measurements within the limits specified in TS 36.133 [16]. Otherwise, the UE only supports the measurements with the purpose set to *reportCGI* only if E-UTRAN has provided sufficient idle periods.
 - 3> try to acquire the global cell identity of the cell indicated by the *cellForWhichToReportCGI* in the associated *measObject* by acquiring the relevant system information from the concerned cell;
 - 3> if an entry in the *cellAccessRelatedInfoList* includes the selected PLMN, acquire the relevant system information from the concerned cell;
 - 3> if the cell indicated by the *cellForWhichToReportCGI* included in the associated *measObject* is an E-UTRAN cell:
 - 4> try to acquire the CSG identity, if the CSG identity is broadcast in the concerned cell;
 - 4> try to acquire the *trackingAreaCode* in the concerned cell;
 - 4> try to acquire the list of additional PLMN Identities, as included in the *plmn-IdentityList*, if multiple PLMN identities are broadcast in the concerned cell;
 - 4> if *cellAccessRelatedInfoList* is included, use *trackingAreaCode* and *plmn-IdentityList* from the entry of *cellAccessRelatedInfoList* containing the selected PLMN;
 - 4> if the *includeMultiBandInfo* is configured:
 - 5> try to acquire the *freqBandIndicator* in the *SystemInformationBlockType1* of the concerned cell;
 - 5> try to acquire the list of additional frequency band indicators, as included in the *multiBandInfoList*, if multiple frequency band indicators are included in the *SystemInformationBlockType1* of the concerned cell;
 - 5> try to acquire the *freqBandIndicatorPriority*, if the *freqBandIndicatorPriority* is included in the *SystemInformationBlockType1* of the concerned cell;
- NOTE 2: The 'primary' PLMN is part of the global cell identity.
 - 3> if the cell indicated by the *cellForWhichToReportCGI* included in the associated *measObject* is a UTRAN cell.
 - 4> try to acquire the LAC, the RAC and the list of additional PLMN Identities, if multiple PLMN identities are broadcast in the concerned cell;

- 4> try to acquire the CSG identity, if the CSG identity is broadcast in the concerned cell;
- 3> if the cell indicated by the *cellForWhichToReportCGI* included in the associated *measObject* is a GERAN cell:
 - 4> try to acquire the RAC in the concerned cell;
- 3> if the cell indicated by the *cellForWhichToReportCGI* included in the associated *measObject* is a CDMA2000 cell and the *cdma2000-Type* included in the *measObject* is *typeHRPD*:
 - 4> try to acquire the Sector ID in the concerned cell;
- 3> if the cell indicated by the *cellForWhichToReportCGI* included in the associated *measObject* is a CDMA2000 cell and the *cdma2000-Type* included in the *measObject* is *type1XRTT*:
 - 4> try to acquire the BASE ID, SID and NID in the concerned cell;
- 2> if the *ul-DelayConfig* is configured for the associated *reportConfig*:
 - 3> ignore the *measObject*;
 - 3> configure the PDCP layer to perform UL PDCP Packet Delay per QCI measurement;
- 2> else:
 - 3> if a measurement gap configuration is setup; or
 - 3> if the UE does not require measurement gaps to perform the concerned measurements:
 - 4> if s-Measure is not configured; or
 - 4> if s-Measure is configured and the PCell RSRP, after layer 3 filtering, is lower than this value; or
 - 4> if measDS-Config is configured in the associated measObject:
 - 5> if the UE supports CSI-RS based discovery signals measurement; and
 - 5> if the *eventId* in the associated *reportConfig* is set to *eventC1* or *eventC2*, or if *reportStrongestCSI-RSs* is included in the associated *reportConfig*:
 - 6> perform the corresponding measurements of CSI-RS resources on the frequency indicated in the concerned *measObject*, applying the discovery signals measurement timing configuration in accordance with *measDS-Config* in the concerned *measObject*;
 - 6> if reportCRS-Meas is included in the associated reportConfig, perform the corresponding measurements of neighbouring cells on the frequencies indicated in the concerned measObject as follows:
 - 7> for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with *measSubframePatternConfigNeigh*, if configured in the concerned *measObject*;
 - 7> apply the discovery signals measurement timing configuration in accordance with *measDS-Config* in the concerned *measObject*;

5> else:

- 6> perform the corresponding measurements of neighbouring cells on the frequencies and RATs indicated in the concerned *measObject* as follows:
 - 7> for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with *measSubframePatternConfigNeigh*, if configured in the concerned *measObject*;
 - 7> if the UE supports CRS based discovery signals measurement, apply the discovery signals measurement timing configuration in accordance with *measDS-Config*, if configured in the concerned *measObject*;

- 4> if the *ue-RxTxTimeDiffPeriodical* is configured in the associated *reportConfig*:
 - 5> perform the UE Rx-Tx time difference measurements on the PCell;
- 4> if the *reportSSTD-Meas* is set to *true* in the associated *reportConfig*:
 - 5> perform SSTD measurements between the PCell and the PSCell;
- 4> if the measRSSI-ReportConfig is configured in the associated reportConfig:
 - 5> perform the RSSI and channel occupancy measurements on the frequency indicated in the associated *measObject*;
- 2> perform the evaluation of reporting criteria as specified in 5.5.4;

The UE capable of CBR measurement when configured to transmit non-P2X related V2X sidelink communication shall:

- 1> if in coverage on the frequency used for V2X sidelink communication transmission as defined in TS 36.304 [4, 11.4]; or
- 1> if the concerned frequency is included in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration* or in *v2x-InterFreqInfoList* within *SystemInformationBlockType21*:
 - 2> if the UE is in RRC_IDLE:
 - 3> if the concerned frequency is the camped frequency:
 - 4> perform CBR measurement on the pools in v2x-CommTxPoolNormalCommon and v2x-CommTxPoolExceptional if included in SystemInformationBlockType21;
 - 3> else if v2x-CommTxPoolNormal or v2x-CommTxPoolExceptional is included in v2x-InterFreqInfoList for the concerned frequency within SystemInformationBlockType21:
 - 4> perform CBR measurement on pools in *v2x-CommTxPoolNormal* and *v2x-CommTxPoolExceptional* in *v2x-InterFreqInfoList* for the concerned frequency in *SystemInformationBlockType21*;
 - 3> else if the concerned frequency broadcasts SystemInformationBlockType21:
 - 4> perform CBR measurement on pools in v2x-CommTxPoolNormalCommon and v2x-CommTxPoolExceptional if included in SystemInformationBlockType21 broadcast on the concerned frequency;
 - 2> if the UE is in RRC_CONNECTED:
 - 3> if *tx-ResourcePoolToAddList* is included in *VarMeasConfig*:
 - 4> perform CBR measurements on each resource pool indicated in tx-ResourcePoolToAddList;
 - 3> if the concerned frequency is the PCell's frequency:
 - 4> perform CBR measurement on the pools in v2x-CommTxPoolNormalDedicated or v2x-SchedulingPool if included in RRCConnectionReconfiguration, v2x-CommTxPoolExceptional if included in SystemInformationBlockType21 for the concerned frequency and v2x-CommTxPoolExceptional if included in mobilityControlInfoV2X;
 - 3> else if v2x-CommTxPoolNormal, v2x-SchedulingPool or v2x-CommTxPoolExceptional is included in v2x-InterFreqInfoList for the concerned frequency within RRCConnectionReconfiguration:
 - 4> perform CBR measurement on pools in v2x-CommTxPoolNormal, v2x-SchedulingPool, and v2x-CommTxPoolExceptional if included in v2x-InterFreqInfoList for the concerned frequency in RRCConnectionReconfiguration;
 - 3> else if the concerned frequency broadcasts *SystemInformationBlockType21*:
 - 4> perform CBR measurement on pools in v2x-CommTxPoolNormalCommon and v2x-CommTxPoolExceptional if included in SystemInformationBlockType21 for the concerned frequency;

1> else:

- 2> perform CBR measurement on pools in *v2x-CommTxPoolList* in *SL-V2X-Preconfiguration* for the concerned frequency;
- NOTE 3: The *s-Measure* defines when the UE is required to perform measurements. The UE is however allowed to perform measurements also when the PCell RSRP exceeds *s-Measure*, e.g., to measure cells broadcasting a CSG identity following use of the autonomous search function as defined in TS 36.304 [4].
- NOTE 4: The UE may not perform the WLAN measurements it is configured with e.g. due to connection to another WLAN based on user preferences as specified in TS 23.402 [75] or due to turning off WLAN.

5.5.3.2 Layer 3 filtering

The UE shall:

1> for each measurement quantity that the UE performs measurements according to 5.5.3.1:

- NOTE 1: This does not include quantities configured solely for UE Rx-Tx time difference, SSTD measurements and RSSI, channel occupancy measurements, WLAN measurements of Band, Carrier Info, Available Admission Capacity, Backhaul Bandwidth, Channel Utilization, and Station Count, CBR measurement, and UL PDCP Packet Delay per QCI measurement i.e. for those types of measurements the UE ignores the *triggerQuantity* and *reportQuantity*.
 - 2> filter the measured result, before using for evaluation of reporting criteria or for measurement reporting, by the following formula:

$$F_n = (1 - a) \cdot F_{n-1} + a \cdot M_n$$

where

 M_n is the latest received measurement result from the physical layer;

 F_n is the updated filtered measurement result, that is used for evaluation of reporting criteria or for measurement reporting;

 F_{n-1} is the old filtered measurement result, where F_0 is set to M_1 when the first measurement result from the physical layer is received; and

 $a = 1/2^{(k/4)}$, where k is the *filterCoefficient* for the corresponding measurement quantity received by the *quantityConfig*;

- 2> adapt the filter such that the time characteristics of the filter are preserved at different input rates, observing that the *filterCoefficient k* assumes a sample rate equal to 200 ms;
- NOTE 2: If k is set to 0, no layer 3 filtering is applicable.
- NOTE 3: The filtering is performed in the same domain as used for evaluation of reporting criteria or for measurement reporting, i.e., logarithmic filtering for logarithmic measurements.
- NOTE 4: The filter input rate is implementation dependent, to fulfil the performance requirements set in [16]. For further details about the physical layer measurements, see TS 36.133 [16].

5.5.4 Measurement report triggering

5.5.4.1 General

If security has been activated successfully, the UE shall:

- 1> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 2> if the corresponding reportConfig includes a purpose set to reportStrongestCellsForSON:
 - 3> consider any neighbouring cell detected on the associated frequency to be applicable;

- 2> else if the corresponding reportConfig includes a purpose set to reportCGI:
 - 3> consider any neighbouring cell detected on the associated frequency/ set of frequencies (GERAN) which has a physical cell identity matching the value of the *cellForWhichToReportCGI* included in the corresponding *measObject* within the *VarMeasConfig* to be applicable;
- 2> else if the corresponding *reportConfig* includes a purpose set to *reportLocation*:
 - 3> consider only the PCell to be applicable;
- 2> else:
 - 3> if the corresponding *measObject* concerns E-UTRA:
 - 4> if the *ue-RxTxTimeDiffPeriodical* is configured in the corresponding *reportConfig*:
 - 5> consider only the PCell to be applicable;
 - 4> else if the reportSSTD-Meas is set to true in the corresponding reportConfig:
 - 5> consider the PSCell to be applicable;
 - 4> else if the *eventA1* or *eventA2* is configured in the corresponding *reportConfig*:
 - 5> consider only the serving cell to be applicable;
 - 4> else if *eventC1* or *eventC2* is configured in the corresponding *reportConfig*; or if *reportStrongestCSI-RSs* is included in the corresponding *reportConfig*:
 - 5> consider a CSI-RS resource on the associated frequency to be applicable when the concerned CSI-RS resource is included in the *measCSI-RS-ToAddModList* defined within the *VarMeasConfig* for this *measId*:
 - 4> else if *measRSSI-ReportConfig* is configured in the corresponding *reportConfig*:
 - 5> consider the resource indicated by the *rmtc-Config* on the associated frequency to be applicable;
 - 4> else if *tx-ResourcePoolToAddList* is configured in the *measObject*:
 - 5> consider the transmission resource pools indicated by the *tx-ResourcePoolToAddList* defined within the *VarMeasConfig* for this *measId* to be applicable;
 - 4> else:
 - 5> if *useWhiteCellList* is set to *TRUE*:
 - 6> consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is included in the *whiteCellsToAddModList* defined within the *VarMeasConfig* for this *measId*:
 - 5> else:
 - 6> consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is not included in the blackCellsToAddModList defined within the VarMeasConfig for this measId;
 - 5> for events involving a serving cell on one frequency and neighbours on another frequency, consider the serving cell on the other frequency as a neighbouring cell;
 - 4> if the corresponding *reportConfig* includes *alternativeTimeToTrigger* and if the UE supports *alternativeTimeToTrigger*:
 - 5> use the value of *alternativeTimeToTrigger* as the time to trigger instead of the value of *timeToTrigger* in the corresponding *reportConfig* for cells included in the *altTTT-CellsToAddModList* of the corresponding *measObject*;
 - 3> else if the corresponding *measObject* concerns UTRA or CDMA2000:

- 4> consider a neighbouring cell on the associated frequency to be applicable when the concerned cell is included in the *cellsToAddModList* defined within the *VarMeasConfig* for this *measId* (i.e. the cell is included in the white-list);
- NOTE 0: The UE may also consider a neighbouring cell on the associated UTRA frequency to be applicable when the concerned cell is included in the *csg-allowedReportingCells* within the *VarMeasConfig* for this *measId*, if configured in the corresponding *measObjectUTRA* (i.e. the cell is included in the range of physical cell identities for which reporting is allowed).
 - 3> else if the corresponding *measObject* concerns GERAN:
 - 4> consider a neighbouring cell on the associated set of frequencies to be applicable when the concerned cell matches the *ncc-Permitted* defined within the *VarMeasConfig* for this *measId*;
 - 3> else if the corresponding measObject concerns WLAN:
 - 4> consider a WLAN on the associated set of frequencies, as indicated by *carrierFreq* or on all WLAN frequencies when *carrierFreq* is not present, to be applicable if the WLAN matches all WLAN identifiers of at least one entry within *wlan-Id-List* for this *measId*;
 - 2> if the *triggerType* is set to *event* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable cells for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include a measurement reporting entry for this *measId* (a first cell triggers the event):
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> if the UE supports T312 and if *useT312* is included for this event and if T310 is running:
 - 4> if T312 is not running:
 - 5> start timer T312 with the value configured in the corresponding *measObject*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 2> if the *triggerType* is set to *event* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable cells not included in the *cellsTriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (a subsequent cell triggers the event):
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> if the UE supports T312 and if *useT312* is included for this event and if T310 is running:
 - 4> if T312 is not running:
 - 5> start timer T312 with the value configured in the corresponding *measObject*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 2> if the *triggerType* is set to *event* and if the leaving condition applicable for this event is fulfilled for one or more of the cells included in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId* for all measurements after layer 3 filtering taken during *timeToTrigger* defined within the *VarMeasConfig* for this event:

- 3> remove the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
- 3> if the UE supports T312 and if *useT312* is included for this event and if T310 is running:
 - 4> if T312 is not running:
 - 5> start timer T312 with the value configured in the corresponding *measObject*;
- 3> if *reportOnLeave* is set to *TRUE* for the corresponding reporting configuration or if *a6-ReportOnLeave* is set to *TRUE* for the corresponding reporting configuration:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5;
- 3> if the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:
 - 4> remove the measurement reporting entry within the VarMeasReportList for this measId;
 - 4> stop the periodical reporting timer for this *measId*, if running;
- 2> if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable CSI-RS resources for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig, while the VarMeasReportList does not include an measurement reporting entry for this measId (i.e. a first CSI-RS resource triggers the event):
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned CSI-RS resource(s) in the *csi-RS-TriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the *triggerType* is set to *event* and if the entry condition applicable for this event, i.e. the event corresponding with the *eventId* of the corresponding *reportConfig* within *VarMeasConfig*, is fulfilled for one or more applicable CSI-RS resources not included in the *csi-RS-TriggeredList* for all measurements after layer 3 filtering taken during *timeToTrigger* defined for this event within the *VarMeasConfig* (i.e. a subsequent CSI-RS resource triggers the event):
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned CSI-RS resource(s) in the *csi-RS-TriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the triggerType is set to event and if the leaving condition applicable for this event is fulfilled for one or more of the CSI-RS resources included in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig for this event:
 - 3> remove the concerned CSI-RS resource(s) in the *csi-RS-TriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> if *c1-ReportOnLeave* is set to *TRUE* for the corresponding reporting configuration or if *c2-ReportOnLeave* is set to *TRUE* for the corresponding reporting configuration:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5;
 - 3> if the csi-RS-TriggeredList defined within the VarMeasReportList for this measId is empty:
 - 4> remove the measurement reporting entry within the VarMeasReportList for this measId;
 - 4> stop the periodical reporting timer for this *measId*, if running;

- 2> if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable transmission resource pools for all measurements taken during timeToTrigger defined for this event within the VarMeasConfig, while the VarMeasReportList does not include an measurement reporting entry for this measId (a first transmission resource pool triggers the event):
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable transmission resource pools not included in the poolsTriggeredList for all measurements taken during timeToTrigger defined for this event within the VarMeasConfig (a subsequent transmission resource pool triggers the event):
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> include the concerned transmission resource pool(s) in the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the triggerType is set to event and if the leaving condition applicable for this event is fulfilled for one or more applicable transmission resource pools included in the poolsTriggeredList defined within the VarMeasReportList for this measId for all measurements taken during timeToTrigger defined within the VarMeasConfig for this event:
 - 3> remove the concerned transmission resource pool(s) from the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> if the *poolsTriggeredList* defined within the *VarMeasReportList* for this *measId* is empty:
 - 4> remove the measurement reporting entry within the VarMeasReportList for this measId;
 - 4> stop the periodical reporting timer for this *measId*, if running;
- 2> if measRSSI-ReportConfig is included and if a (first) measurement result is available:
 - 3> include a measurement reporting entry within the VarMeasReportList for this measId;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> initiate the measurement reporting procedure as specified in 5.5.5 immediately when RSSI sample values are reported by the physical layer after the first L1 measurement duration;
- 2> else if the *purpose* is included and set to *reportStrongestCells*, *reportStrongestCellsForSON*, *reportLocation* or *sidelink* and if a (first) measurement result is available:
 - 3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> if the *purpose* is set to *reportStrongestCells* and *reportStrongestCSI-RSs* is not included:
 - 4> if the *triggerType* is set to *periodical* and the corresponding *reportConfig* includes the *ul-DelayConfig*:
 - 5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after a first measurement result is provided by lower layers;
 - 4> else if the corresponding measurement object concerns WLAN:

- 5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the PCell and for the applicable WLAN(s);
- 4> else if the *reportAmount* exceeds 1:
 - 5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the PCell;
- 4> else (i.e. the *reportAmount* is equal to 1):
 - 5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the PCell and for the strongest cell among the applicable cells, or becomes available for the pair of PCell and the PSCell in case of SSTD measurements;
- 3> else if the *purpose* is set to *reportLocation*:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after both the quantity to be reported for the PCell and the location information become available;
- 3> else if the *purpose* is set to *sidelink*:
 - 4> initiate the measurement reporting procedure as specified in 5.5.5 immediately after both the quantity to be reported for the PCell and the CBR measurement result become available;
- 3> else:
 - 4> initiate the measurement reporting procedure, as specified in 5.5.5, when it has determined the strongest cells on the associated frequency;
- 2> upon expiry of the periodical reporting timer for this *measId*:
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> if the *purpose is* included and set to *reportCGI* and if the UE acquired the information needed to set all fields of *cgi-Info* for the requested cell:
 - 3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> stop timer T321;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- 2> upon expiry of the T321 for this *measId*:
 - 3> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;
 - 3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
 - 3> initiate the measurement reporting procedure, as specified in 5.5.5;
- NOTE 2: The UE does not stop the periodical reporting with *triggerType* set to *event* or to *periodical* while the corresponding measurement is not performed due to the PCell RSRP being equal to or better than *s-Measure* or due to the measurement gap not being setup.
- NOTE 3: If the UE is configured with DRX, the UE may delay the measurement reporting for event triggered and periodical triggered measurements until the Active Time, which is defined in TS 36.321 [6].

5.5.4.2 Event A1 (Serving becomes better than threshold)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when condition A1-1, as specified below, is fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition A1-2, as specified below, is fulfilled;

1> for this measurement, consider the primary or secondary cell that is configured on the frequency indicated in the associated *measObjectEUTRA* to be the serving cell;

Inequality A1-1 (Entering condition)

Ms - Hys > Thresh

Inequality A1-2 (Leaving condition)

Ms + Hys < Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of the serving cell, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Thresh is the threshold parameter for this event (i.e. *a1-Threshold* as defined within *reportConfigEUTRA* for this event).

Ms is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Hys is expressed in dB.

Thresh is expressed in the same unit as *Ms*.

5.5.4.3 Event A2 (Serving becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A2-2, as specified below, is fulfilled;

1> for this measurement, consider the primary or secondary cell that is configured on the frequency indicated in the associated *measObjectEUTRA* to be the serving cell;

Inequality A2-1 (Entering condition)

Ms + Hys < Thresh

Inequality A2-2 (Leaving condition)

Ms - Hys > Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of the serving cell, not taking into account any offsets.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Thresh is the threshold parameter for this event (i.e. a2-Threshold as defined within reportConfigEUTRA for this event).

Ms is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Hys is expressed in dB.

Thresh is expressed in the same unit as *Ms*.

5.5.4.4 Event A3 (Neighbour becomes offset better than PCell/ PSCell)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A3-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A3-2, as specified below, is fulfilled;

1> if usePSCell of the corresponding reportConfig is set to true:

2> use the PSCell for Mp, Ofp and Ocp;

1> else:

2> use the PCell for Mp, Ofp and Ocp;

NOTE The cell(s) that triggers the event is on the frequency indicated in the associated *measObject* which may be different from the frequency used by the PCell/ PSCell.

Inequality A3-1 (Entering condition)

$$Mn + Ofn + Ocn - Hys > Mp + Ofp + Ocp + Off$$

Inequality A3-2 (Leaving condition)

$$Mn + Ofn + Ocn + Hys < Mp + Ofp + Ocp + Off$$

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ofn is the frequency specific offset of the frequency of the neighbour cell (i.e. *offsetFreq* as defined within *measObjectEUTRA* corresponding to the frequency of the neighbour cell).

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.

Mp is the measurement result of the PCell/PSCell, not taking into account any offsets.

Ofp is the frequency specific offset of the frequency of the PCell/ PSCell (i.e. *offsetFreq* as defined within *measObjectEUTRA* corresponding to the frequency of the PCell/ PSCell).

Ocp is the cell specific offset of the PCell/ PSCell (i.e. *cellIndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the PCell/ PSCell), and is set to zero if not configured for the PCell/ PSCell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Off is the offset parameter for this event (i.e. a3-Offset as defined within reportConfigEUTRA for this event).

Mn, *Mp* are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn, Ocn, Ofp, Ocp, Hys, Off are expressed in dB.

5.5.4.5 Event A4 (Neighbour becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A4-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A4-2, as specified below, is fulfilled;

Inequality A4-1 (Entering condition)

$$Mn + Ofn + Ocn - Hys > Thresh$$

Inequality A4-2 (Leaving condition)

$$Mn + Ofn + Ocn + Hys < Thresh$$

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ofn is the frequency specific offset of the frequency of the neighbour cell (i.e. *offsetFreq* as defined within *measObjectEUTRA* corresponding to the frequency of the neighbour cell).

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Thresh is the threshold parameter for this event (i.e. a4-Threshold as defined within reportConfigEUTRA for this event).

Mn is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn, Ocn, Hys are expressed in dB.

Thresh is expressed in the same unit as Mn.

5.5.4.6 Event A5 (PCell/ PSCell becomes worse than threshold1 and neighbour becomes better than threshold2)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when both condition A5-1 and condition A5-2, as specified below, are fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition A5-3 or condition A5-4, i.e. at least one of the two, as specified below, is fulfilled;
- 1> if usePSCell of the corresponding reportConfig is set to true:

2> use the PSCell for Mp;

1> else:

2> use the PCell for *Mp*;

NOTE: The cell(s) that triggers the event is on the frequency indicated in the associated *measObject* which may be different from the frequency used by the PCell/ PSCell.

Inequality A5-1 (Entering condition 1)

Mp + Hys < Thresh

Inequality A5-2 (Entering condition 2)

Mn + Ofn + Ocn - Hys > Thresh2

Inequality A5-3 (Leaving condition 1)

Mp - Hys > Thresh

Inequality A5-4 (Leaving condition 2)

Mn + Ofn + Ocn + Hys < Thresh2

The variables in the formula are defined as follows:

Mp is the measurement result of the PCell/ PSCell, not taking into account any offsets.

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ofn is the frequency specific offset of the frequency of the neighbour cell (i.e. *offsetFreq* as defined within *measObjectEUTRA* corresponding to the frequency of the neighbour cell).

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Thresh1 is the threshold parameter for this event (i.e. *a5-Threshold1* as defined within *reportConfigEUTRA* for this event).

Thresh2 is the threshold parameter for this event (i.e. *a5-Threshold2* as defined within *reportConfigEUTRA* for this event).

Mn, Mp are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn, Ocn, Hys are expressed in dB.

Thresh1 is expressed in the same unit as **Mp**.

Thresh2 is expressed in the same unit as *Mn*.

5.5.4.6a Event A6 (Neighbour becomes offset better than SCell)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A6-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A6-2, as specified below, is fulfilled;

1> for this measurement, consider the (secondary) cell that is configured on the frequency indicated in the associated *measObjectEUTRA* to be the serving cell;

NOTE: The neighbour(s) is on the same frequency as the SCell i.e. both are on the frequency indicated in the associated *measObject*.

Inequality A6-1 (Entering condition)

Mn + Ocn - Hys > Ms + Ocs + Off

Inequality A6-2 (Leaving condition)

Mn + Ocn + Hys < Ms + Ocs + Off

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.

Ms is the measurement result of the serving cell, not taking into account any offsets.

Ocs is the cell specific offset of the serving cell (i.e. *cellIndividualOffset* as defined within *measObjectEUTRA* corresponding to the serving frequency), and is set to zero if not configured for the serving cell.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Off is the offset parameter for this event (i.e. a6-Offset as defined within reportConfigEUTRA for this event).

Mn, Ms are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ocn, Ocs, Hys, Off are expressed in dB.

5.5.4.7 Event B1 (Inter RAT neighbour becomes better than threshold)

The UE shall:

1> for UTRA and CDMA2000, only trigger the event for cells included in the corresponding measurement object;

1> consider the entering condition for this event to be satisfied when condition B1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition B1-2, as specified below, is fulfilled;

Inequality B1-1 (Entering condition)

Mn + Ofn - Hys > Thresh

Inequality B1-2 (Leaving condition)

Mn + Ofn + Hys < Thresh

The variables in the formula are defined as follows:

Mn is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA 2000 measurement result, *pilotStrength* is divided by -2.

Ofn is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. *offsetFreq* as defined within the *measObject* corresponding to the frequency of the neighbour inter-RAT cell).

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigInterRAT for this event).

Thresh is the threshold parameter for this event (i.e. b1-Threshold as defined within reportConfigInterRAT for this event). For CDMA2000, b1-Threshold is divided by -2.

Mn is expressed in dBm or in dB, depending on the measurement quantity of the inter-RAT neighbour cell.

Ofn, Hys are expressed in dB.

Thresh is expressed in the same unit as Mn.

5.5.4.8 Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2)

The UE shall:

1> for UTRA and CDMA2000, only trigger the event for cells included in the corresponding measurement object;

1> consider the entering condition for this event to be satisfied when both condition B2-1 and condition B2-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition B2-3 or condition B2-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality B2-1 (Entering condition 1)

Mp + Hys < Thresh

Inequality B2-2 (Entering condition 2)

Mn + Ofn - Hys > Thresh2

Inequality B2-3 (Leaving condition 1)

Mp-Hys > Thresh

Inequality B2-4 (Leaving condition 2)

Mn + Ofn + Hys < Thresh2

The variables in the formula are defined as follows:

Mp is the measurement result of the PCell, not taking into account any offsets.

Mn is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA2000 measurement result, *pilotStrength* is divided by -2.

Ofn is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. *offsetFreq* as defined within the *measObject* corresponding to the frequency of the inter-RAT neighbour cell).

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigInterRAT for this event).

Thresh1 is the threshold parameter for this event (i.e. b2-*Threshold1* as defined within *reportConfigInterRAT* for this event).

Thresh2 is the threshold parameter for this event (i.e. *b2-Threshold2* as defined within *reportConfigInterRAT* for this event). For CDMA2000, *b2-Threshold2* is divided by -2.

Mp is expressed in dBm in case of RSRP, or in dB in case of RSRQ.

Mn is expressed in dBm or dB, depending on the measurement quantity of the inter-RAT neighbour cell.

Ofn, Hys are expressed in dB.

Thresh1 is expressed in the same unit as *Mp*.

Thresh2 is expressed in the same unit as *Mn*.

5.5.4.9 Event C1 (CSI-RS resource becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition C1-2, as specified below, is fulfilled;

Inequality C1-1 (Entering condition)

Mcr + Ocr - Hys > Thresh

Inequality C1-2 (Leaving condition)

Mcr + Ocr + Hys < Thresh

The variables in the formula are defined as follows:

Mcr is the measurement result of the CSI-RS resource, not taking into account any offsets.

Ocr is the CSI-RS specific offset (i.e. *csi-RS-IndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Thresh is the threshold parameter for this event (i.e. *c1-Threshold* as defined within *reportConfigEUTRA* for this event).

Mcr, Thresh are expressed in dBm.

Ocr, Hys are expressed in dB.

5.5.4.10 Event C2 (CSI-RS resource becomes offset better than reference CSI-RS resource)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition C2-2, as specified below, is fulfilled;

NOTE: The CSI-RS resource(s) that triggers the event is on the same frequency as the reference CSI-RS resource, i.e. both are on the frequency indicated in the associated *measObject*.

Inequality C2-1 (Entering condition)

Mcr + Ocr - Hys > Mref + Oref + Off

Inequality C2-2 (Leaving condition)

Mcr + Ocr + Hys < Mref + Oref + Off

The variables in the formula are defined as follows:

Mcr is the measurement result of the CSI-RS resource, not taking into account any offsets.

Ocr is the CSI-RS specific offset of the CSI-RS resource (i.e. csi-RS-IndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.

Mref is the measurement result of the reference CSI-RS resource (i.e. *c2-RefCSI-RS* as defined within *reportConfigEUTRA* for this event), not taking into account any offsets.

Oref is the CSI-RS specific offset of the reference CSI-RS resource (i.e. *csi-RS-IndividualOffset* as defined within *measObjectEUTRA* corresponding to the frequency of the reference CSI-RS resource), and is set to zero if not configured for the reference CSI-RS resource.

Hys is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).

Off is the offset parameter for this event (i.e. c2-Offset as defined within reportConfigEUTRA for this event).

Mcr, Mref are expressed in dBm.

Ocr, Oref, Hys, Off are expressed in dB.

5.5.4.11 Event W1 (WLAN becomes better than a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when wlan-MobilitySet within VarWLAN-MobilityConfig does not contain any entries and condition W1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition W1-2, as specified below, is fulfilled;

Inequality W1-1 (Entering condition)

Mn - Hys > Thresh

Inequality W1-2 (Leaving condition)

Mn + Hys < Thresh

The variables in the formula are defined as follows:

Mn is the measurement result of WLAN(s) configured in the measurement object, not taking into account any offsets.

Hys is the hysteresis parameter for this event.

Thresh is the threshold parameter for this event (i.e. w1-Threshold as defined within reportConfigInterRAT for this event).

Mn is expressed in dBm.

Hys is expressed in dB.

Thresh is expressed in the same unit as Mn.

5.5.4.12 Event W2 (All WLAN inside WLAN mobility set becomes worse than threshold1 and a WLAN outside WLAN mobility set becomes better than threshold2)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when both conditions W2-1 and W2-2 as specified below are fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition W2-3 or condition W2-4, i.e. at least one of the two, as specified below is fulfilled;

Inequality W2-1 (Entering condition 1)

Ms + Hys < Thresh1

Inequality W2-2 (Entering condition 2)

Mn - Hys > Thresh2

Inequality W2-3 (Leaving condition 1)

Ms - Hys > Thresh1

Inequality W2-4 (Leaving condition 2)

Mn + Hys < Thresh2

The variables in the formula are defined as follows:

Ms is the measurement result of WLAN(s) which matches all WLAN identifiers of at least one entry within wlan-MobilitySet in VarWLAN-MobilityConfig, not taking into account any offsets.

Mn is the measurement result of WLAN(s) configured in the measurement object which does not match all WLAN identifiers of any entry within *wlan-MobilitySet* in *VarWLAN-MobilityConfig*, not taking into account any offsets.

Hys is the hysteresis parameter for this event.

Thresh1 is the threshold parameter for this event (i.e. w2-Threshold1 as defined within reportConfigInterRAT for this event).

Thresh2 is the threshold parameter for this event (i.e. w2-Threshold2 as defined within reportConfigInterRAT for this event).

Mn, Ms are expressed in dBm.

Hys is expressed in dB.

Thresh1 is expressed in the same unit as *Ms*.

Thresh2 is expressed in the same unit as *Mn*.

5.5.4.13 Event W3 (All WLAN inside WLAN mobility set becomes worse than a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition W3-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition W3-2, as specified below, is fulfilled;

Inequality W3-1 (Entering condition)

Ms + Hys < Thresh

Inequality W3-2 (Leaving condition)

Ms - Hys > Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of WLAN(s) which matches all WLAN identifiers of at least one entry within wlan-MobilitySet in VarWLAN-MobilityConfig, not taking into account any offsets.

Hys is the hysteresis parameter for this event.

Thresh is the threshold parameter for this event (i.e. w3-Threshold as defined within reportConfigInterRAT for this event).

Ms is expressed in dBm.

Hys is expressed in dB.

Thresh is expressed in the same unit as Ms.

5.5.4.14 Event V1 (The channel busy ratio is above a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition V1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition V1-2, as specified below, is fulfilled;

Inequality V1-1 (Entering condition)

Ms > Thresh

Inequality V1-2 (Leaving condition)

Ms < Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of channel busy ratio of the transmission resource pool, not taking into account any offsets.

Thresh is the threshold parameter for this event (i.e. v1-Threshold as defined within ReportConfigEUTRA).

Ms is expressed in decimal from 0 to 1 in steps of 0.01.

Thresh is expressed in the same unit as *Ms*.

5.5.4.15 Event V2 (The channel busy ratio is below a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition V2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition V2-2, as specified below, is fulfilled;

Inequality V2-1 (Entering condition)

Ms < Thresh

Inequality V2-2 (Leaving condition)

Ms > Thresh

The variables in the formula are defined as follows:

Ms is the measurement result of channel busy ratio of the transmission resource pool, not taking into account any offsets.

Thresh is the threshold parameter for this event (i.e. v2-Threshold as defined within ReportConfigEUTRA).

Ms is expressed in decimal from 0 to 1 in steps of 0.01.

Thresh is expressed in the same unit as Ms.

5.5.5 Measurement reporting



Figure 5.5.5-1: Measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to E-UTRAN. The UE shall initiate this procedure only after successful security activation.

For the *measId* for which the measurement reporting procedure was triggered, the UE shall set the *measResults* within the *MeasurementReport* message as follows:

- 1> set the *measId* to the measurement identity that triggered the measurement reporting;
- 1> set the measResultPCell to include the quantities of the PCell;
- 1> set the *measResultServFreqList* to include for each SCell that is configured, if any, within *measResultSCell* the quantities of the concerned SCell, if available according to performance requirements in [16], except if *purpose* for the *reportConfig* associated with the *measId* that triggered the measurement reporting is set to *reportLocation*;
- 1> if the *reportConfig* associated with the *measId* that triggered the measurement reporting includes *reportAddNeighMeas*:
 - 2> for each serving frequency for which *measObjectId* is referenced in the *measIdList*, other than the frequency corresponding with the *measId* that triggered the measurement reporting:
 - 3> set the *measResultServFreqList* to include within *measResultBestNeighCell* the *physCellId* and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;
- 1> if there is at least one applicable neighbouring cell to report:
 - 2> set the *measResultNeighCells* to include the best neighbouring cells up to *maxReportCells* in accordance with the following:
 - 3> if the *triggerType* is set to *event*:
 - 4> include the cells included in the *cellsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 3> else:
 - 4> include the applicable cells for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;
- NOTE 1: The reliability of the report (i.e. the certainty it contains the strongest cells on the concerned frequency) depends on the measurement configuration i.e. the *reportInterval*. The related performance requirements are specified in TS 36.133 [16].
 - 3> for each cell that is included in the *measResultNeighCells*, include the *physCellId*;
 - 3> if the *triggerType* is set to *event*; or the *purpose* is set to *reportStrongestCells* or to *reportStrongestCellsForSON*:
 - 4> for each included cell, include the layer 3 filtered measured results in accordance with the *reportConfig* for this *measId*, ordered as follows:
 - 5> if the *measObject* associated with this *measId* concerns E-UTRA:

- 6> set the *measResult* to include the quantity(ies) indicated in the *reportQuantity* within the concerned *reportConfig* in order of decreasing *triggerQuantity*, i.e. the best cell is included first:
- 5> if the *measObject* associated with this *measId* concerns UTRA FDD and if *ReportConfigInterRAT* includes the *reportQuantityUTRA-FDD*:
 - 6> set the *measResult* to include the quantities indicated by the *reportQuantityUTRA-FDD* in order of decreasing *measQuantityUTRA-FDD* within the *quantityConfig*, i.e. the best cell is included first;
- 5> if the *measObject* associated with this *measId* concerns UTRA FDD and if *ReportConfigInterRAT* does not include the *reportQuantityUTRA-FDD*; or
- 5> if the measObject associated with this measId concerns UTRA TDD, GERAN or CDMA2000:
 - 6> set the *measResult* to the quantity as configured for the concerned RAT within the *quantityConfig* in order of either decreasing quantity for UTRA and GERAN or increasing quantity for CDMA2000 *pilotStrength*, i.e. the best cell is included first;
- 3> else if the *purpose* is set to *reportCGI*:
 - 4> if the mandatory present fields of the *cgi-Info* for the cell indicated by the *cellForWhichToReportCGI* in the associated *measObject* have been obtained:
 - 5> if the *includeMultiBandInfo* is configured:
 - 6> include the *freqBandIndicator*;
 - 6> if the cell broadcasts the *multiBandInfoList*, include the *multiBandInfoList*;
 - 6> if the cell broadcasts the freqBandIndicatorPriority, include the freqBandIndicatorPriority;
 - 5> if the cell broadcasts a CSG identity:
 - 6> include the *csg-Identity*;
 - 6> include the *csg-MemberStatus* and set it to *member* if the cell is a CSG member cell;
 - 5> if the si-RequestForHO is configured within the reportConfig associated with this measId:
 - 6> include the *cgi-Info* containing all the fields other than the *plmn-IdentityList* that have been successfully acquired;
 - 6> include, within the *cgi-Info*, the field *plmn-IdentityList* in accordance with the following:
 - 7> if the cell is a CSG member cell, determine the subset of the PLMN identities, starting from the second entry of PLMN identities in the broadcast information, that meet the following conditions:
 - a) equal to the RPLMN or an EPLMN; and
 - b) the CSG whitelist of the UE includes an entry comprising of the concerned PLMN identity and the CSG identity broadcast by the cell;
 - 7> if the subset of PLMN identities determined according to the previous includes at least one PLMN identity, include the *plmn-IdentityList* and set it to include this subset of the PLMN identities:
 - 7> if the cell is a CSG member cell, include the *primaryPLMN-Suitable* if the primary PLMN meets conditions a) and b) specified above;

5> else:

6> include the *cgi-Info* containing all the fields that have been successfully acquired and in accordance with the following:

- 7> include in the *plmn-IdentityList* the list of identities starting from the second entry of PLMN Identities in the broadcast information;
- 1> for the cells included according to the previous (i.e. covering the PCell, the SCells, the best non-serving cells on serving frequencies as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in 36.133 [16];
- 1> if there is at least one applicable CSI-RS resource to report:
 - 2> set the *measResultCSI-RS-List* to include the best CSI-RS resources up to *maxReportCells* in accordance with the following:
 - 3> if the *triggerType* is set to *event*:
 - 4> include the CSI-RS resources included in the *csi-RS-TriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 3> else:
 - 4> include the applicable CSI-RS resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;
- NOTE 2: The reliability of the report (i.e. the certainty it contains the strongest CSI-RS resources on the concerned frequency) depends on the measurement configuration i.e. the *reportInterval*. The related performance requirements are specified in TS 36.133 [16].
 - 3> for each CSI-RS resource that is included in the *measResultCSI-RS-List*:
 - 4> include the *measCSI-RS-Id*:
 - 4> include the layer 3 filtered measured results in accordance with the *reportConfig* for this *measId*, ordered as follow:
 - 5> set the *csi-RSRP-Result* to include the quantity indicated in the *reportQuantity* within the concerned *reportConfig* in order of decreasing *triggerQuantityCSI-RS*, i.e. the best CSI-RS resource is included first:
 - 4> if *reportCRS-Meas* is included within the associated *reportConfig*, and the cell indicated by *physCellId* of this CSI-RS resource is not a serving cell:
 - 5> set the *measResultNeighCells* to include the cell indicated by *physCellId* of this CSI-RS resource, and include the *physCellId*;
 - 5> set the *rsrpResult* to include the RSRP of the concerned cell, if available according to performance requirements in [16];
 - 5> set the *rsrqResult* to include the RSRQ of the concerned cell, if available according to performance requirements in [16];
- 1> if the ue-RxTxTimeDiffPeriodical is configured within the corresponding reportConfig for this measId;
 - 2> set the *ue-RxTxTimeDiffResult* to the measurement result provided by lower layers;
 - 2> set the *currentSFN*;
- 1> if the measRSSI-ReportConfig is configured within the corresponding reportConfig for this measId:
 - 2> set the rssi-Result to the average of sample value(s) provided by lower layers in the reportInterval;
 - 2> set the *channelOccupancy* to the rounded percentage of sample values which are beyond to the *channelOccupancyThreshold* within all the sample values in the *reportInterval*;
- 1> if uplink PDCP delay results are available:
 - 2> set the *ul-PDCP-DelayResultList* to include the uplink PDCP delay results available;

- 1> if the includeLocationInfo is configured in the corresponding reportConfig for this measId or if purpose for the reportConfig associated with the measId that triggered the measurement reporting is set to reportLocation; and detailed location information that has not been reported is available, set the content of the locationInfo as follows:
 - 2> include the *locationCoordinates*;
 - 2> if available, include the *gnss-TOD-msec*, except if *purpose* for the *reportConfig* associated with the *measId* that triggered the measurement reporting is set to *reportLocation*;
- 1> if the reportSSTD-Meas is set to true within the corresponding reportConfig for this measId:
 - 2> set the *measResultSSTD* to the measurement results provided by lower layers;
- 1> if there is at least one applicable transmission resource pool to report:
 - 2> set the measResultListCBR to include the CBR measurement results in accordance with the following:
 - 3> if the *triggerType* is set to *event*:
 - 4> include the transmission resource pools included in the *poolsTriggeredList* as defined within the *VarMeasReportList* for this *measId*;
 - 3> else:
 - 4> include the applicable transmission resource pools for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;
 - 3> for each transmission resource pool to be reported:
 - 4> set the *poolIdentity* to the *poolReportId* of this transmission resource pool;
 - 4> if adjacencyPSCCH-PSSCH is set to TRUE for this transmission resource pool:
 - 5> set the *cbr-PSSCH* to the CBR measurement result on PSSCH and PSCCH of this transmission resource pool provided by lower layers;
 - 4> else:
 - 5> set the *cbr-PSSCH* to the CBR measurement result on PSSCH of this transmission resource pool provided by lower layers if available;
 - 5> set the *cbr-PSCCH* to the CBR measurement result on PSCCH of this transmission resource pool provided by lower layers if available;
- 1> increment the numberOfReportsSent as defined within the VarMeasReportList for this measId by 1;
- 1> stop the periodical reporting timer, if running;
- 1> if the *numberOfReportsSent* as defined within the *VarMeasReportList* for this *measId* is less than the *reportAmount* as defined within the corresponding *reportConfig* for this *measId*:
 - 2> start the periodical reporting timer with the value of *reportInterval* as defined within the corresponding *reportConfig* for this *measId*;
- 1> else:
 - 2> if the *triggerType* is set to *periodical*:
 - 3> remove the entry within the VarMeasReportList for this measId;
 - 3> remove this *measId* from the *measIdList* within *VarMeasConfig*;
- 1> if the measured results are for CDMA2000 HRPD:
 - 2> set the preRegistrationStatusHRPD to the UE's CDMA2000 upper layer's HRPD preRegistrationStatus;
- 1> if the measured results are for CDMA2000 1xRTT:

- 2> set the preRegistrationStatusHRPD to FALSE;
- 1> if the measured results are for WLAN:
 - 2> set the *measResultListWLAN* to include the quantities within the *quantityConfigWLAN* for up to *maxReportCells* WLAN(s), determined according to the following:
 - 3> include WLAN the UE is connected to, if any;
 - 3> if reportAnyWLAN is set to TRUE:
 - 4> consider WLAN with any WLAN identifiers to be applicable for measurement reporting;
 - 3> else:
 - 4> consider only WLANs which do not match all WLAN identifiers of any entry within *wlan-MobilitySet* in *VarWLAN-MobilityConfig* to be applicable for measurement reporting;
 - 3> include applicable WLAN in order of decreasing WLAN RSSI, i.e. the best WLAN is included first;
 - 2> for each included WLAN:
 - 3> set wlan-Identifiers to include all WLAN identifiers that can be acquired for the WLAN measured;
 - 3> set connectedWLAN to TRUE if the UE is connected to the WLAN measured;
 - 3> if reportQuantityWLAN exists within the ReportConfigInterRAT within the VarMeasConfig for this measId:
 - 4> if bandRequestWLAN is set to TRUE:
 - 5> set bandWLAN to include WLAN band of the WLAN measured;
 - 4> if *carrierInfoRequestWLAN* is set to *TRUE*:
 - 5> set *carrierInfoWLAN* to include WLAN carrier information of the WLAN measured if it can be acquired;
 - 4> if availableAdmissionCapacityRequestWLAN is set to TRUE:
 - 5> set the measResult to include avaiableAdmissionCapacityWLAN if it can be acquired;
 - 4> if backhaulDL-BandwidthRequestWLAN is set to TRUE:
 - 5> set the *measResult* to include *backhaulDL-BandwidthWLAN* if it can be acquired;
 - 4> if backhaulUL-BandwidthRequestWLAN is set to TRUE:
 - 5> set the measResult to include backhaulUL-BandwidthWLAN if it can be acquired;
 - 4> if *channelUtilizationRequestWLAN* is set to *TRUE*:
 - 5> set the *measResult* to include *channelUtilizationWLAN* if it can be acquired;
 - 4> if *stationCountRequestWLAN* is set to *TRUE*:
 - 5> set the *measResult* to include *stationCountWLAN* if it can be acquired;
- 1> submit the MeasurementReport message to lower layers for transmission, upon which the procedure ends;

5.5.6 Measurement related actions

5.5.6.1 Actions upon handover and re-establishment

E-UTRAN applies the handover procedure as follows:

- when performing the handover procedure, as specified in 5.3.5.4, ensure that a *measObjectId* corresponding to each handover target serving frequency is configured as a result of the procedures described in this sub-clause and in 5.3.5.4;
- when changing the band while the physical frequency remains unchanged, E-UTRAN releases the *measObject* corresponding to the source frequency and adds a *measObject* corresponding to the target frequency (i.e. it does not reconfigure the *measObject*);

E-UTRAN applies the re-establishment procedure as follows:

- when performing the connection re-establishment procedure, as specified in 5.3.7, ensure that a *measObjectId* corresponding each target serving frequency is configured as a result of the procedure described in this subclause and the subsequent connection reconfiguration procedure immediately following the re-establishment procedure;
- in the first reconfiguration following the re-establishment when changing the band while the physical frequency remains unchanged, E-UTRAN releases the *measObject* corresponding to the source frequency and adds a *measObject* corresponding to the target frequency (i.e. it does not reconfigure the *measObject*);

The UE shall:

- 1> for each *measId* included in the *measIdList* within *VarMeasConfig*:
 - 2> if the *triggerType* is set to *periodical*:
 - 3> remove this *measId* from the *measIdList* within *VarMeasConfig*:
- 1> if the procedure was triggered due to a handover or successful re-establishment and the procedure involves a change of primary frequency, update the *measId* values in the *measIdList* within *VarMeasConfig* as follows:
 - 2> if a *measObjectId* value corresponding to the target primary frequency exists in the *measObjectList* within *VarMeasConfig*:
 - 3> for each *measId* value in the *measIdList*:
 - 4> if the *measId* value is linked to the *measObjectId* value corresponding to the source primary frequency:
 - 5> link this *measId* value to the *measObjectId* value corresponding to the target primary frequency;
 - 4> else if the *measId* value is linked to the *measObjectId* value corresponding to the target primary frequency:
 - 5> link this *measId* value to the *measObjectId* value corresponding to the source primary frequency;

2> else:

- 3> remove all *measId* values that are linked to the *measObjectId* value corresponding to the source primary frequency;
- 1> remove all measurement reporting entries within VarMeasReportList;
- 1> stop the periodical reporting timer or timer T321, whichever one is running, as well as associated information (e.g. *timeToTrigger*) for all *measId*;
- 1> release the measurement gaps, if activated;
- NOTE: If the UE requires measurement gaps to perform inter-frequency or inter-RAT measurements, the UE resumes the inter-frequency and inter-RAT measurements after the E-UTRAN has setup the measurement gaps.

5.5.6.2 Speed dependant scaling of measurement related parameters

The UE shall adjust the value of the following parameter configured by the E-UTRAN depending on the UE speed: *timeToTrigger*. The UE shall apply 3 different levels, which are selected as follows:

The UE shall:

- 1> perform mobility state detection using the mobility state detection as specified in TS 36.304 [4] with the following modifications:
 - 2> counting handovers instead of cell reselections;
 - 2> applying the parameter applicable for RRC_CONNECTED as included in *speedStatePars* within *VarMeasConfig*;
- 1> if high mobility state is detected:
 - 2> use the *timeToTrigger* value multiplied by *sf-High* within *VarMeasConfig*;
- 1> else if medium mobility state is detected:
 - 2> use the *timeToTrigger* value multiplied by *sf-Medium* within *VarMeasConfig*;
- 1> else:
 - 2> no scaling is applied;

5.5.7 Inter-frequency RSTD measurement indication

5.5.7.1 General



Figure 5.5.7.1-1: Inter-frequency RSTD measurement indication

The purpose of this procedure is to indicate to the network that the UE is going to start/stop OTDOA inter-frequency RSTD measurements which require measurement gaps as specified in [16, 8.1.2.6]. The procedure is also used to indicate to the network that the UE is going to start/stop OTDOA intra-frequency RSTD measurements which require measurement gaps.

NOTE: It is a network decision to configure the measurement gap.

5.5.7.2 Initiation

The UE shall:

- 1> if and only if upper layers indicate to start performing inter-frequency RSTD measurements and the UE requires measurement gaps for these measurements while measurement gaps are either not configured or not sufficient:
 - 2> initiate the procedure to indicate start;
- NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency if the provided measurement gaps are insufficient.
- 1> if and only if upper layers indicate to stop performing inter-frequency RSTD measurements:
 - 2> initiate the procedure to indicate stop;

NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.

5.5.7.3 Actions related to transmission of *InterFreqRSTDMeasurementIndication* message

The UE shall set the contents of *InterFreqRSTDMeasurementIndication* message as follows:

- 1> if the procedure is initiated to indicate start or stop of inter-frequency RSTD measurements:
 - 2> set the *rstd-InterFreqIndication* as follows:
 - 3> if the procedure is initiated to indicate start of inter-frequency RSTD measurements:
 - 4> set the *rstd-InterFreqInfoList* according to the information received from upper layers;
 - 3> else if the procedure is initiated to indicate stop of inter-frequency RSTD measurements:
 - 4> set the *rstd-InterFreqIndication* to the value *stop*;

1> else:

- 2> set the *rstd-InterFreqIndication* as follows:
 - 3> if the procedure is initiated to indicate start of intra-frequency RSTD measurements:
 - 4> set the *carrierFreq* in the *rstd-InterFreqInfoList* to the carrier frequency of the serving cell;
 - 3> else if the procedure is initiated to indicate stop of inter-frequency RSTD measurements:
 - 4> set the *rstd-InterFreqIndication* to the value *stop*;
- 1> submit the *InterFreqRSTDMeasurementIndication* message to lower layers for transmission, upon which the procedure ends;

5.6 Other

5.6.0 General

For NB-IoT, only a subset of the procedures described in this sub-clause apply.

Table 5.6.0-1 specifies the procedures that are applicable to NB-IoT. All other procedures are not applicable to NB-IoT; this is not further stated in the corresponding procedures.

Table 5.6.0-1: "Other" Procedures applicable to a NB-IoT UE

Sub-clause	Procedures
5.6.1	DL information transfer
5.6.2	UL information transfer
5.6.3	UE Capability transfer

5.6.1 DL information transfer

5.6.1.1 General

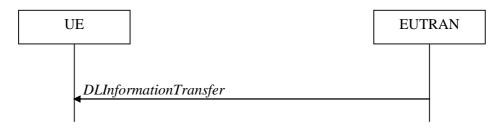


Figure 5.6.1.1-1: DL information transfer

The purpose of this procedure is to transfer NAS or (tunnelled) non-3GPP dedicated information from E-UTRAN to a UE in RRC_CONNECTED.

5.6.1.2 Initiation

E-UTRAN initiates the DL information transfer procedure whenever there is a need to transfer NAS or non-3GPP dedicated information. E-UTRAN initiates the DL information transfer procedure by sending the *DLInformationTransfer* message.

5.6.1.3 Reception of the *DLInformationTransfer* by the UE

Upon receiving *DLInformationTransfer* message, the UE shall:

- 1> if the UE is a NB-IoT UE; or
- 1> if the *dedicatedInfoType* is set to *dedicatedInfoNAS*:
 - 2> forward the *dedicatedInfoNAS* to the NAS upper layers.
- 1> if the dedicatedInfoType is set to dedicatedInfoCDMA2000-1XRTT or to dedicatedInfoCDMA2000-HRPD:
 - 2> forward the dedicatedInfoCDMA2000 to the CDMA2000 upper layers;

5.6.2 UL information transfer

5.6.2.1 General

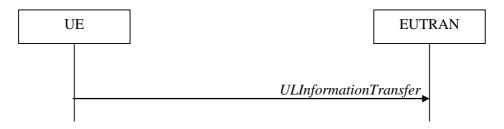


Figure 5.6.2.1-1: UL information transfer

The purpose of this procedure is to transfer NAS or (tunnelled) non-3GPP dedicated information from the UE to E-UTRAN.

5.6.2.2 Initiation

A UE in RRC_CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer NAS or non-3GPP dedicated information, except at RRC connection establishment or resume in which case the NAS information is piggybacked to the RRCConnectionSetupComplete or RRCConnectionResumeComplete message

correspondingly. The UE initiates the UL information transfer procedure by sending the *ULInformationTransfer* message. When CDMA2000 information has to be transferred, the UE shall initiate the procedure only if SRB2 is established.

5.6.2.3 Actions related to transmission of *ULInformationTransfer* message

The UE shall set the contents of the ULInformationTransfer message as follows:

- 1> if there is a need to transfer NAS information:
 - 2> if the UE is a NB-IoT UE:
 - 3> set the *dedicatedInfoNAS* to include the information received from upper layers;
 - 2> else, set the *dedicatedInfoType* to include the *dedicatedInfoNAS*;
- 1> if there is a need to transfer CDMA2000 1XRTT information:
 - 2> set the *dedicatedInfoType* to include the *dedicatedInfoCDMA2000-1XRTT*;
- 1> if there is a need to transfer CDMA2000 HRPD information:
 - 2> set the dedicatedInfoType to include the dedicatedInfoCDMA2000-HRPD;
- 1> upon RRC connection establishment, if UE supports the Control Plane CIoT EPS optimisation and UE does not need UL gaps during continuous uplink transmission:
 - 2> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for ULInformationTransfer message and subsequent uplink transmission in RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];
- 1> submit the ULInformationTransfer message to lower layers for transmission, upon which the procedure ends;

5.6.2.4 Failure to deliver *ULInformationTransfer* message

The UE shall:

- 1> if the UE is a NB-IoT UE, AS security is not started and radio link failure occurs before the successful delivery of *ULInformationTransfer* messages has been confirmed by lower layers; or
- 1> if mobility (i.e. handover, RRC connection re-establishment) occurs before the successful delivery of *ULInformationTransfer* messages has been confirmed by lower layers:
 - 2> inform upper layers about the possible failure to deliver the information contained in the concerned *ULInformationTransfer* messages;

5.6.3 UE capability transfer

5.6.3.1 General

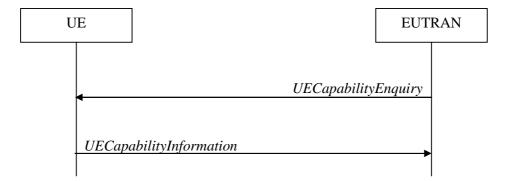


Figure 5.6.3.1-1: UE capability transfer

The purpose of this procedure is to transfer UE radio access capability information from the UE to E-UTRAN.

If the UE has changed its E-UTRAN radio access capabilities, the UE shall request higher layers to initiate the necessary NAS procedures (see TS 23.401 [41]) that would result in the update of UE radio access capabilities using a new RRC connection.

NOTE: Change of the UE's GERAN UE radio capabilities in RRC_IDLE is supported by use of Tracking Area Update.

5.6.3.2 Initiation

E-UTRAN initiates the procedure to a UE in RRC_CONNECTED when it needs (additional) UE radio access capability information.

5.6.3.3 Reception of the UECapabilityEnquiry by the UE

The UE shall:

- 1> for NB-IoT, set the contents of *UECapabilityInformation* message as follows:
 - 2> include the UE Radio Access Capability Parameters within the ue-Capability-Container;
 - 2> include ue-RadioPagingInfo;
 - 2> submit the *UECapabilityInformation* message to lower layers for transmission, upon which the procedure ends;
- 1> else, set the contents of *UECapabilityInformation* message as follows:
 - 2> if the *ue-CapabilityRequest* includes *eutra*:
 - 3> include the *UE-EUTRA-Capability* within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *eutra*;
 - 3> if the UE supports FDD and TDD:
 - 4> set all fields of *UECapabilityInformation*, except field *fdd-Add-UE-EUTRA-Capabilities* and *tdd-Add-UE-EUTRA-Capabilities* (including their sub-fields), to include the values applicable for both FDD and TDD (i.e. functionality supported by both modes);
 - 4> if (some of) the UE capability fields have a different value for FDD and TDD:
 - 5> if for FDD, the UE supports additional functionality compared to what is indicated by the previous fields of *UECapabilityInformation*:
 - 6> include field *fdd-Add-UE-EUTRA-Capabilities* and set it to include fields reflecting the additional functionality applicable for FDD;
 - 5> if for TDD, the UE supports additional functionality compared to what is indicated by the previous fields of *UECapabilityInformation*:
 - 6> include field *tdd-Add-UE-EUTRA-Capabilities* and set it to include fields reflecting the additional functionality applicable for TDD;
- NOTE 1: The UE includes fields of XDD-Add-UE-EUTRA-Capabilities in accordance with the following:
 - The field is included only if one or more of its sub-fields (or bits in the feature group indicators string) has a value that is different compared to the value signalled elsewhere within *UE-EUTRA-Capability*; (this value signalled elsewhere is also referred to as the *Common value*, that is supported for both XDD modes)
 - For the fields that are included in XDD-Add-UE-EUTRA-Capabilities, the UE sets:
 - the sub-fields (or bits in the feature group indicators string) that are not allowed to be different to the same value as the *Common value*;

- the sub-fields (or bits in the feature group indicators string) that are allowed to be different to a value indicating at least the same functionality as indicated by the *Common value*;
- 3> else (UE supports single xDD mode):
 - 4> set all fields of *UECapabilityInformation*, except field *fdd-Add-UE-EUTRA-Capabilities* and *tdd-Add-UE-EUTRA-Capabilities* (including their sub-fields), to include the values applicable for the xDD mode supported by the UE;
- 3> compile a list of band combinations, candidate for inclusion in the *UECapabilityInformation* message, comprising of band combinations supported by the UE according to the following priority order (i.e. listed in order of decreasing priority):
 - 4> include all non-CA bands, regardless of whether UE supports carrier aggregation, only:
 - if the UE includes ue-Category-v1020 (i.e. indicating category 6 to 8); or
 - if for at least one of the non-CA bands, the UE supports more MIMO layers with TM9 and TM10 than implied by the UE category; or
 - if the UE supports TM10 with one or more CSI processes;
 - 4> if the *UECapabilityEnquiry* message includes *requestedFrequencyBands* and UE supports *requestedFrequencyBands*:
 - 5> include all 2DL+1UL CA band combinations, only consisting of bands included in requestedFrequencyBands;
 - 5> include all other CA band combinations, only consisting of bands included in requestedFrequencyBands, and prioritized in the order of requestedFrequencyBands, (i.e. first include remaining band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on);
 - 4> else (no requested frequency bands):
 - 5> include all 2DL+1UL CA band combinations;
 - 5> include all other CA band combinations;
 - 4> if UE supports maximumCCsRetrieval and if the UECapabilityEnquiry message includes the requestedMaxCCsDL and the requestedMaxCCsUL (i.e. both UL and DL maximums are given):
 - 5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the *requestedMaxCCsDL* or for which the number of CCs in UL exceeds the value indicated in the *requestedMaxCCsUL*;
 - 5> indicate in requestedCCsUL the same value as received in requestedMaxCCsUL;
 - 5> indicate in requestedCCsDL the same value as received in requestedMaxCCsDL;
 - 4> else if UE supports *maximumCCsRetrieval* and if the *UECapabilityEnquiry* message includes the *requestedMaxCCsDL* (i.e. only DL maximum limit is given):
 - 5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the *requestedMaxCCsDL*;
 - 5> indicate value in requestedCCsDL the same value as received in requestedMaxCCsDL;
 - 4> else if UE supports *maximumCCsRetrieval* and if the *UECapabilityEnquiry* message includes the *requestedMaxCCsUL* (i.e. only UL maximum limit is given):
 - 5> remove from the list of candidates the band combinations for which the number of CCs in UL exceeds the value indicated in the *requestedMaxCCsUL*;
 - 5> indicate in requestedCCsUL the same value as received in requestedMaxCCsUL;

- 4> if the UE supports *reducedIntNonContComb* and the *UECapabilityEnquiry* message includes *requestReducedIntNonContComb*:
 - 5> set reducedIntNonContCombRequested to true;
 - 5> remove from the list of candidates the intra-band non-contiguous CA band combinations which support is implied by another intra-band non-contiguous CA band combination included in the list of candidates as specified in TS 36.306 [5, 4.3.5.21]:
- 4> if the UE supports requestReducedFormat and UE supports skipFallbackCombinations and UECapabilityEnquiry message includes requestSkipFallbackComb:
 - 5> set skipFallbackCombRequested to true;
 - 5> for each band combination included in the list of candidates (including 2DL+1UL CA band combinations), starting with the ones with the lowest number of DL and UL carriers, that concerns a fallback band combination of another band combination included in the list of candidates as specified in TS 36.306 [5]:
 - 6> remove the band combination from the list of candidates;
 - 6> include *differentFallbackSupported* in the band combination included in the list of candidates whose fallback concerns the removed band combination, if its capabilities differ from the removed band combination;
- 4> if the UE supports requestReducedFormat and diffFallbackCombReport, and UECapabilityEnquiry message includes requestDiffFallbackCombList:
 - 5> if the UE does not support *skipFallbackCombinations* or *UECapabilityEnquiry* message does not include *requestSkipFallbackComb*:
 - 6> remove all band combination from the list of candidates;
 - 5> for each CA band combination indicated in requestDiffFallbackCombList:
 - 6> include the CA band combination, if not already in the list of candidates;
 - 6> include the fallback combinations for which the supported UE capabilities are different from the capability of the CA band combination;
 - 5> include CA band combinations indicated in requestDiffFallbackCombList into requestedDiffFallbackCombList;
- 3> if the UECapabilityEnquiry message includes requestReducedFormat and UE supports requestReducedFormat:
 - 4> include in *supportedBandCombinationReduced* as many as possible of the band combinations included in the list of candidates, including the non-CA combinations, determined according to the rules and priority order defined above;

3> else

- 4> if the *UECapabilityEnquiry* message includes *requestedFrequencyBands* and UE supports *requestedFrequencyBands*:
 - 5> include in *supportedBandCombination* as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;
 - 5> include in *supportedBandCombinationAdd* as many as possible of the remaining band combinations included in the list of candidates, (i.e. the candidates not included in *supportedBandCombination*), up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;

4> else

- 5> include in *supportedBandCombination* as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules defined above;
- 5> if it is not possible to include in *supportedBandCombination* all the band combinations to be included according to the above, selection of the subset of band combinations to be included is left up to UE implementation;
- 3> indicate in *requestedBands* the same bands and in the same order as included in *requestedFrequencyBands*, if received;
- 3> if the UE is a category 0, M1 or M2 UE, or supports any UE capability information in *ue-RadioPagingInfo*, according to TS 36.306 [5]:
 - 4> include *ue-RadioPagingInfo* and set the fields according to TS 36.306 [5];
- 2> if the ue-CapabilityRequest includes geran-cs and if the UE supports GERAN CS domain:
 - 3> include the UE radio access capabilities for GERAN CS within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *geran-cs*;
- 2> if the ue-CapabilityRequest includes geran-ps and if the UE supports GERAN PS domain:
 - 3> include the UE radio access capabilities for GERAN PS within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *geran-ps*;
- 2> if the *ue-CapabilityRequest* includes *utra* and if the UE supports UTRA:
 - 3> include the UE radio access capabilities for UTRA within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *utra*;
- 2> if the ue-CapabilityRequest includes cdma2000-1XRTT and if the UE supports CDMA2000 1xRTT:
 - 3> include the UE radio access capabilities for CDMA2000 within a *ue-CapabilityRAT-Container* and with the *rat-Type* set to *cdma2000-1XRTT*;
- 1> submit the UECapabilityInformation message to lower layers for transmission, upon which the procedure ends;

5.6.4 CSFB to 1x Parameter transfer

5.6.4.1 General

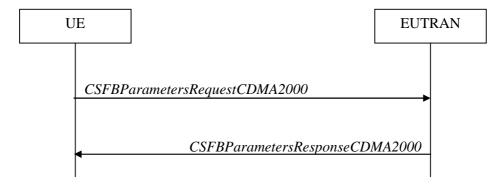


Figure 5.6.4.1-1: CSFB to 1x Parameter transfer

The purpose of this procedure is to transfer the CDMA2000 1xRTT parameters required to register the UE in the CDMA2000 1xRTT network for CSFB support.

5.6.4.2 Initiation

A UE in RRC_CONNECTED initiates the CSFB to 1x parameter transfer procedure upon request from the CDMA2000 upper layers. The UE initiates the CSFB to 1x parameter transfer procedure by sending the *CSFBParametersRequestCDMA2000* message.

5.6.4.3 Actions related to transmission of CSFBParametersRequestCDMA2000 message

The UE shall:

1> submit the *CSFBParametersRequestCDMA2000* message to lower layers for transmission using the current configuration;

5.6.4.4 Reception of the CSFBParametersResponseCDMA2000 message

Upon reception of the CSFBParametersResponseCDMA2000 message, the UE shall:

1> forward the rand and the mobilityParameters to the CDMA2000 1xRTT upper layers;

5.6.5 UE Information

5.6.5.1 General

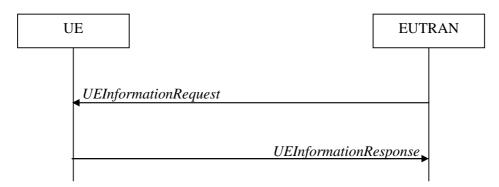


Figure 5.6.5.1-1: UE information procedure

The UE information procedure is used by E-UTRAN to request the UE to report information.

5.6.5.2 Initiation

E-UTRAN initiates the procedure by sending the *UEInformationRequest* message. E-UTRAN should initiate this procedure only after successful security activation.

5.6.5.3 Reception of the *UEInformationRequest* message

Upon receiving the UEInformationRequest message, the UE shall, only after successful security activation:

- 1> if rach-ReportReq is set to true, set the contents of the rach-Report in the UEInformationResponse message as follows:
 - 2> set the *numberOfPreamblesSent* to indicate the number of preambles sent by MAC for the last successfully completed random access procedure;
 - 2> if contention resolution was not successful as specified in TS 36.321 [6] for at least one of the transmitted preambles for the last successfully completed random access procedure:
 - 3> set the *contentionDetected* to *true*;
 - 2> else:

3> set the *contentionDetected* to *false*;

- 1> if *rlf-ReportReq* is set to *true* and the UE has radio link failure information or handover failure information available in *VarRLF-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRLF-Report*:
 - 2> set *timeSinceFailure* in *VarRLF-Report* to the time that elapsed since the last radio link or handover failure in E-UTRA;
 - 2> set the rlf-Report in the UEInformationResponse message to the value of rlf-Report in VarRLF-Report;
 - 2> discard the *rlf-Report* from *VarRLF-Report* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> if *connEstFailReportReq* is set to *true* and the UE has connection establishment failure information in *VarConnEstFailReport* and if the RPLMN is equal to *plmn-Identity* stored in *VarConnEstFailReport*:
 - 2> set *timeSinceFailure* in *VarConnEstFailReport* to the time that elapsed since the last connection establishment failure in E-UTRA;
 - 2> set the *connEstFailReport* in the *UEInformationResponse* message to the value of *connEstFailReport* in *VarConnEstFailReport*;
 - 2> discard the *connEstFailReport* from *VarConnEstFailReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> if the *logMeasReportReq* is present and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:
 - 2> if *VarLogMeasReport* includes one or more logged measurement entries, set the contents of the *logMeasReport* in the *UEInformationResponse* message as follows:
 - 3> include the absoluteTimeStamp and set it to the value of absoluteTimeInfo in the VarLogMeasReport;
 - 3> include the traceReference and set it to the value of traceReference in the VarLogMeasReport;
 - 3> include the *traceRecordingSessionRef* and set it to the value of *traceRecordingSessionRef* in the *VarLogMeasReport*;
 - 3> include the *tce-Id* and set it to the value of *tce-Id* in the *VarLogMeasReport*;
 - 3> include the *logMeasInfoList* and set it to include one or more entries from *VarLogMeasReport* starting from the entries logged first;
 - 3> if the *VarLogMeasReport* includes one or more additional logged measurement entries that are not included in the *logMeasInfoList* within the *UEInformationResponse* message:
 - 4> include the *logMeasAvailable*;
- 1> if *mobilityHistoryReportReq* is set to *true*:
 - 2> include the mobilityHistoryReport and set it to include entries from VarMobilityHistoryReport;
 - 2> include in the *mobilityHistoryReport* an entry for the current cell, possibly after removing the oldest entry if required, and set its fields as follows:
 - 3> set visitedCellId to the global cell identity of the current cell:
 - 3> set field *timeSpent* to the time spent in the current cell;
- 1> if the *logMeasReport* is included in the *UEInformationResponse*:
 - 2> submit the UEInformationResponse message to lower layers for transmission via SRB2;
 - 2> discard the logged measurement entries included in the *logMeasInfoList* from *VarLogMeasReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
- 1> else:
 - 2> submit the *UEInformationResponse* message to lower layers for transmission via SRB1;

5.6.6 Logged Measurement Configuration

5.6.6.1 General



Figure 5.6.6.1-1: Logged measurement configuration

The purpose of this procedure is to configure the UE to perform logging of measurement results while in RRC_IDLE and to perform logging of measurement results for MBSFN in both RRC_IDLE and RRC_CONNECTED. The procedure applies to logged measurements capable UEs that are in RRC_CONNECTED.

NOTE: E-UTRAN may retrieve stored logged measurement information by means of the UE information procedure.

5.6.6.2 Initiation

E-UTRAN initiates the logged measurement configuration procedure to UE in RRC_CONNECTED by sending the *LoggedMeasurementConfiguration* message.

5.6.6.3 Reception of the LoggedMeasurementConfiguration by the UE

Upon receiving the LoggedMeasurementConfiguration message the UE shall:

- 1> discard the logged measurement configuration as well as the logged measurement information as specified in 5.6.7;
- 1> store the received logging Duration, logging Interval and area Configuration, if included, in VarLogMeas Config;
- 1> if the LoggedMeasurementConfiguration message includes plmn-IdentityList:
 - 2> set *plmn-IdentityList* in *VarLogMeasReport* to include the RPLMN as well as the PLMNs included in *plmn-IdentityList*;
- 1> else:
 - 2> set *plmn-IdentityList* in *VarLogMeasReport* to include the RPLMN;
- 1> store the received absoluteTimeInfo, traceReference, traceRecordingSessionRef and tce-Id in VarLogMeasReport;
- 1> store the received *targetMBSFN-AreaList*, if included, in *VarLogMeasConfig*;
- 1> start timer T330 with the timer value set to the *loggingDuration*;

5.6.6.4 T330 expiry

Upon expiry of T330 the UE shall:

1> release VarLogMeasConfig;

The UE is allowed to discard stored logged measurements, i.e. to release *VarLogMeasReport*, 48 hours after T330 expiry.

5.6.7 Release of Logged Measurement Configuration

5.6.7.1 General

The purpose of this procedure is to release the logged measurement configuration as well as the logged measurement information.

5.6.7.2 Initiation

The UE shall initiate the procedure upon receiving a logged measurement configuration in another RAT. The UE shall also initiate the procedure upon power off or detach.

The UE shall:

- 1> stop timer T330, if running;
- 1> if stored, discard the logged measurement configuration as well as the logged measurement information, i.e. release the UE variables *VarLogMeasConfig* and *VarLogMeasReport*;

5.6.8 Measurements logging

5.6.8.1 General

This procedure specifies the logging of available measurements by a UE in RRC_IDLE that has a logged measurement configuration and the logging of available measurements by a UE in both RRC_IDLE and RRC_CONNECTED if *targetMBSFN-AreaList* is included in *VarLogMeasConfig*.

5.6.8.2 Initiation

While T330 is running, the UE shall:

- 1> if measurement logging is suspended:
 - 2> if during the last logging interval the IDC problems detected by the UE is resolved, resume measurement logging;
- 1> if not suspended, perform the logging in accordance with the following:
 - 2> if targetMBSFN-AreaList is included in VarLogMeasConfig:
 - 3> if the UE is camping normally on an E-UTRA cell or is connected to E-UTRA; and
 - 3> if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport; and
 - 3> if the PCell (in RRC_CONNECTED) or cell where the UE is camping (in RRC_IDLE) is part of the area indicated by *areaConfiguration* if configured in *VarLogMeasConfig*:
 - 4> for MBSFN areas, indicated in *targetMBSFN-AreaList*, from which the UE is receiving MBMS service:
 - 5> perform MBSFN measurements in accordance with the performance requirements as specified in TS 36.133 [16];
- NOTE 1: When configured to perform MBSFN measurement logging by *targetMBSFN-AreaList*, the UE is not required to receive additional MBSFN subframes, i.e. logging is based on the subframes corresponding to the MBMS services the UE is receiving.

- 5> perform logging at regular time intervals as defined by the *loggingInterval* in *VarLogMeasConfig*, but only for those intervals for which MBSFN measurement results are available as specified in TS 36.133 [16];
- 2> else if the UE is camping normally on an E-UTRA cell and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and, if the cell is part of the area indicated by areaConfiguration if configured in VarLogMeasConfig:
 - 3> perform the logging at regular time intervals, as defined by the loggingInterval in VarLogMeasConfig;
 - 2> when adding a logged measurement entry in *VarLogMeasReport*, include the fields in accordance with the following3> if the UE detected IDC problems during the last logging interval;
 - 4> if measResultServCell in VarLogMeasReport is not empty;
 - 5> include InDeviceCoexDetected;
 - 5> suspend measurement logging from the next logging interval;
 - 4> else;
 - 5> suspend measurement logging;
- NOTE 1A: The UE may detect the start of IDC problems as early as Phase 1 as described in 23.4 of TS 36.300 [9].
 - 3> set the *relativeTimeStamp* to indicate the elapsed time since the moment at which the logged measurement configuration was received;
 - 3> if detailed location information became available during the last logging interval, set the content of the *locationInfo* as follows:
 - 4> include the *locationCoordinates*;
 - 3> if targetMBSFN-AreaList is included in VarLogMeasConfig:
 - 4> for each MBSFN area, for which the mandatory measurements result fields became available during the last logging interval:
 - 5> set the *rsrpResultMBSFN*, *rsrqResultMBSFN* to include measurement results that became available during the last logging interval;
 - 5> include the fields *signallingBLER-Result* or *dataBLER-MCH-ResultList* if the concerned BLER results are availble,
 - 5> set the *mbsfn-Areald* and *carrierFrequency* to indicate the MBSFN area in which the UE is receiving MBSFN transmission;
 - 4> if in RRC CONNECTED:
 - 5> set the *servCellIdentity* to indicate global cell identity of the PCell;
 - 5> set the measResultServCell to include the layer 3 filtered measured results of the PCell;
 - 5> if available, set the *measResultNeighCells* to include the layer 3 filtered measured results of SCell(s) and neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSRP, for at most the following number of cells: 6 intra-frequency and 3 inter-frequency cells per frequency and according to the following:
 - 6> for each cell included, include the optional fields that are available;
 - 5> if available, optionally set the *measResultNeighCells* to include the layer 3 filtered measured results of neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSCP(UTRA)/RSSI(GERAN)/PilotStrength(cdma2000), for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:

6> for each cell included, include the optional fields that are available;

4> if in RRC_IDLE:

- 5> set the *servCellIdentity* to indicate global cell identity of the serving cell;
- 5> set the *measResultServCell* to include the quantities of the serving cell;
- 5> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency and according to the following:
 - 6> for each neighbour cell included, include the optional fields that are available;
- 5> if available, optionally set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval, for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:
 - 6> for each cell included, include the optional fields that are available;
- 4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];
- 4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;
- NOTE 2: The UE includes the latest results in accordance with the performance requirements as specified in TS 36.133 [16]. E.g. RSRP and RSRQ results are available only if the UE has a sufficient number of results/receives a sufficient number of subframes during the logging interval.

- 4> set the servCellIdentity to indicate global cell identity of the cell the UE is camping on;
- 4> set the measResultServCell to include the quantities of the cell the UE is camping on;
- 4> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell reselection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 interfrequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/set of frequencies (GERAN) per RAT and according to the following:
 - 5> for each neighbour cell included, include the optional fields that are available;
- 4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];
- 4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;
- NOTE 3: The UE includes the latest results of the available measurements as used for cell reselection evaluation in RRC_IDLE or as used for evaluation of reporting criteria or for measurement reporting according to 5.5.3 in RRC_CONNECTED, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].
 - 2> when the memory reserved for the logged measurement information becomes full, stop timer T330 and perform the same actions as performed upon expiry of T330, as specified in 5.6.6.4;

5.6.9 In-device coexistence indication

5.6.9.1 General

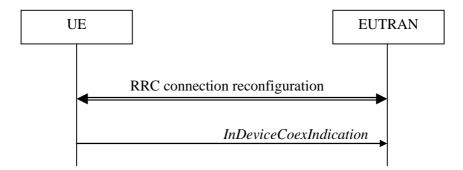


Figure 5.6.9.1-1: In-device coexistence indication

The purpose of this procedure is to inform E-UTRAN about (a change of) the In-Device Coexistence (IDC) problems experienced by the UE in RRC_CONNECTED, as described in TS 36.300 [9], and to provide the E-UTRAN with information in order to resolve them.

5.6.9.2 Initiation

A UE capable of providing IDC indications may initiate the procedure when it is configured to provide IDC indications and upon change of IDC problem information.

Upon initiating the procedure, the UE shall:

- 1> if configured to provide IDC indications:
 - 2> if the UE did not transmit an InDeviceCoexIndication message since it was configured to provide IDC indications:
 - 3> if on one or more frequencies for which a *measObjectEUTRA* is configured, the UE is experiencing IDC problems that it cannot solve by itself; or
 - 3> if configured to provide IDC indications for UL CA; and if on one or more supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, the UE is experiencing IDC problems that it cannot solve by itself:
 - 4> initiate transmission of the InDeviceCoexIndication message in accordance with 5.6.9.3;

- 3> if the set of frequencies, for which a *measObjectEUTRA* is configured and on which the UE is experiencing IDC problems that it cannot solve by itself, is different from the set indicated in the last transmitted *InDeviceCoexIndication* message; or
- 3> if for one or more of the frequencies in the previously reported set of frequencies, the *interferenceDirection* is different from the value indicated in the last transmitted *InDeviceCoexIndication* message; or
- 3> if the TDM assistance information is different from the assistance information included in the last transmitted *InDeviceCoexIndication* message; or
- 3> if configured to provide IDC indications for UL CA; and if the *victimSystemType* is different from the value indicated in the last transmitted *InDeviceCoexIndication* message; or
- 3> if configured to provide IDC indications for UL CA; and if the set of supported UL CA combinations on which the UE is experiencing IDC problems that it cannot solve by itself and that the UE includes in affectedCarrierFreqCombList according to 5.6.9.3, is different from the set indicated in the last transmitted InDeviceCoexIndication message:

- 4> initiate transmission of the InDeviceCoexIndication message in accordance with 5.6.9.3;
- NOTE 1: The term "IDC problems" refers to interference issues applicable across several subframes/slots where not necessarily all the subframes/slots are affected.
- NOTE 2: For the frequencies on which a serving cell or serving cells is configured that is activated, IDC problems consist of interference issues that the UE cannot solve by itself, during either active data exchange or upcoming data activity which is expected in up to a few hundred milliseconds.

For frequencies on which a SCell or SCells is configured that is deactivated, reporting IDC problems indicates an anticipation that the activation of the SCell or SCells would result in interference issues that the UE would not be able to solve by itself.

For a non-serving frequency, reporting IDC problems indicates an anticipation that if the non-serving frequency or frequencies became a serving frequency or serving frequencies then this would result in interference issues that the UE would not be able to solve by itself.

5.6.9.3 Actions related to transmission of *InDeviceCoexIndication* message

The UE shall set the contents of the InDeviceCoexIndication message as follows:

- 1> if there is at least one E-UTRA carrier frequency, for which a measurement object is configured, that is affected by IDC problems:
 - 2> include the field *affectedCarrierFreqList* with an entry for each affected E-UTRA carrier frequency for which a measurement object is configured;
 - 2> for each E-UTRA carrier frequency included in the field *affectedCarrierFreqList*, include *interferenceDirection* and set it accordingly;
 - 2> include Time Domain Multiplexing (TDM) based assistance information, unless *idc-HardwareSharingIndication* is configured and the UE has no Time Doman Multiplexing based assistance information that could be used to resolve the IDC problems:
 - 3> if the UE has DRX related assistance information that could be used to resolve the IDC problems:
 - 4> include drx-CycleLength, drx-Offset and drx-ActiveTime;
 - 3> else (the UE has desired subframe reservation patterns related assistance information that could be used to resolve the IDC problems):
 - 4> include idc-SubframePatternList;
 - 3> use the MCG as timing reference if TDM based assistance information regarding the SCG is included;
- 1> if the UE is configured to provide UL CA information and there is a supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems:
 - 2> include *victimSystemType* in *ul-CA-AssistanceInfo*;
 - 2> if the UE sets *victimSystemType* to *wlan* or *Bluetooth*:
 - 3> include affectedCarrierFreqCombList in ul-CA-AssistanceInfo with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;
 - 2> else:
 - 3> optionally include *affectedCarrierFreqCombList* in *ul-CA-AssistanceInfo* with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;
- 1> if *idc-HardwareSharingIndication* is configured, and there is at least one E-UTRA carrier frequency, for which a measurement object is configured, the UE is experiencing hardware sharing problems that it cannot solve by itself:
 - 2> include the *hardwareSharingProblem* and set it accordingly;

- NOTE 1: When sending an *InDeviceCoexIndication* message to inform E-UTRAN the IDC problems, the UE includes all assistance information (rather than providing e.g. the changed part(s) of the assistance information).
- NOTE 2: Upon not anymore experiencing a particular IDC problem that the UE previously reported, the UE provides an IDC indication with the modified contents of the *InDeviceCoexIndication* message (e.g. by an empty message).

The UE shall submit the InDeviceCoexIndication message to lower layers for transmission.

5.6.10 UE Assistance Information

5.6.10.1 General

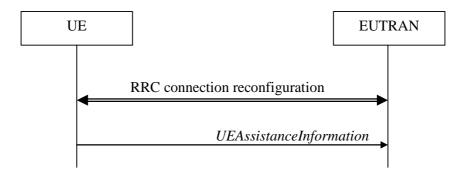


Figure 5.6.10.1-1: UE Assistance Information

The purpose of this procedure is to inform E-UTRAN of the UE's power saving preference and SPS assistance information, maximum PDSCH/PUSCH bandwidth configuration preference, or the UE's delay budget report carrying desired increment/decrement in the Uu air interface delay or connected mode DRX cycle length and for BL UEs or UEs in CE of the RLM event ("early-out-of-sync" or "early-in-sync") and RLM information. Upon configuring the UE to provide power preference indications E-UTRAN may consider that the UE does not prefer a configuration primarily optimised for power saving until the UE explicitly indicates otherwise.

5.6.10.2 Initiation

A UE capable of providing power preference indications in RRC_CONNECTED may initiate the procedure in several cases including upon being configured to provide power preference indications and upon change of power preference. A UE capable of providing SPS assistance information in RRC_CONNECTED may initiate the procedure in several cases including upon being configured to provide SPS assistance information and upon change of SPS assistance information.

A UE capable of providing delay budget report in RRC_CONNECTED may initiate the procedure in several cases, including upon being configured to provide delay budget report and upon change of delay budget preference.

A UE capable of CE mode and providing maximum PDSCH/PUSCH bandwidth preference in RRC_CONNECTED may initiate the procedure upon being configured to provide maximum PDSCH/PUSCH bandwidth preference and/or upon change of maximum PDSCH/PUSCH bandwidth preference.

Upon initiating the procedure, the UE shall:

- 1> if configured to provide power preference indications:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *powerPrefIndication* since it was configured to provide power preference indications; or
 - 2> if the current power preference is different from the one indicated in the last transmission of the *UEAssistanceInformation* message and timer T340 is not running:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;
- 1> if configured to provide maximum PDSCH/PUSCH bandwidth preference:

- 2> if the UE did not transmit a *UEAssistanceInformation* message with *bw-Preference* since it was configured to provide maximum PDSCH/PUSCH bandwidth preference; or:
- 2> if the current maximum PDSCH/PUSCH bandwidth preference is different from the one indicated in the last transmission of the *UEAssistanceInformation* message and timer T341 is not running;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;
- 1> if configured to provide SPS assistance information:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *sps-AssistanceInformation* since it was configured to provide SPS assistance information; or
 - 2> if the current SPS assistance information is different from the one indicated in the last transmission of the *UEAssistanceInformation* message:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;
- 1> if configured to report RLM events:
 - 2> if "early-out-of-sync" event has been detected and T343 is not running; or:
 - 2> if "early-in-sync" event has been detected and T344 is not running:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;
- 1> if configured to provide delay budget report:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *delayBudgetReport* since it was configured to provide delay budget report; or
 - 2> if the current delay budget is different from the one indicated in the last transmission of the *UEAssistanceInformation* message and timer T342 is not running:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.6.10.3;

5.6.10.3 Actions related to transmission of *UEAssistanceInformation* message

The UE shall set the contents of the UEAssistanceInformation message for power preference indications:

- 1> if configured to provide power preference indication and if the UE prefers a configuration primarily optimised for power saving:
 - 2> set powerPrefIndication to lowPowerConsumption;
- 1> else if configured to provide power preference indication:
 - 2> start or restart timer T340 with the timer value set to the *powerPrefIndicationTimer*;
 - 2> set powerPrefIndication to normal;

The UE shall set the contents of the UEAssistanceInformation message for SPS assistance information:

- 1> if configured to provide SPS assistance information:
 - 2> if there is any traffic for V2X sidelink communication which needs to report SPS assistance information:
 - 3> include trafficPatternInfoListSL in the UEAssistanceInformation message;
 - 2> if there is any traffic for uplink communication which needs to report SPS assistance information:
 - 3> include trafficPatternInfoListUL in the UEAssistanceInformation message;

The UE shall set the contents of the UEAssistanceInformation message for bandwidth preference indications:

1> start timer T341 with the timer value set to the *bw-PreferenceIndicationTimer*;

1> set bw-Preference to its preferred configuration;

The UE shall set the contents of the UEAssistanceInformation message for delay budget report:

- 1> if configured to provide delay budget report:
 - 2> if the UE prefers an adjustment in the connected mode DRX cycle length:
 - 3> set *delayBudgetReport* to *type1* according to a desired value;
 - 2> else if the UE prefers coverage enhancement configuration change:
 - 3> set *delayBudgetReport* to *type2* according to a desired value;
 - 2> start or restart timer T342 with the timer value set to the delayBudgetReportingProhibitTimer;

The UE shall set the contents of the UEAssistanceInformation message for the RLM report:

- 1> if T314 has expired:
 - 2> set rlm-event to earlyOutOfSync;
 - 2> start timer T343 with the timer value set to the *rlmReportTimer*:
- 1> if T315 has expired:
 - 2> set rlm-event to earlyInSync;
 - 2> start timer T344 with the timer value set to the *rlmReportTimer*:
 - 2> if configured to report *rlmReportRep-MPDCCH*:
 - 3> set excessRep-MPDCCH to the value indicated by lower layers;

The UE shall submit the UEAssistanceInformation message to lower layers for transmission.

- NOTE 1: It is up to UE implementation when and how to trigger SPS assistance information.
- NOTE 2: It is up to UE implementation to set the content of trafficPatternInfoListSL and trafficPatternInfoListUL.
- NOTE 3: Traffic patterns for different Destination Layer 2 IDs are provided in different entries in *trafficPatternInfoListSL*.

5.6.11 Mobility history information

5.6.11.1 General

This procedure specifies how the mobility history information is stored by the UE, covering RRC_CONNECTED and RRC_IDLE.

5.6.11.2 Initiation

If the UE supports storage of mobility history information, the UE shall:

- 1> Upon change of cell, consisting of PCell in RRC_CONNECTED or serving cell in RRC_IDLE, to another E-UTRA or inter-RAT cell or when entering out of service:
 - 2> include an entry in variable *VarMobilityHistoryReport* possibly after removing the oldest entry, if necessary, according to following:
 - 3> if the global cell identity of the previous PCell/ serving cell is available:
 - 4> include the global cell identity of that cell in the field *visitedCellId* of the entry;
 - 3> else:

- 4> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;
- 3> set the field *timeSpent* of the entry as the time spent in the previous PCell/ serving cell;
- 1> upon entering E-UTRA (in RRC_CONNECTED or RRC_IDLE) while previously out of service and/ or using another RAT:
 - 2> include an entry in variable *VarMobilityHistoryReport* possibly after removing the oldest entry, if necessary, according to following:
 - 3> set the field *timeSpent* of the entry as the time spent outside E-UTRA;

5.6.12 RAN-assisted WLAN interworking

5.6.12.1 General

The purpose of this procedure is to facilitate access network selection and traffic steering between E-UTRAN and WLAN.

If required by upper layers (see TS 24.312 [66], the UE shall provide an up-to-date set of the applicable parameters provided by *wlan-OffloadConfigCommon* or *wlan-OffloadConfigDedicated* to upper layers, and inform upper layers when no parameters are configured. The parameter set from either *wlan-OffloadConfigCommon* or *wlan-OffloadConfigDedicated* is selected as specified in subclauses 5.2.2.24, 5.3.12, 5.6.12.2 and 5.6.12.4.

5.6.12.2 Dedicated WLAN offload configuration

The UE shall:

- 1> if the received wlan-OffloadInfo is set to release:
 - 2> release wlan-OffloadConfigDedicated and t350;
 - 2> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:
 - 3> apply the *wlan-OffloadConfigCommon* corresponding to the RPLMN included in *SystemInformationBlockType17*;
- 1> else:
 - 2> apply the received wlan-OffloadConfigDedicated:

5.6.12.3 WLAN offload RAN evaluation

The UE shall:

- 1> if the UE is configured with either wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated; and
- 1> if the UE is in RRC_IDLE or none of *rclwi-Configuration*, *lwa-Configuration* and *lwip-Configuration* is configured:
 - 2> provide measurement results required for the evaluation of the network selection and traffic steering rules as defined in TS 24.312 [66] to upper layers;
 - 2> evaluate the network selection and traffic steering rules as defined in TS 36.304 [4] using WLAN identifiers as indicated in other subclauses (either provided in *steerToWLAN* included in *rclwi-Configuration* or in *wlan-Id-List* included in *SystemInformationBlockType17*);

5.6.12.4 T350 expiry or stop

The UE shall:

1> if T350 expires or is stopped:

- 2> release the wlan-OffloadConfigDedicated and t350;
- 2> release rclwi-Configuration if configured;
- 2> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:
 - 3> apply the *wlan-OffloadConfigCommon* and the *wlan-Id-List* corresponding to the RPLMN included in *SystemInformationBlockType17*;

5.6.12.5 Cell selection/ re-selection while T350 is running

The UE shall:

- 1> if, while T350 is running, the UE selects/ reselects a cell which is not the PCell when the *wlan-OffloadDedicated* was configured:
 - 2> stop timer T350;
 - 2> perform the actions as specified in 5.6.12.4;

5.6.13 SCG failure information

5.6.13.1 General

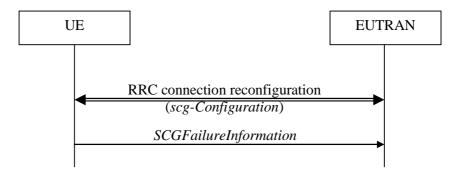


Figure 5.6.13.1-1: SCG failure information

The purpose of this procedure is to inform E-UTRAN about an SCG failure the UE has experienced i.e. SCG radio link failure, SCG change failure.

5.6.13.2 Initiation

A UE initiates the procedure to report SCG failures when SCG transmission is not suspended and when one of the following conditions is met:

- 1> upon detecting radio link failure for the SCG, in accordance with 5.3.11; or
- 1> upon SCG change failure, in accordance with 5.3.5.7a; or
- 1> upon stopping uplink transmission towards the PSCell due to exceeding the maximum uplink transmission timing difference when *powerControlMode* is configured to 1, in accordance with subclause 7.17.2 of TS 36.133 [29].

Upon initiating the procedure, the UE shall:

- 1> suspend all SCG DRBs and suspend SCG transmission for split DRBs;
- 1> reset SCG-MAC;
- 1> stop T307;
- 1> initiate transmission of the SCGFailureInformation message in accordance with 5.6.13.3;

5.6.13.3 Actions related to transmission of SCGFailureInformation message

The UE shall set the contents of the SCGFailureInformation message as follows:

- 1> if the UE initiates transmission of the *SCGFailureInformation* message to provide SCG radio link failure information:
 - 2> include failureType and set it to the trigger for detecting SCG radio link failure;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message to provide SCG change failure information:
 - 2> include failureType and set it to scg-ChangeFailure;
- 1> else if the UE initiates transmission of the *SCGFailureInformation* message due to exceeding maximum uplink transmission timing difference:
 - 2> include failureType and set it to maxUL-TimingDiff;
- 1> set the *measResultServFreqList* to include for each SCG cell that is configured, if any, within *measResultSCell* the quantities of the concerned SCell, if available according to performance requirements in [16];
- 1> for each SCG serving frequency included in *measResultServFreqList*, include within *measResultBestNeighCell* the *physCellId* and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;
- 1> set the *measResultNeighCells* to include the best measured cells on non-serving E-UTRA frequencies, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows;
 - 2> if the UE was configured to perform measurements for one or more non-serving EUTRA frequencies and measurement results are available, include the *measResultListEUTRA*;
 - 2> for each neighbour cell included, include the optional fields that are available;
- NOTE 2: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

The UE shall submit the SCGFailureInformation message to lower layers for transmission.

5.6.14 LTE-WLAN Aggregation

5.6.14.1 Introduction

E-UTRAN can configure the UE to connect to a WLAN and configure bearers for LWA (referred to as LWA DRBs). The UE uses the WLAN parameters received from E-UTRAN in performing WLAN measurements. The UE also performs WLAN connection management as described in 5.6.15 while LWA is configured.

5.6.14.2 Reception of LWA configuration

Upon reception of LWA configuration, the UE shall:

- 1> if the received *lwa-Configuration* is set to *release*:
 - 2> release the LWA configuration as described in 5.6.14.3;
- 1> else:
 - 2> if the received *lwa-Config* includes *lwa-WT-Counter*:
 - 3> determine the S-K_{WT} key based on the K_{eNB} key and received *lwa-WT-Counter* value, as specified in TS 33.401 [32];

- 3> forward the S-K_{WT} key to upper layers to be used as a PMK or PSK for WLAN authentication;
- 2> if the received *lwa-Config* includes *lwa-MobilityConfig*:
 - 3> if the received *lwa-MobilityConfig* includes *wlan-ToReleaseList*:
 - 4> for each WLAN-Identifiers included in wlan-ToReleaseList:
 - 5> remove the WLAN-Identifiers if already part of the current wlan-MobilitySet in VarWLAN-MobilityConfig;
 - 3> if the received *lwa-MobilityConfig* includes *wlan-ToAddList*:
 - 4> for each WLAN-Identifiers included in wlan-ToAddList:
 - 5> add the WLAN-Identifiers to the current wlan-MobilitySet in VarWLAN-MobilityConfig;
 - 3> if the received *lwa-MobilityConfig* includes *associationTimer*:
 - 4> start or restart timer T351 with the timer value set to the association Timer;
 - 3> if the received *lwa-MobilityConfig* includes *successReportRequested*:
 - 4> set successReportRequested in VarWLAN-MobilityConfig to the value of successReportRequested;
 - 3> if the received *lwa-MobilityConfig* includes *wlan-SuspendConfig*:
 - 4> set the field(s) in *wlan-SuspendConfig* within *VarWLAN-MobilityConfig* to the value(s) of field(s) included in *wlan-SuspendConfig*;
- 2> start WLAN Status Monitoring as described in 5.6.15.4;

5.6.14.3 Release of LWA configuration

To release the LWA configuration, the UE shall:

- 1> for each LWA DRB that is part of the current UE configuration:
 - 2> disable data handling for this DRB at the LWAAP entity;
 - 2> perform PDCP data recovery as specified in TS 36.323 [8];
- 1> delete any existing values in VarWLAN-MobilityConfig and VarWLAN-Status;
- 1> stop timer T351, if running;
- 1> stop WLAN status monitoring and WLAN connection attempts for LWA;
- 1> indicate the release of LWA configuration, if configured, to upper layers;

5.6.15 WLAN connection management

5.6.15.1 Introduction

WLAN connection management procedures in this section are triggered as specified in other sections where the UE is using a WLAN connection for LWA, RCLWI or LWIP.

The UE stores the current WLAN mobility set, which is a set of one or more WLAN identifier(s) (e.g. BSSID, SSID, HESSID) in *wlan-MobilitySet* in *VarWLAN-MobilityConfig*. This WLAN mobility set can be configured and updated by the eNB. A WLAN is considered to be inside the WLAN mobility set if its identifiers match all WLAN identifiers of at least one entry in *wlan-MobilitySet* and outside the WLAN mobility set otherwise. When the UE receives a new or updated WLAN mobility set, it initiates connection to a WLAN inside the WLAN mobility set, if not already connected to such a WLAN, and starts WLAN status monitoring as described in 5.6.15.4. The UE can perform WLAN mobility within the WLAN mobility set (connect or reconnect to a WLAN inside the WLAN mobility set) without any signalling to E-UTRAN.

The UE reports the WLAN connection status information to E-UTRAN as described in 5.6.15.2. The information in this report is based on the monitoring of WLAN connection as described in 5.6.15.4.

5.6.15.2 WLAN connection status reporting

5.6.15.2.1 General



Figure 5.6.15.2.1-1: WLAN connection status reporting

The purpose of this procedure is to inform E-UTRAN about the status of WLAN connection for LWA, RCLWI, or LWIP.

5.6.15.2.2 Initiation

The UE in RRC_CONNECTED initiates the WLAN status reporting procedure when:

- 1> it connects successfully to a WLAN inside WLAN mobility set while T351 is running after a WLAN mobility set change; or
- 1> after a lwa-WT-Counter update or after a lwip-Counter update (if success report is requested by the eNB); or
- 1> its connection or connection attempts to all WLAN(s) inside WLAN mobility set fails in accordance with WLAN Status Monitoring described in 5.6.15.4; or
- 1> T351 expires; or
- 1> its WLAN connection to all WLAN(s) inside WLAN mobility set becomes temporarily unavailable; or
- 1> its WLAN connection to a WLAN inside the WLAN mobility set is successfully established after its previous WLAN Connection Status Report indicating WLAN temporary suspension;

Upon initiating the procedure, the UE shall:

1> initiate transmission of the WLANConnectionStatusReport message in accordance with 5.6.15.2.3;

5.6.15.2.3 Actions related to transmission of WLANConnectionStatusReport message

The UE shall set the contents of the WLANConnectionStatusReport message as follows:

- 1> set wlan-status to status in VarWLAN-Status;
- 1> submit the WLANConnectionStatusReport message to lower layers for transmission, upon which the procedure ends;

5.6.15.3 T351 Expiry (WLAN connection attempt timeout)

Upon T351 expiry, the UE shall:

- 1> set the *status* in *VarWLAN-Status* to *failureTimeout*;
- 1> perform WLAN connection status reporting procedure in 5.6.15.2;
- 1> stop WLAN status monitoring and WLAN connection attempts;

5.6.15.4 WLAN status monitoring

To perform WLAN status monitoring, the UE shall:

- 1> if UE is not configured with *rclwi-Configuration* and WLAN connection to a WLAN inside the WLAN mobility set is successfully established or maintained after a WLAN mobility set configuration update, after a *lwa-WT-Counter* update or after a *lwip-Counter* update:
 - 2> set the status in VarWLAN-Status to successful Association;
 - 2> stop timer T351, if running;
 - 2> if successReportRequested in VarWLAN-MobilityConfig is set to TRUE:
 - 3> perform WLAN Connection Status Reporting procedure in 5.6.15.2;
- 1> if WLAN connection or connection attempts to all WLAN(s) inside WLAN mobility set fails:
 - 2> if the failure is due to WLAN radio link issues:
 - 3> set the *status* in *VarWLAN-Status* to *failureWlanRadioLink*;
 - 2> else if the failure is due to UE internal problems related to WLAN:
 - 3> set the *status* in *VarWLAN-Status* to *failureWlanUnavailable*;
- NOTE 1: The UE internal problems related to WLAN include connection to another WLAN based on user preferences or turning off WLAN connection or connection rejection from WLAN or other WLAN problems.
 - 3> remove all WLAN related measurement reporting entries within VarMeasReportList;
 - 2> stop timer T351, if running;
 - 2> perform WLAN Connection Status Reporting procedure in 5.6.15.2;
 - 2> if the UE is configured with *rclwi-Configuration*:
 - 3> release *rclwi-Configuration* and inform upper layers of a move-traffic-from-WLAN indication (see TS 24.302 [74]);
 - 2> stop WLAN Status Monitoring and WLAN connection attempts;
- 1> if wlan-SuspendResumeAllowed in wlan-SuspendConfig within VarWLAN-MobilityConfig is set to TRUE:
 - 2> if WLAN connection to all WLAN(s) inside WLAN mobility set becomes temporarily unavailable:
 - 3> set the status in VarWLAN-Status to suspended;
 - 3> if wlan-SuspendTriggersStatusReport in wlan-SuspendConfig within VarWLAN-MobilityConfig is set to TRUE:
 - 4> trigger PDCP Status Report as specified in [8];
 - 3> perform WLAN Connection Status Reporting procedure in 5.6.15.2;
 - 2> if the *status* in *VarWLAN-Status* in the last WLAN Connection Status Report by this UE was *suspended* and WLAN connection to a WLAN inside the WLAN mobility set is successfully established:
 - 3> set the status in VarWLAN-Status to resumed;
 - 3> perform WLAN Connection Status Reporting procedure in 5.6.15.2;

5.6.16 RAN controlled LTE-WLAN interworking

5.6.16.1 General

The purpose of this procedure is to perform RAN-controlled LTE-WLAN interworking (RCLWI) i.e. control access network selection and traffic steering between E-UTRAN and WLAN.

5.6.16.2 WLAN traffic steering command

The UE shall:

- 1> if the received *rclwi-Configuration* is set to *setup*:
 - 2> if the *command* is set to *steerToWLAN*:
 - 3> inform the upper layers of a move-traffic-to-WLAN indication along with the WLAN identifier lists in *steerToWLAN* (see TS 24.302 [74]);
 - 3> store steerToWLAN in wlan-MobilitySet in VarWLAN-MobilityConfig;
 - 3> perform the WLAN status monitoring procedure as specified in 5.6.15.4 using *steerToWLAN* as the WLAN mobility set;
 - 2> else:
 - 3> inform the upper layers of a move-traffic-from-WLAN indication (see TS 24.302 [74]);
 - 3> clear wlan-MobilitySet in VarWLAN-MobilityConfig;
 - 3> stop performing the WLAN status monitoring procedure as specified in 5.6.15.4;
 - 3> delete any existing values in VarWLAN-Status;
- 1> else (the *rclwi-Configuration* is released):
 - 2> clear wlan-MobilitySet in VarWLAN-MobilityConfig;
 - 2> stop performing the WLAN status monitoring procedure as specified in 5.6.15.4;
 - 2> delete any existing values in *VarWLAN-Status*;
 - 2> inform the upper layers of release of the *rclwi-Configuration*.

5.6.17 LTE-WLAN aggregation with IPsec tunnel

5.6.17.1 General

The WLAN resources that are used over the LWIP tunnel as described in TS 36.300 [9] established as part of LWIP procedures are referred to as 'LWIP resources'. The purpose of this section is to specify procedures to indicate to higher layers to initiate the establishment/ release of the LWIP tunnel over WLAN and to indicate which DRB(s) shall use the LWIP resources.

5.6.17.2 LWIP reconfiguration

The UE shall:

- 1> if the received *lwip-Configuration* is set to *release*:
 - 2> release the LWIP configuration, if configured, as described in 5.6.17.3;
- 1> else:
 - 2> if *lwip-MobilityConfig* is included:

- 3> if the received lwip-MobilityConfig includes wlan-ToReleaseList:
 - 4> for each WLAN-Identifiers included in wlan-ToReleaseList:
 - 5> remove the *WLAN-Identifiers* if already part of the current *wlan-MobilitySet* in *VarWLAN-MobilityConfig*;
- 3> if the received lwip-MobilityConfig includes wlan-ToAddList:
 - 4> for each WLAN-Identifiers included in wlan-ToAddList:
 - 5> add the WLAN-Identifiers to the current wlan-MobilitySet in VarWLAN-MobilityConfig;
- 3> if the received *lwip-MobilityConfig* includes *associationTimer*:
 - 4> start timer T351 with the timer value set according to the value of associationTimer;
- 3> if the received *lwip-MobilityConfig* includes *successReportRequested*:
 - 4> set successReportRequested in VarWLAN-MobilityConfig to the value of successReportRequested;
- 2> if *tunnelConfigLWIP* is included:
 - 3> indicate to higher layers to configure the LWIP tunnel according to the received tunnelConfigLWIP [32];
 - 3> if *lwip-Counter* is included:
 - 4> determine the LWIP-PSK based on the K_{eNB} key and received *lwip-Counter* value, as specified in TS 33.401 [32];
 - 4> forward the LWIP-PSK to upper layers for LWIP tunnel establishment;
- 2> start WLAN Status Monitoring as described in 5.6.15.4;

5.6.17.3 LWIP release

The UE shall:

- 1> delete any existing values in VarWLAN-MobilityConfig and VarWLAN-Status;
- 1> stop timer T351, if running;
- 1> release the *lwip-Configuration*;
- 1> indicate to higher layers to stop all DRBs from using the LWIP resources;
- 1> indicate to higher layers to release the LWIP tunnel [32];
- 1> stop WLAN status monitoring and WLAN connection attempts for LWIP;

5.6.18 Void

5.7 Generic error handling

5.7.1 General

The generic error handling defined in the subsequent sub-clauses applies unless explicitly specified otherwise e.g. within the procedure specific error handling.

The UE shall consider a value as not comprehended when it is set:

- to an extended value that is not defined in the version of the transfer syntax supported by the UE.

- to a spare or reserved value unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/ reserved value.

The UE shall consider a field as not comprehended when it is defined:

- as spare or reserved unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/ reserved field.

5.7.2 ASN.1 violation or encoding error

The UE shall:

- 1> when receiving an RRC message on the BCCH, BR-BCCH, PCCH, CCCH, MCCH, SC-MCCH or SBCCH for which the abstract syntax is invalid [13]:
 - 2> ignore the message;

NOTE: This section applies in case one or more fields is set to a value, other than a spare, reserved or extended value, not defined in this version of the transfer syntax. E.g. in the case the UE receives value 12 for a field defined as INTEGER (1..11). In cases like this, it may not be possible to reliably detect which field is in the error hence the error handling is at the message level.

5.7.3 Field set to a not comprehended value

The UE shall, when receiving an RRC message on any logical channel:

- 1> if the message includes a field that has a value that the UE does not comprehend:
 - 2> if a default value is defined for this field:
 - 3> treat the message while using the default value defined for this field;
 - 2> else if the concerned field is optional:
 - 3> treat the message as if the field were absent and in accordance with the need code for absence of the concerned field;
 - 2> else:
 - 3> treat the message as if the field were absent and in accordance with sub-clause 5.7.4;

5.7.4 Mandatory field missing

The UE shall:

- 1> if the message includes a field that is mandatory to include in the message (e.g. because conditions for mandatory presence are fulfilled) and that field is absent or treated as absent:
 - 2> if the RRC message was received on DCCH or CCCH:
 - 3> ignore the message;
 - 2> else:
 - 3> if the field concerns a (sub-field of) an entry of a list (i.e. a SEQUENCE OF):
 - 4> treat the list as if the entry including the missing or not comprehended field was not present;
 - 3> else if the field concerns a sub-field of another field, referred to as the 'parent' field i.e. the field that is one nesting level up compared to the erroneous field:
 - 4> consider the 'parent' field to be set to a not comprehended value;
 - 4> apply the generic error handling to the subsequent 'parent' field(s), until reaching the top nesting level i.e. the message level;

- 3> else (field at message level):
 - 4> ignore the message;
- NOTE 1: The error handling defined in these sub-clauses implies that the UE ignores a message with the message type or version set to a not comprehended value.
- NOTE 2: The nested error handling for messages received on logical channels other than DCCH and CCCH applies for errors in extensions also, even for errors that can be regarded as invalid E-UTRAN operation e.g. E-UTRAN not observing conditional presence.

The following ASN.1 further clarifies the levels applicable in case of nested error handling for errors in extension fields.

```
-- /example/ ASN1START
-- Example with extension addition group
ItemInfoList ::=
                                  SEOUENCE (SIZE (1..max)) OF ItemInfo
ItemInfo ::=
                                  SEQUENCE {
    itemIdentity
                                     INTEGER (1..max),
    field1
                                      Field1,
    field2
                                                            OPTIONAL,
                                                                               -- Need ON
                                     Field2
                                                            OPTIONAL,
    [[ field3-r9
                                     Field3-r9
                                                                               -- Cond Cond1
       field4-r9
                                     Field4-r9
                                                            OPTIONAL
                                                                               -- Need ON
    ]]
}
-- Example with traditional non-critical extension (empty sequence)
BroadcastInfoBlock1 ::=
                                  SEQUENCE {
                                     INTEGER (1..max),
   itemIdentity
                                      Field1,
    field1
    field2
                                      Field2
                                                            OPTIONAL.
                                                                                -- Need ON
   nonCriticalExtension
                                     BroadcastInfoBlock1-v940-IEs OPTIONAL
BroadcastInfoBlock1-v940-IEs::= SEQUENCE {
   field3-r9
                                     Field3-r9
                                                            OPTIONAL,
                                                                               -- Cond Cond1
                                     SEQUENCE {}

OPTIONAL,
                                                                               -- Need ON
    field4-r9
                                     Field4-r9
   nonCriticalExtension
                                                                                -- Need OP
-- ASN1STOP
```

The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension addition group is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of *field3* would result in the entire itemInfo entry to be ignored (rather than just the extension addition group containing *field3* and *field4*)
- a traditional *nonCriticalExtension* is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of *field3* would result in the entire *BroadcastInfoBlock1* to be ignored (rather than just the non critical extension containing *field3* and *field4*).

5.7.5 Not comprehended field

The UE shall, when receiving an RRC message on any logical channel:

- 1> if the message includes a field that the UE does not comprehend:
 - 2> treat the rest of the message as if the field was absent;
- NOTE: This section does not apply to the case of an extension to the value range of a field. Such cases are addressed instead by the requirements in section 5.7.3.

5.8 MBMS

5.8.1 Introduction

5.8.1.1 General

In general the control information relevant only for UEs supporting MBMS is separated as much as possible from unicast control information. Most of the MBMS control information is provided on a logical channel specific for MBMS common control information: the MCCH. E-UTRA employs one MCCH logical channel per MBSFN area. In case the network configures multiple MBSFN areas, the UE acquires the MBMS control information from the MCCHs that are configured to identify if services it is interested to receive are ongoing. The action applicable when the UE is unable to simultaneously receive MBMS and unicast services is up to UE implementation. In this release of the specification, an MBMS capable UE is only required to support reception of a single MBMS service at a time, and reception of more than one MBMS service (also possibly on more than one MBSFN area) in parallel is left for UE implementation. The MCCH carries the MBSFNAreaConfiguration message, which indicates the MBMS sessions that are ongoing as well as the (corresponding) radio resource configuration. The MCCH may also carry the MBMSCountingRequest message, when E-UTRAN wishes to count the number of UEs in RRC_CONNECTED that are receiving or interested to receive one or more specific MBMS services.

A limited amount of MBMS control information is provided on the BCCH. This primarily concerns the information needed to acquire the MCCH(s). This information is carried by means of a single MBMS specific *SystemInformationBlock: SystemInformationBlockType13*. An MBSFN area is identified solely by the *mbsfn-AreaId* in *SystemInformationBlockType13*. At mobility, the UE considers that the MBSFN area is continuous when the source cell and the target cell broadcast the same value in the *mbsfn-AreaId*.

5.8.1.2 Scheduling

The MCCH information is transmitted periodically, using a configurable repetition period. Scheduling information is not provided for MCCH i.e. both the time domain scheduling as well as the lower layer configuration are semi-statically configured, as defined within *SystemInformationBlockType13*.

For MBMS user data, which is carried by the MTCH logical channel, E-UTRAN periodically provides MCH scheduling information (MSI) at lower layers (MAC). This MCH information only concerns the time domain scheduling i.e. the frequency domain scheduling and the lower layer configuration are semi-statically configured. The periodicity of the MSI is configurable and defined by the MCH scheduling period.

5.8.1.3 MCCH information validity and notification of changes

Change of MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod m=0, where m is the number of radio frames comprising the modification period. The modification period is configured by means of SystemInformationBlockType13.

When the network changes (some of) the MCCH information, it notifies the UEs about the change during a first modification period. In the next modification period, the network transmits the updated MCCH information. These general principles are illustrated in figure 5.8.1.3-1, in which different colours indicate different MCCH information. Upon receiving a change notification, a UE interested to receive MBMS services acquires the new MCCH information immediately from the start of the next modification period. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information.

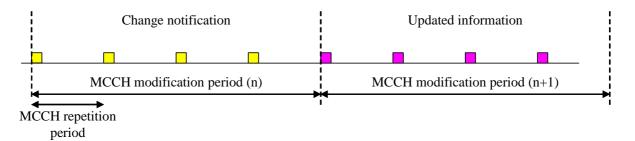


Figure 5.8.1.3-1: Change of MCCH Information

Indication of an MBMS specific RNTI, the M-RNTI (see TS 36.321 [6]), on PDCCH is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about an MCCH information change. When receiving an MCCH information change notification, the UE knows that the MCCH information will change at the next modification period boundary. The notification on PDCCH indicates which of the MCCHs will change, which is done by means of an 8-bit bitmap. Within this bitmap, the bit at the position indicated by the field *notificationIndicator* is used to indicate changes for that MBSFN area: if the bit is set to "1", the corresponding MCCH will change. No further details are provided e.g. regarding which MCCH information will change. The MCCH information change notification is used to inform the UE about a change of MCCH information upon session start or about the start of MBMS counting.

The MCCH information change notifications on PDCCH are transmitted periodically and are carried on MBSFN subframes only except on MBMS-dedicated cell or FeMBMS/Unicast-mixed cell where the MCCH information change is provided on non-MBSFN subframes. These MCCH information change notification occasions are common for all MCCHs that are configured, and configurable by parameters included in *SystemInformationBlockType13*: a repetition coefficient, a radio frame offset and a subframe index. These common notification occasions are based on the MCCH with the shortest modification period.

NOTE 1: E-UTRAN may modify the MBMS configuration information provided on MCCH at the same time as updating the MBMS configuration information carried on BCCH i.e. at a coinciding BCCH and MCCH modification period. Upon detecting that a new MCCH is configured on BCCH, a UE interested to receive one or more MBMS services should acquire the MCCH, unless it knows that the services it is interested in are not provided by the corresponding MBSFN area.

A UE that is receiving an MBMS service via MRB shall acquire the MCCH information from the start of each modification period. A UE interested to receive MBMS from a carrier on which *dl-Bandwidth* included in *MasterInformationBlock* is set to *n6* shall acquire the MCCH information at least once every MCCH modification period. A UE that is not receiving an MBMS service via MRB, as well as UEs that are receiving an MBMS service via MRB but potentially interested to receive other services not started yet in another MBSFN area from a carrier on which *dl-Bandwidth* included in *MasterInformationBlock* is other than n6, shall verify that the stored MCCH information remains valid by attempting to find the MCCH information change notification at least *notificationRepetitionCoeff* times during the modification period of the applicable MCCH(s), if no MCCH information change notification is received.

NOTE 2: In case the UE is aware which MCCH(s) E-UTRAN uses for the service(s) it is interested to receive, the UE may only need to monitor change notifications for a subset of the MCCHs that are configured, referred to as the 'applicable MCCH(s)' in the above.

5.8.2 MCCH information acquisition

5.8.2.1 General

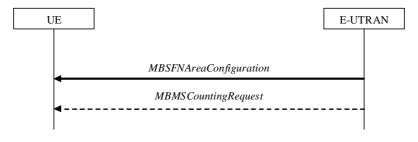


Figure 5.8.2.1-1: MCCH information acquisition

The UE applies the MCCH information acquisition procedure to acquire the MBMS control information that is broadcasted by the E-UTRAN. The procedure applies to MBMS capable UEs that are in RRC_IDLE or in RRC_CONNECTED.

5.8.2.2 Initiation

A UE interested to receive MBMS services shall apply the MCCH information acquisition procedure upon entering the corresponding MBSFN area (e.g. upon power on, following UE mobility) and upon receiving a notification that the MCCH information has changed. A UE that is receiving an MBMS service shall apply the MCCH information acquisition procedure to acquire the MCCH, that corresponds with the service that is being received, at the start of each modification period.

Unless explicitly stated otherwise in the procedural specification, the MCCH information acquisition procedure overwrites any stored MCCH information, i.e. delta configuration is not applicable for MCCH information and the UE discontinues using a field if it is absent in MCCH information unless explicitly specified otherwise.

5.8.2.3 MCCH information acquisition by the UE

An MBMS capable UE shall:

- 1> if the procedure is triggered by an MCCH information change notification:
 - 2> start acquiring the *MBSFNAreaConfiguration* message and the *MBMSCountingRequest* message if present, from the beginning of the modification period following the one in which the change notification was received:
- NOTE 1: The UE continues using the previously received MCCH information until the new MCCH information has been acquired.
- 1> if the UE enters an MBSFN area:
 - 2> acquire the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, at the next repetition period;
- 1> if the UE is receiving an MBMS service:
 - 2> start acquiring the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, that both concern the MBSFN area of the service that is being received, from the beginning of each modification period;

5.8.2.4 Actions upon reception of the MBSFNAreaConfiguration message

No UE requirements related to the contents of this *MBSFNAreaConfiguration* apply other than those specified elsewhere e.g. within procedures using the concerned system information, the corresponding field descriptions.

5.8.2.5 Actions upon reception of the MBMSCountingRequest message

Upon receiving *MBMSCountingRequest* message, the UE shall perform the MBMS Counting procedure as specified in 5.8.4.

5.8.3 MBMS PTM radio bearer configuration

5.8.3.1 General

The MBMS PTM radio bearer configuration procedure is used by the UE to configure RLC, MAC and the physical layer upon starting and/or stopping to receive an MRB. The procedure applies to UEs interested to receive one or more MBMS services.

NOTE: In case the UE is unable to receive an MBMS service due to capability limitations, upper layers may take appropriate action e.g. terminate a lower priority unicast service.

5.8.3.2 Initiation

The UE applies the MRB establishment procedure to start receiving a session of a service it has an interest in. The procedure may be initiated e.g. upon start of the MBMS session, upon (re-)entry of the corresponding MBSFN service area, upon becoming interested in the MBMS service, upon removal of UE capability limitations inhibiting reception of the concerned service.

The UE applies the MRB release procedure to stop receiving a session. The procedure may be initiated e.g. upon stop of the MBMS session, upon leaving the corresponding MBSFN service area, upon losing interest in the MBMS service, when capability limitations start inhibiting reception of the concerned service.

5.8.3.3 MRB establishment

Upon MRB establishment, the UE shall:

- 1> establish an RLC entity in accordance with the configuration specified in 9.1.1.4;
- 1> configure an MTCH logical channel in accordance with the received *locgicalChannelIdentity*, applicable for the MRB, as included in the *MBSFNAreaConfiguration* message;
- 1> configure the physical layer in accordance with the *pmch-Config*, applicable for the MRB, as included in the *MBSFNAreaConfiguration* message;
- 1> inform upper layers about the establishment of the MRB by indicating the corresponding tmgi and sessionId;

5.8.3.4 MRB release

Upon MRB release, the UE shall:

- 1> release the RLC entity as well as the related MAC and physical layer configuration;
- 1> inform upper layers about the release of the MRB by indicating the corresponding tmgi and sessionId;

5.8.4 MBMS Counting Procedure

5.8.4.1 General

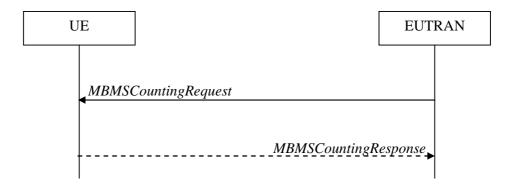


Figure 5.8.4.1-1: MBMS Counting procedure

The MBMS Counting procedure is used by the E-UTRAN to count the number of RRC_CONNECTED mode UEs which are receiving via an MRB or interested to receive via an MRB the specified MBMS services.

The UE determines interest in an MBMS service, that is identified by the TMGI, by interaction with upper layers.

5.8.4.2 Initiation

E-UTRAN initiates the procedure by sending an MBMSCountingRequest message.

5.8.4.3 Reception of the MBMSCountingRequest message by the UE

Upon receiving the MBMSCountingRequest message, the UE in RRC_CONNECTED mode shall:

- 1> if the *SystemInformationBlockType1*, that provided the scheduling information for the *systemInformationBlockType13* that included the configuration of the MCCH via which the *MBMSCountingRequest* message was received, contained the identity of the Registered PLMN; and
- 1> if the UE is receiving via an MRB or interested to receive via an MRB at least one of the services in the received *countingRequestList*:
 - 2> if more than one entry is included in the *mbsfn-AreaInfoList* received in the *SystemInformationBlockType13* that included the configuration of the MCCH via which the *MBMSCountingRequest* message was received:
 - 3> include the *mbsfn-AreaIndex* in the *MBMSCountingResponse* message and set it to the index of the entry in the *mbsfn-AreaInfoList* within the received *SystemInformationBlockType13* that corresponds with the MBSFN area used to transfer the received *MBMSCountingRequest* message;
 - 2> for each MBMS service included in the received *countingRequestList*:
 - 3> if the UE is receiving via an MRB or interested to receive via an MRB this MBMS service:
 - 4> include an entry in the *countingResponseList* within the *MBMSCountingResponse* message with *countingResponseService* set it to the index of the entry in the *countingRequestList* within the received *MBMSCountingRequest* that corresponds with the MBMS service the UE is receiving or interested to receive;
 - 2> submit the *MBMSCountingResponse* message to lower layers for transmission upon which the procedure ends:
- NOTE 1: UEs that are receiving an MBMS User Service [56] by means of a Unicast Bearer Service [57] (i.e. via a DRB), but are interested to receive the concerned MBMS User Service [56] via an MBMS Bearer Service (i.e. via an MRB), respond to the counting request.
- NOTE 2: If ciphering is used at upper layers, the UE does not respond to the counting request if it can not decipher the MBMS service for which counting is performed (see TS 22.146 [62, 5.3]).
- NOTE 3: The UE treats the *MBMSCountingRequest* messages received in each modification period independently. In the unlikely case E-UTRAN would repeat an *MBMSCountingRequest* (i.e. including the same services) in a subsequent modification period, the UE responds again. The UE provides at most one *MBMSCountingResponse* message to multiple transmission attempts of an *MBMSCountingRequest* messages in a given modification period.

5.8.5 MBMS interest indication

5.8.5.1 General

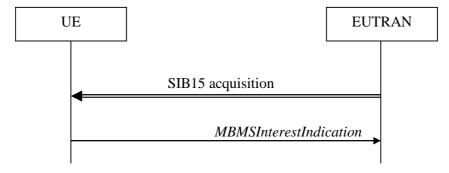


Figure 5.8.5.1-1: MBMS interest indication

The purpose of this procedure is to inform E-UTRAN that the UE is receiving or is interested to receive MBMS service(s) via an MRB or SC-MRB, and if so, to inform E-UTRAN about the priority of MBMS versus unicast reception.

5.8.5.2 Initiation

An MBMS or SC-PTM capable UE in RRC_CONNECTED may initiate the procedure in several cases including upon successful connection establishment, upon entering or leaving the service area, upon session start or stop, upon change of interest, upon change of priority between MBMS reception and unicast reception or upon change to a PCell broadcasting *SystemInformationBlockType15*.

Upon initiating the procedure, the UE shall:

- 1> if *SystemInformationBlockType15* is broadcast by the PCell:
 - 2> ensure having a valid version of SystemInformationBlockType15 for the PCell;
 - 2> if the UE did not transmit an MBMSInterestIndication message since last entering RRC_CONNECTED state; or
 - 2> if since the last time the UE transmitted an *MBMSInterestIndication* message, the UE connected to a PCell not broadcasting *SystemInformationBlockType15*:
 - 3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:
 - 4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;

2> else:

- 3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, has changed since the last transmission of the MBMSInterestIndication message; or
- 3> if the prioritisation of reception of all indicated MBMS frequencies compared to reception of any of the established unicast bearers has changed since the last transmission of the *MBMSInterestIndication* message:
 - 4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;
- NOTE: The UE may send an *MBMSInterestIndication* even when it is able to receive the MBMS services it is interested in i.e. to avoid that the network allocates a configuration inhibiting MBMS reception.
 - 3> else if *SystemInformationBlockType20* is broadcast by the PCell:
 - 4> if since the last time the UE transmitted an *MBMSInterestIndication* message, the UE connected to a PCell not broadcasting *SystemInformationBlockType20*; or
 - 4> if the set of MBMS services of interest determined in accordance with 5.8.5.3a is different from *mbms-Services* included in the last transmission of the *MBMSInterestIndication* message;
 - 5> initiate the transmission of the MBMSInterestIndication message in accordance with 5.8.5.4.

5.8.5.3 Determine MBMS frequencies of interest

The UE shall:

- 1> consider a frequency to be part of the MBMS frequencies of interest if the following conditions are met:
 - 2> at least one MBMS session the UE is receiving or interested to receive via an MRB or SC-MRB is ongoing or about to start; and
- NOTE 1: The UE may determine whether the session is ongoing from the start and stop time indicated in the User Service Description (USD), see 3GPP TS 36.300 [9] or 3GPP TS 26.346 [57].
 - 2> for at least one of these MBMS sessions *SystemInformationBlockType15* acquired from the PCell includes for the concerned frequency one or more MBMS SAIs as indicated in the USD for this session; and
- NOTE 2: The UE considers a frequency to be part of the MBMS frequencies of interest even though E-UTRAN may (temporarily) not employ an MRB or SC-MRB for the concerned session. I.e. the UE does not verify if the session is indicated on (SC-)MCCH

- NOTE 3: The UE considers the frequencies of interest independently of any synchronization state, e.g. [9, Annex J.1]
 - 2> the UE is capable of simultaneously receiving MRBs and/or is capable of simultaneously receiving SC-MRBs on the set of MBMS frequencies of interest, regardless of whether a serving cell is configured on each of these frequencies or not; and
 - 2> the *supportedBandCombination* the UE included in *UE-EUTRA-Capability* contains at least one band combination including the set of MBMS frequencies of interest;
- NOTE 4: Indicating a frequency implies that the UE supports *SystemInformationBlockType13* or *SystemInformationBlockType20* acquisition for the concerned frequency i.e. the indication should be independent of whether a serving cell is configured on that frequency.
- NOTE 5: When evaluating which frequencies it can receive simultaneously, the UE does not take into account the serving frequencies that are currently configured i.e. it only considers MBMS frequencies it is interested to receive.
- NOTE 6: The set of MBMS frequencies of interest includes at most one frequency for a given physical frequency. The UE only considers a physical frequency to be part of the MBMS frequencies of interest if it supports at least one of the bands indicated for this physical frequency in *SystemInformationBlockType1* (for serving frequency) or *SystemInformationBlockType15* (for neighbouring frequencies). In this case, E-UTRAN may assume the UE supports MBMS reception on any of the bands supported by the UE (i.e. according to *supportedBandCombination*).

5.8.5.3a Determine MBMS services of interest

The UE shall:

- 1> consider a MBMS service to be part of the MBMS services of interest if the following conditions are met:
 - 2> the UE is SC-PTM capable; and
 - 2> the UE is receiving or interested to receive this service via an SC-MRB; and
 - 2> one session of this service is ongoing or about to start; and
 - 2> one or more MBMS SAIs in the USD for this service is included in *SystemInformationBlockType15* acquired from the PCell for a frequency belonging to the set of MBMS frequencies of interest, determined according to 5.8.5.3.

5.8.5.4 Actions related to transmission of MBMSInterestIndication message

The UE shall set the contents of the MBMSInterestIndication message as follows:

- 1> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:
 - 2> include mbms-FreqList and set it to include the MBMS frequencies of interest sorted by decreasing order of interest, using the EARFCN corresponding with freqBandIndicator included in SystemInformationBlockType1 (for serving frequency), if applicable, and the EARFCN(s) as included in SystemInformationBlockType15 (for neighbouring frequencies);
- NOTE 1: The EARFCN included in *mbms-FreqList* is merely used to indicate a physical frequency the UE is interested to receive i.e. the UE may not support the band corresponding to the included EARFCN (but it does support at least one of the bands indicated in system information for the concerned physical frequency).
 - 2> include *mbms-Priority* if the UE prioritises reception of all indicated MBMS frequencies above reception of any of the unicast bearers;
 - 2> if *SystemInformationBlockType20* is broadcast by the PCell:
 - 3> include *mbms-Services* and set it to indicate the set of MBMS services of interest determined in accordance with 5.8.5.3a;

NOTE 2: If the UE prioritises MBMS reception and unicast data cannot be supported because of congestion on the MBMS carrier(s), E-UTRAN may initiate release of unicast bearers. It is up to E-UTRAN implementation whether all bearers or only GBR bearers are released. E-UTRAN does not initiate reestablishment of the released unicast bearers upon alleviation of the congestion.

The UE shall submit the MBMSInterestIndication message to lower layers for transmission.

5.8a SC-PTM

5.8a.1 Introduction

5.8a.1.1 General

SC-PTM control information is provided on a specific logical channel: the SC-MCCH. The SC-MCCH carries the *SCPTMConfiguration* message which indicates the MBMS sessions that are ongoing as well as the (corresponding) information on when each session may be scheduled, i.e.scheduling period, scheduling window and start offset. The *SCPTMConfiguration* message also provides information about the neighbour cells transmitting the MBMS sessions which are ongoing on the current cell.

A limited amount of SC-PTM control information is provided on the BCCH or BR-BCCH. This primarily concerns the information needed to acquire the SC-MCCH.

NOTE: For BL UEs and UEs in CE, SC-MCCH transmission uses a 1.4 MHz channel bandwidth and a maximum TBS of 936 bits, see TS 36.213 [23]. For NB-IoT UEs, the maximum TBS for SC-MCCH transmission is 680 bits, see TS 36.213 [23].

5.8a.1.2 SC-MCCH scheduling

The SC-MCCH information (i.e. information transmitted in messages sent over SC-MCCH) is transmitted periodically, using a configurable repetition period. SC-MCCH transmissions (and the associated radio resources and MCS) are indicated on PDCCH.

5.8a.1.3 SC-MCCH information validity and notification of changes

Change of SC-MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same SC-MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod m= 0, where m is the number of radio frames comprising the modification period. The modification period is configured by means of SystemInformationBlockType20 (SystemInformationBlockType20-NB in NB-IoT). If H-SFN is provided in SystemInformationBlockType1-BR, modification period boundaries for BL UEs or UEs in CE are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0. The modification period boundaries for NB-IoT UEs are defined by SFN values for which (H-SFN * 1024 + SFN) mod m=0.

When the network changes (some of) the SC-MCCH information, it notifies the UEs, other than BL UEs, UEs in CE or NB-IoT UEs, about the change in the first subframe which can be used for SC-MCCH transmission in a repetition period. LSB bit in 8-bit bitmap when set to '1' indicates the change in SC-MCCH. Upon receiving a change notification, a UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information starting from the same subframe. The UE applies the previously acquired SC-MCCH information until the UE acquires the new SC-MCCH information.

When the network changes (some of) the SC-MCCH information for start of new MBMS service(s) transmitted using SC-PTM, it notifies BL UEs, UEs in CE or NB-IoT UEs about the change in every PDCCH which schedules the first SC-MCCH in a repetition period in the current modification period. The notification is transmitted with 1 bit. The bit, when set to '1', indicates the start of new MBMS service(s), see TS 36.212 [22, 5.3.3.1.14 & 6.4.3.3]. Upon receiving a change notification, a BL UE, UE in CE or NB-IoT UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information scheduled by the PDCCH. The BL UE, UE in CE or NB-IoT UE applies the previously acquired SC-MCCH information until the BL UE, UE in CE or NB-IoT UE acquires the new SC-MCCH information.

When the network changes SC-MTCH specific information e.g. start of new MBMS service(s) transmitted using SC-PTM or change of ongoing MBMS service(s) transmitted using SC-PTM, it notifies the BL UEs, UEs in CE or NB-IoT UEs in the PDCCH which schedules the SC-MTCH in the current modification period. The notification is transmitted with a 2 bit bitmap. The LSB in the 2-bit bitmap, when set to '1', indicates the change of the on-going MBMS service and the MSB in the 2-bit bitmap, when set to '1', indicates the start of new MBMS service(s), see TS 36.212 [22, 5.3.3.1.12 & 5.3.3.1.13 & 6.4.3.2]. In the case the network changes an on-going SC-MTCH transmission in the next modification period, it notifies the BL UEs, UEs in CE or NB-IoT UEs in the PDCCH which schedules this SC-MTCH in the current modification period. In the case the network starts new MBMS service(s) transmitted using SC-PTM, the network notifies the UEs which have on-going SC-MTCH in the PDCCH scheduling each of the SC-MTCH. Upon receiving such notification, a BL UE, UE in CE or NB-IoT UE acquires the new SC-MCCH information at the start of the next modification period. The BL UE, UE in CE or NB-IoT UE applies the previously acquired SC-MCCH information until the BL UE, UE in CE or NB-IoT UE acquires the new SC-MCCH information.

5.8a.1.4 Procedures

The SC-PTM capable UE receiving or interested to receive MBMS service(s) via SC-MRB applies SC-PTM procedures described in 5.8a and, except for NB-IoT UE, the MBMS interest indication procedure as specified in 5.8.5.

5.8a.2 SC-MCCH information acquisition

5.8a.2.1 General



Figure 5.8a.2.1-1: SC-MCCH information acquisition

The UE applies the SC-MCCH information acquisition procedure to acquire the SC-PTM control information that is broadcast by the E-UTRAN. The procedure applies to SC-PTM capable UEs that are in RRC_IDLE. This procedure also applies to SC-PTM capable UEs that are in RRC_CONNECTED except for BL UEs, UEs in CE or NB-IoT UEs.

5.8a.2.2 Initiation

A UE interested to receive MBMS services via SC-MRB shall apply the SC-MCCH information acquisition procedure upon entering the cell broadcasting <code>SystemInformationBlockType20</code> (<code>SystemInformationBlockType20-NB</code> in NB-IoT) (e.g. upon power on, following UE mobility) and upon receiving a notification that the SC-MCCH information has changed. A UE, except for BL UE, UE in CE or NB-IoT UE, that is receiving an MBMS service via SC-MRB shall apply the SC-MCCH information acquisition procedure to acquire the SC-MCCH information that corresponds with the service that is being received, at the start of each modification period. The BL UE, UE in CE or NB-IoT UE that is receiving an MBMS service via SC-MRB shall apply the SC-MCCH information acquisition procedure upon receiving a notification that the SC-MCCH information that corresponds with the service that is being received is about to be changed. The BL UE, UE in CE or NB-IoT UE that is receiving an MBMS service via SC-MRB may apply the SC-MCCH information acquisition procedure upon receiving a notification that the SC-MCCH information is about to be changed due to start of a new service.

Unless explicitly stated otherwise in the procedural specification, the SC-MCCH information acquisition procedure overwrites any stored SC-MCCH information, i.e. delta configuration is not applicable for SC-MCCH information and the UE discontinues using a field if it is absent in SC-MCCH information unless explicitly specified otherwise.

5.8a.2.3 SC-MCCH information acquisition by the UE

A SC-PTM capable UE shall:

- 1> if the procedure is triggered by an SC-MCCH information change notification and the UE has no ongoing MBMS service:
 - 2> except for a BL UE, UE in CE or NB-IoT UE, start acquiring the *SCPTMConfiguration* message from the subframe in which the change notification was received;
 - 2> for a BL UE, UE in CE or NB-IoT UE, acquire the *SCPTMConfiguration* message scheduled by the PDCCH in which the change notification was received;
- NOTE 1: The UE continues using the previously received SC-MCCH information until the new SC-MCCH information has been acquired.
- 1> if the UE enters a cell broadcasting SystemInformationBlockType20 (SystemInformationBlockType20-NB in NB-IoT):
 - 2> acquire the SCPTMConfiguration message at the next repetition period;
- 1> if the UE is receiving an MBMS service via an SC-MRB:
 - 2> except for BL UE, UE in CE or NB-IoT UE, start acquiring the *SCPTMConfiguration* message from the beginning of each modification period;
 - 2> a BL UE, UE in CE or NB-IoT UE shall start acquiring the *SCPTMConfiguration* message at the start of the next modification period upon receiving a notification that the SC-MCCH information that corresponds with the service that is being received is about to be changed;
 - 2> a BL UE, UE in CE or NB-IoT UE may start acquiring the *SCPTMConfiguration* message at the start of the next modification period upon receiving a notification that the SC-MCCH information is about to be changed due to start of a new service;

5.8a.2.4 Actions upon reception of the SCPTMConfiguration message

No UE requirements related to the contents of this *SCPTMConfiguration* apply other than those specified elsewhere e.g. within procedures using the concerned system information, the corresponding field descriptions.

5.8a.3 SC-PTM radio bearer configuration

5.8a.3.1 General

The SC-PTM radio bearer configuration procedure is used by the UE to configure RLC, MAC and the physical layer upon starting and/or stopping to receive an SC-MRB transmitted on SC-MTCH. The procedure applies to SC-PTM capable UEs that are in RRC_IDLE and to SC-PTM capable UEs that are not BL UEs, UEs in CE or NB-IoT UEs in RRC_CONNECTED, and are interested to receive one or more MBMS services via SC-MRB.

NOTE: In case the UE is unable to receive an MBMS service via an SC-MRB due to capability limitations, upper layers may take appropriate action e.g. terminate a lower priority unicast service.

5.8a.3.2 Initiation

The UE applies the SC-MRB establishment procedure to start receiving a session of a MBMS service it has an interest in. The procedure may be initiated e.g. upon start of the MBMS session, upon entering a cell providing via SC-MRB a MBMS service in which the UE has interest, upon becoming interested in the MBMS service, upon removal of UE capability limitations inhibiting reception of the concerned service.

The UE applies the SC-MRB release procedure to stop receiving a session. The procedure may be initiated e.g. upon stop of the MBMS session, upon leaving the cell where a SC-MRB is established, upon losing interest in the MBMS service, when capability limitations start inhibiting reception of the concerned service.

5.8a.3.3 SC-MRB establishment

Upon SC-MRB establishment, the UE shall:

- 1> establish an RLC entity in accordance with the configuration specified in 9.1.1.7;
- 1> configure a SC-MTCH logical channel applicable for the SC-MRB and instruct MAC to receive DL-SCH on the cell where the *SCPTMConfiguration* message was received for the MBMS service for which the SC-MRB is established and using *g-RNTI* and *sc-mtch-SchedulingInfo* (if included) in this message for this MBMS service;
- 1> configure the physical layer in accordance with the *sc-mtch-InfoList*, applicable for the SC-MRB, as included in the *SCPTMConfiguration* message;
- 1> inform upper layers about the establishment of the SC-MRB by indicating the corresponding *tmgi* and *sessionId*;

5.8a.3.4 SC-MRB release

Upon SC-MRB release, the UE shall:

- 1> release the RLC entity as well as the related MAC and physical layer configuration;
- 1> inform upper layers about the release of the SC-MRB by indicating the corresponding tmgi and sessionId;

5.9 RN procedures

5.9.1 RN reconfiguration

5.9.1.1 General

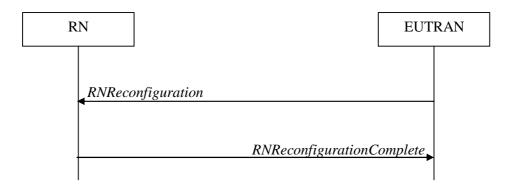


Figure 5.9.1.1-1: RN reconfiguration

The purpose of this procedure is to configure/reconfigure the RN subframe configuration and/or to update the system information relevant for the RN in RRC_CONNECTED.

5.9.1.2 Initiation

E-UTRAN may initiate the RN reconfiguration procedure to an RN in RRC_CONNECTED when AS security has been activated.

5.9.1.3 Reception of the RNReconfiguration by the RN

The RN shall:

- 1> if the *rn-SystemInfo* is included:
 - 2> if the *systemInformationBlockType1* is included:
 - 3> act upon the received SystemInformationBlockType1 as specified in 5.2.2.7;
 - 2> if the *SystemInformationBlockType2* is included:
 - 3> act upon the received SystemInformationBlockType2 as specified in 5.2.2.9;

- 1> if the *rn-SubframeConfig* is included:
 - 2> reconfigure lower layers in accordance with the received *subframeConfigPatternFDD* or *subframeConfigPatternTDD*;
 - 2> if the *rpdcch-Config* is included:
 - 3> reconfigure lower layers in accordance with the received *rpdcch-Config*;
- 1> submit the *RNReconfigurationComplete* message to lower layers for transmission, upon which the procedure ends:

5.10 Sidelink

5.10.1 Introduction

The sidelink communication and associated synchronisation resource configuration applies for the frequency at which it was received/acquired. Moreover, for a UE configured with one or more SCells, the sidelink communication and associated synchronisation resource configuration provided by dedicated signalling applies for the PCell/ the primary frequency. The sidelink discovery and associated synchronisation resource configuration applies for the frequency at which it was received/acquired or the indicated frequency in the configuration. For a UE configured with one or more SCells, the sidelink discovery and associated synchronisation resource configuration provided by dedicated signalling applies for the the PCell/ the primary frequency / any other indicated frequency.

- NOTE 1: Upper layers configure the UE to receive or transmit sidelink communication on a specific frequency, to monitor or transmit non-PS related sidelink discovery announcements on one or more frequencies or to monitor or transmit PS related sidelink discovery announcements on a specific frequency, but only if the UE is authorised to perform these particular ProSe related sidelink activities.
- NOTE 2: It is up to UE implementation which actions to take (e.g. termination of unicast services, detach) when it is unable to perform the desired sidelink activities, e.g. due to UE capability limitations.

Sidelink communication consists of one-to-many and one-to-one sidelink communication. One-to-many sidelink communication consists of relay related and non-relay related one-to-many sidelink communication. One-to-one sidelink communication consists of relay related and non-relay related one-to-one sidelink communication. In relay related one-to-one sidelink communication the communicating parties consist of one sidelink relay UE and one sidelink remote UE.

Sidelink discovery consists of public safety related (PS related) and non-PS related sidelink discovery. PS related sidelink discovery consists of relay related and non-relay related PS related sidelink discovery. Upper layers indicate to RRC whether a particular sidelink announcement is PS related or non-PS related.

Upper layers indicate to RRC whether a particular sidelink procedure is V2X related or not.

The specification covers the use of UE to network sidelink relays by specifying the additional requirements that apply for a sidelink relay UE and a sidelink remote UE. I.e. for such UEs the regular sidelink UE requirements equally apply unless explicitly stated otherwise.

5.10.1a Conditions for sidelink communication operation

When it is specified that the UE shall perform sidelink communication operation only if the conditions defined in this section are met, the UE shall perform sidelink communication operation only if:

- 1> if the UE's serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for sidelink communication operation belongs to the registered or equivalent PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for sidelink communication operation as defined in TS 36.304 [4, 11.4]; or
- 1> if the UE is camped on a serving cell (RRC_IDLE) on which it fulfils the conditions to support sidelink communication in limited service state as specified in TS 23.303 [68, 4.5.6]; and if either the serving cell is on the frequency used for sidelink communication operation or the UE is out of coverage on the frequency used for sidelink communication operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE has no serving cell (RRC_IDLE);

5.10.1b Conditions for PS related sidelink discovery operation

When it is specified that the UE shall perform PS related sidelink discovery operation only if the conditions defined in this section are met, the UE shall perform PS related sidelink discovery operation only if:

- 1> if the UE's serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for PS related sidelink discovery operation belongs to the registered or other PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for PS related sidelink discovery operation as defined in TS 36.304 [4, 11.4]; or
- 1> if the UE is camped on a serving cell (RRC_IDLE) on which it fulfils the conditions to support sidelink discovery in limited service state as specified in TS 23.303 [68, 4.5.6]; and if either the serving cell is on the frequency used for PS related sidelink discovery operation or the UE is out of coverage on the frequency used for PS related sidelink discovery operation as defined in TS 36.304 [4, 11.4]; or
- 1> if the UE has no serving cell (RRC_IDLE);

5.10.1c Conditions for non-PS related sidelink discovery operation

When it is specified that the UE shall perform non-PS related sidelink discovery operation only if the conditions defined in this section are met, the UE shall perform non-PS related sidelink discovery operation only if:

1> if the UE's serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is suitable; and if the selected cell on the frequency used for non-PS related sidelink discovery operation belongs to the registered or other PLMN as specified in TS 24.334 [69].

5.10.1d Conditions for V2X sidelink communication operation

When it is specified that the UE shall perform V2X sidelink communication operation only if the conditions defined in this section are met, the UE shall perform V2X sidelink communication operation only if:

- 1> if the UE's serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for V2X sidelink communication operation belongs to the registered or equivalent PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for V2X sidelink communication operation as defined in TS 36.304 [4, 11.4]; or
- 1> if the UE's serving cell (for RRC_IDLE or RRC_CONNECTED) fulfils the conditions to support V2X sidelink communication in limited service state as specified in TS 23.285 [78, 4.4.8]; and if either the serving cell is on the frequency used for V2X sidelink communication operation or the UE is out of coverage on the frequency used for V2X sidelink communication operation as defined in TS 36.304 [4, 11.4]; or
- 1> if the UE has no serving cell (RRC_IDLE);

5.10.2 Sidelink UE information

5.10.2.1 General

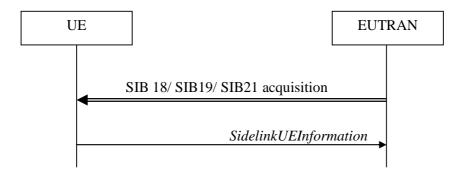


Figure 5.10.2-1: Sidelink UE information

The purpose of this procedure is to inform E-UTRAN that the UE is interested or no longer interested to receive sidelink communication or discovery, to receive V2X sidelink communication, as well as to request assignment or release of transmission resources for sidelink communication or discovery announcements or V2X sidelink communication or sidelink discovery gaps, to report parameters related to sidelink discovery from system information of inter-frequency/PLMN cells and to report the synchronization reference used by the UE for V2X sidelink communication.

5.10.2.2 Initiation

A UE capable of sidelink communication or V2X sidelink communication or sidelink discovery that is in RRC_CONNECTED may initiate the procedure to indicate it is (interested in) receiving sidelink communication or V2X sidelink communication or sidelink discovery in several cases including upon successful connection establishment, upon change of interest, upon change to a PCell broadcasting *SystemInformationBlockType18* or *SystemInformationBlockType21* including *sl-V2X-ConfigCommon*. A UE capable of sidelink communication or V2X sidelink communication or sidelink discovery may initiate the procedure to request assignment of dedicated resources for the concerned sidelink communication transmission or discovery announcements or V2X sidelink communication transmission or to request sidelink discovery gaps for sidelink discovery transmission or sidelink discovery reception and a UE capable of inter-frequency/PLMN sidelink discovery parameter reporting may initiate the procedure to report parameters related to sidelink discovery from system information of inter-frequency/PLMN cells.

NOTE 1: A UE in RRC_IDLE that is configured to transmit sidelink communication / V2X sidelink communication / sidelink discovery announcements, while SystemInformationBlockType18/
SystemInformationBlockType19/ SystemInformationBlockType21 including sl-V2X-ConfigCommon does not include the resources for transmission (in normal conditions), initiates connection establishment in accordance with 5.3.3.1a.

Upon initiating the procedure, the UE shall:

- 1> if *SystemInformationBlockType18* is broadcast by the PCell:
 - 2> ensure having a valid version of SystemInformationBlockType18 for the PCell;
 - 2> if configured by upper layers to receive sidelink communication:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType18*; or
- NOTE 2: After handover/ re-establishment from a source PCell not broadcasting *SystemInformationBlockType18* the UE repeats the same interest information that it provided previously as such a source PCell may not forward the interest information.
 - 3> if the last transmission of the *SidelinkUEInformation* message did not include *commRxInterestedFreq*; or if the frequency configured by upper layers to receive sidelink communication on has changed since the last transmission of the *SidelinkUEInformation* message:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate the sidelink communication reception frequency of interest in accordance with 5.10.2.3;

- 3> if the last transmission of the *SidelinkUEInformation* message included *commRxInterestedFreq*:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it is no longer interested in sidelink communication reception in accordance with 5.10.2.3;
- 2> if configured by upper layers to transmit non-relay related one-to-many sidelink communication:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType18*; or
 - 3> if the last transmission of the *SidelinkUEInformation* message did not include *commTxResourceReq*; or if the information carried by the *commTxResourceReq* has changed since the last transmission of the *SidelinkUEInformation* message:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate the non-relay related one-to-many sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

- 3> if the last transmission of the SidelinkUEInformation message included commTxResourceReq:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires non-relay related one-to-many sidelink communication transmission resources in accordance with 5.10.2.3;
- 2> if configured by upper layer to transmit relay related one-to-many sidelink communication:
 - 3> if the UE did not transmit a SidelinkUEInformation message since entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType18*, connected to a PCell not broadcasting *SystemInformationBlockType19* or broadcasting *SystemInformationBlockType19* not including *discConfigRelay*; or
 - 3> if the last transmission of *SidelinkUEInformation* message did not include *commTxResourceReqRelay*; or if the information carried by the *commTxResourceReqRelay* has changed since the last transmission of the *SidelinkUEInformation* message:
 - 4> if the UE is acting as sidelink relay UE:
 - 5> initiate transmission of the *SidelinkUEInformation* message to indicate the relay related one-tomany sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

- 3> if the last transmission of the SidelinkUEInformation message included commTxResourceReqRelay:
 - 4> initiate transmission of the SidelinkUEInformation message to indicate it no longer requires relay related one-to-many sidelink communication transmission resources in accordance with 5.10.2.3;
- 2> if configured by upper layers to transmit non-relay related one-to-one sidelink communication:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType18* or connected to a PCell broadcasting *SystemInformationBlockType18* not including *commTxResourceUC-ReqAllowed*; or
 - 3> if the last transmission of the *SidelinkUEInformation* message did not include *commTxResourceReqUC*; or if the information carried by the *commTxResourceReqUC* has changed since the last transmission of the *SidelinkUEInformation* message:
 - 4> if commTxResourceUC-ReqAllowed is included in SystemInformationBlockType18:
 - 5> initiate transmission of the *SidelinkUEInformation* message to indicate the non-relay related one-to-one sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

- 3> if the last transmission of the SidelinkUEInformation message included commTxResourceReqUC:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires non-relay related one-to-one sidelink communication transmission resources in accordance with 5.10.2.3;
- 2> if configured by upper layers to transmit relay related one-to-one sidelink communication:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state: or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType18*, connected to a PCell not broadcasting

- SystemInformationBlockType19 or broadcasting SystemInformationBlockType19 not including discConfigRelay; or
- 3> if the last transmission of the *SidelinkUEInformation* message did not include *commTxResourceReqRelayUC*; or if the information carried by the *commTxResourceReqRelayUC* has changed since the last transmission of the *SidelinkUEInformation* message:
 - 4> if the UE is acting as sidelink relay UE; or:
 - 4> if the UE has a selected sidelink relay UE; and if *SystemInformationBlockType19* is broadcast by the PCell and includes *discConfigRelay*; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;
 - 5> initiate transmission of the *SidelinkUEInformation* message to indicate the relay related one-to-one sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

- 3> if the last transmission of the SidelinkUEInformation message included commTxResourceReaRelayUC:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires relay related one-to-one sidelink communication transmission resources in accordance with 5.10.2.3;
- 1> if SystemInformationBlockType19 is broadcast by the PCell:
 - 2> ensure having a valid version of SystemInformationBlockType19 for the PCell;
 - 2> if configured by upper layers to receive sidelink discovery announcements on a serving frequency or on one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19 of the PCell:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType19*; or
 - 3> if the last transmission of the SidelinkUEInformation message did not include discRxInterest:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it is interested in sidelink discovery reception in accordance with 5.10.2.3;

- 3> if the last transmission of the SidelinkUEInformation message included discRxInterest:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it is no longer interested in sidelink discovery reception in accordance with 5.10.2.3;
- 2> if the UE is configured by upper layers to transmit non-PS related sidelink discovery announcements on the primary frequency or on one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19 of the PCell, with discTxResourcesInterFreq included within discResourcesNonPS and not set to noTxOnCarrier:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state: or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType19* or connected to a PCell broadcasting *SystemInformationBlockType19* not including *discTxResourcesInterFreq* within *discResourcesNonPS* or *discTxResourcesInterFreq* did not include all frequencies for which the UE will request resources; or
 - 3> if the last transmission of the *SidelinkUEInformation* message did not include *discTxResourceReq*; or if the non-PS related sidelink discovery announcement resources required by the UE have changed (i.e. resulting in a change of *discTxResourceReq*) since the last transmission of the *SidelinkUEInformation* message:

4> initiate transmission of the *SidelinkUEInformation* message to indicate the non-PS related sidelink discovery announcement resources required by the UE in accordance with 5.10.2.3;

2> else:

- 3> if the last transmission of the *SidelinkUEInformation* message included *discTxResourceReq*:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires non-PS related sidelink discovery announcement resources in accordance with 5.10.2.3;
- 2> if configured by upper layers to transmit PS related sidelink discovery announcements on the primary frequency or, in case of non-relay PS related sidelink discovery announcements, on a frequency included in *discInterFreqList*, if included in *SystemInformationBlockType19*, with *discTxResourcesInterFreq* included within *discResourcesPS* and not set to *noTxOnCarrier*:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType19*, connected to a PCell broadcasting *SystemInformationBlockType19* not including *discConfigPS*, or in case of non-relay PS related transmission: (connected to a PCell broadcasting *SystemInformationBlockType19* not including *discTxResourcesInterFreq* within *discResourcesPS* or for which *discTxResourcesInterFreq* did not include all frequencies for which the UE will request resources), or in case of relay related PS sidelink discovery announcements: (connected to a PCell broadcasting *SystemInformationBlockType19* not including *discConfigRelay*) sidelink; or
 - 3> if the last transmission of the *SidelinkUEInformation* message did not include *discTxResourceReqPS*; or if the PS related sidelink discovery announcement resources required by the UE have changed (i.e. resulting in a change of *discTxResourceReqPS*) since the last transmission of the *SidelinkUEInformation* message:
 - 4> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or
 - 4> if the UE is acting as sidelink relay UE; and if *SystemInformationBlockType19* includes *discConfigRelay*; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or
 - 4> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:
 - 5> initiate transmission of the *SidelinkUEInformation* message to indicate the PS related sidelink discovery announcement resources required by the UE in accordance with 5.10.2.3;

- 3> if the last transmission of the SidelinkUEInformation message included discTxResourceReqPS:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires PS related sidelink discovery announcement resources in accordance with 5.10.2.3;
- 2> if configured by upper layers to monitor or transmit sidelink discovery announcements; and if the UE requires sidelink discovery gaps, to perform such actions:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType19* or connected to a PCell broadcasting *SystemInformationBlockType19* not including *gapRequestsAllowedCommon* while at the same time the UE was not configured with *gapRequestsAllowedDedicated*; or
 - 3> if the last transmission of the SidelinkUEInformation message did not include the gaps required to monitor or transmit the sidelink discovery announcements (i.e. UE requiring gaps to monitor discovery announcements while discRxGapReq was not included or UE requiring gaps to transmit discovery announcements while discTxGapReq was not included); or if the sidelink discovery gaps required by the

UE have changed (i.e. resulting in a change of *discRxGapReq* or *discTxGapReq*) since the last transmission of the *SidelinkUEInformation* message:

- 4> if the UE is configured with gapRequestsAllowedDedicated set to true; or
- 4> if the UE is not configured with *gapRequestsAllowedDedicated* and *gapRequestsAllowedCommon* is included in *SystemInformationBlockType19*:
 - 5> initiate transmission of the *SidelinkUEInformation* message to indicate the sidelink discovery gaps required by the UE in accordance with 5.10.2.3;

2> else:

- 3> if the last transmission of the SidelinkUEInformation message included discTxGapReq or discRxGapReq:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires sidelink discovery gaps in accordance with 5.10.2.3;
- 2> if the UE acquired the relevant parameters from the system information of one or more cells on a carrier included in the *discSysInfoToReportConfig* and T370 is running:
 - 3> if the UE has configured lower layers to transmit or monitor the sidelink discovery announcements on those cells:
 - 4> initiate transmission of the *SidelinkUEInformation* message to report the acquired system information parameters and stop T370;
- 1> if SystemInformationBlockType21 including sl-V2X-ConfigCommon is broadcast by the PCell:
 - 2> ensure having a valid version of SystemInformationBlockType21 for the PCell;
 - 2> if configured by upper layers to receive V2X sidelink communication on a primary frequency or on one or more frequencies included in *v2x-InterFreqInfoList*, if included in *SystemInformationBlockType21* of the PCell:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType21* including *sl-V2X-ConfigCommon*; or
 - 3> if the last transmission of the *SidelinkUEInformation* message did not include *v2x-CommRxInterestedFreqList*; or if the frequency(ies) configured by upper layers to receive V2X sidelink communication on has changed since the last transmission of the *SidelinkUEInformation* message:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate the V2X sidelink communication reception frequency(ies) of interest in accordance with 5.10.2.3;

2> else:

- 3> if the last transmission of the SidelinkUEInformation message included v2x-CommRxInterestedFreqList:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it is no longer interested in V2X sidelink communication reception in accordance with 5.10.2.3;
- 2> if configured by upper layers to transmit V2X sidelink communication on a primary frequency or on one or more frequencies included in *v2x-InterFreqInfoList*, if included in *SystemInformationBlockType21* of the PCell:
 - 3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
 - 3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType21* including *sl-V2X-ConfigCommon*; or

- 3> if the last transmission of the *SidelinkUEInformation* message did not include *v2x-CommTxResourceReq*; or if the information carried by the *v2x-CommTxResourceReq* has changed since the last transmission of the *SidelinkUEInformation* message:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate the V2X sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

- 3> if the last transmission of the SidelinkUEInformation message included v2x-CommTxResourceReq:
 - 4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires V2X sidelink communication transmission resources in accordance with 5.10.2.3;

5.10.2.3 Actions related to transmission of SidelinkUEInformation message

The UE shall set the contents of the SidelinkUEInformation message as follows:

- 1> if the UE initiates the procedure to indicate it is (no more) interested to receive sidelink communication or discovery or receive V2X sidelink communication or to request (configuration/ release) of sidelink communication or V2X sidelink communication or sidelink discovery transmission resources (i.e. UE includes all concerned information, irrespective of what triggered the procedure):
 - 2> if *SystemInformationBlockType18* is broadcast by the PCell:
 - 3> if configured by upper layers to receive sidelink communication:
 - 4> include commRxInterestedFreq and set it to the sidelink communication frequency;
 - 3> if configured by upper layers to transmit non-relay related one-to-many sidelink communication:
 - 4> include *commTxResourceReq* and set its fields as follows:
 - 5> set *carrierFreq* to indicate the sidelink communication frequency i.e. the same value as indicated in *commRxInterestedFreq* if included;
 - 5> set *destinationInfoList* to include the non-relay related one-to-many sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;
 - 3> if configured by upper layers to transmit non-relay related one-to-one sidelink communication; and
 - 3> if commTxResourceUC-ReqAllowed is included in SystemInformationBlockType18:
 - 4> include *commTxResourceReqUC* and set its fields as follows:
 - 5> set *carrierFreq* to indicate the one-to-one sidelink communication frequency i.e. the same value as indicated in *commRxInterestedFreq* if included;
 - 5> set *destinationInfoList* to include the non-relay related one-to-one sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;
 - 3> if configured by upper layers to transmit relay related one-to-one sidelink communication; and
 - 3> if SystemInformationBlockType19 is broadcast by the PCell including discConfigRelay; and
 - 3> if the UE is acting as sidelink relay UE; or if the UE has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:
 - 4> include *commTxResourceReqRelayUC* and set its fields as follows:
 - 5> set *destinationInfoList* to include the one-to-one sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;
 - 4> include *ue-Type* and set it to *relayUE* if the UE is acting as sidelink relay UE and to *remoteUE* otherwise;
 - 3> if configured by upper layers to transmit relay related one-to-many sidelink communication; and

- 3> if SystemInformationBlockType19 is broadcast by the PCell including discConfigRelay; and
- 3> if the UE is acting as sidelink relay UE:
 - 4> include *commTxResourceReqRelay* and set its fields as follows:
 - 5> set *destinationInfoList* to include the one-to-many sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;
 - 4> include *ue-Type* and set it to *relayUE*;
- 2> if *SystemInformationBlockType19* is broadcast by the PCell:
 - 3> if configured by upper layers to receive sidelink discovery announcements on a serving frequency or one or more frequencies included in *discInterFreqList*, if included in *SystemInformationBlockType19*:
 - 4> include discRxInterest;
 - 3> if the UE is configured by upper layers to transmit non-PS related sidelink discovery announcements:
 - 4> for each frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements that concerns the primary frequency or that is included in *discInterFreqList* with *discTxResourcesInterFreq* included within *discResourcesNonPS* and not set to *noTxOnCarrier*:
 - 5> for the first frequency, include *discTxResourceReq* and set it to indicate the number of discovery messages for sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency, if different from the primary;
 - 5> for any additional frequency, include *discTxResourceReqAddFreq* and set it to indicate the number of discovery messages for sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency;
 - 3> if configured by upper layers to transmit PS related sidelink discovery announcements; and
 - 3> if the frequency on which the UE is configured to transmit PS related sidelink discovery announcements either concerns the primary frequency or, in case of non-relay PS related sidelink discovery announcements, is included in *discInterFreqList* with *discTxResources InterFreq* included within *discResourcesPS* and not set to *noTxOnCarrier*:
 - 4> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements and SystemInformationBlockType19 includes discConfigPS; or
 - 4> if the UE is acting as sidelink relay UE; and if *SystemInformationBlockType19* includes *discConfigRelay*; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or
 - 4> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:
 - 5> include *discTxResourceReqPS* and set it to indicate the number of discovery messages for PS related sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency, if different from the primary;
- 2> if *SystemInformationBlockType21* is broadcast by the PCell and *SystemInformationBlockType21* includes *sl-V2X-ConfigCommon*:
 - 3> if configured by upper layers to receive V2X sidelink communication:
 - 4> include *v2x-CommRxInterestedFreqList* and set it to the frequency(ies) for V2X sidelink communication reception;
 - 3> if configured by upper layers to transmit V2X sidelink communication:
 - 4> if configured by upper layers to transmit P2X related V2X sidelink communication:
 - 5> include *p2x-CommTxType* set to *true*;

- 4> include *v2x-CommTxResourceReq* and set its fields as follows for each frequency on which the UE is configured for V2X sidelink communication transmission:
 - 5> set carrierFreqCommTx to indicate the frequency for V2X sidelink communication transmission;
 - 5> set *v2x-TypeTxSync* to the current synchronization reference type used on the associated *carrierFreqCommTx* for V2X sidelink communication transmission;
 - 5> set *v2x-DestinationInfoList* to include the V2X sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;
- 1> else if the UE initiates the procedure to request sidelink discovery transmission and/ or reception gaps:
 - 2> if the UE is configured with gapRequestsAllowedDedicated set to true; or
 - 2> if the UE is not configured with *gapRequestsAllowedDedicated* and *gapRequestsAllowedCommon* is included in *SystemInformationBlockType19*:
 - 3> if the UE requires sidelink discovery gaps to monitor the sidelink discovery announcements the UE is configured to monitor by upper layers:
 - 4> include *discRxGapReq* and set it to indicate, for each frequency that either concerns the primary frequency or is included in *discInterFreqList* on which the UE is configured to monitor sidelink discovery announcements and for which it requires sidelink discovery gaps to do so, the gap pattern(s) as well as the concerned frequency, if different from the primary;
 - 3> if the UE requires sidelink discovery gaps to transmit the sidelink discovery announcements the UE is configured to transmit by upper layers:
 - 4> include *discTxGapReq* and set it to indicate, for each frequency that either concerns the primary or is included in *discInterFreqList* on which the UE is configured to transmit sidelink discovery announcements and for which it requires sidelink discovery gaps to do so, the gap pattern(s) as well as the concerned frequency, if different from the primary;
- 1> else if the UE initiates the procedure to report the system information parameters related to sidelink discovery of carriers other than the primary:
 - 2> include *discSysInfoReportFreqList* and set it to report the system information parameter acquired from the cells on those carriers;

The UE shall submit the SidelinkUEInformation message to lower layers for transmission.

5.10.3 Sidelink communication monitoring

A UE capable of sidelink communication that is configured by upper layers to receive sidelink communication shall:

- 1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:
 - 2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
 - 3> if the cell chosen for sidelink communication reception broadcasts *SystemInformationBlockType18* including *commRxPool*:
 - 4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by *commRxPool*;
- NOTE 1: If *commRxPool* includes one or more entries including *rxParametersNCell*, the UE may only monitor such entries if the associated PSS/SSS or SLSSIDs is detected. When monitoring such pool(s), the UE applies the timing of the concerned PSS/SSS or SLSS.
 - 2> else (i.e. out of coverage on the sidelink carrier):
 - 3> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources that were preconfigured (i.e. *preconfigComm* in *SL-Preconfiguration* defined in 9.3);

NOTE 2: The UE may monitor in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UE's own timing.

5.10.4 Sidelink communication transmission

A UE capable of sidelink communication that is configured by upper layers to transmit non-relay related sidelink communication and has related data to be transmitted or a UE capable of relay related sidelink communication that is configured by upper layers to transmit relay related sidelink communications and satisfies the conditions for relay related sidelink communication specified in this section shall:

- 1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:
 - 2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
 - 3> if the UE is in RRC_CONNECTED and uses the PCell for sidelink communication:
 - 4> if the UE is configured, by the current PCell/ the PCell in which physical layer problems or radio link failure was detected, with *commTxResources* set to *scheduled*:
 - 5> if T310 or T311 is running; and if the PCell at which the UE detected physical layer problems or radio link failure broadcasts *SystemInformationBlockType18* including *commTxPoolExceptional*; or
 - 5> if T301 is running and the cell on which the UE initiated connection re-establishment broadcasts SystemInformationBlockType18 including commTxPoolExceptional:
 - 6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in *commTxPoolExceptional*;
 - 5> else:
 - 6> configure lower layers to request E-UTRAN to assign transmission resources for sidelink communication;
 - 4> else if the UE is configured with commTxPoolNormalDedicated or commTxPoolNormalDedicatedExt:
 - 5> if *priorityList* is included for the entries of *commTxPoolNormalDedicated* or *commTxPoolNormalDedicatedExt*:
 - 6> configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated by *commTxPoolNormalDedicated* or *commTxPoolNormalDedicatedExt* i.e. indicate all entries of this field to lower layers;
 - 5> else:
 - 6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in *commTxPoolNormalDedicated*;
 - 3> else (i.e. sidelink communication in RRC_IDLE or on cell other than PCell in RRC_CONNECTED):
 - 4> if the cell chosen for sidelink communication transmission broadcasts SystemInformationBlockType18:
 - 5> if SystemInformationBlockType18 includes commTxPoolNormalCommon:
 - 6> if *priorityList* is included for the entries of *commTxPoolNormalCommon* or *commTxPoolNormalCommonExt*:
 - 7> configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated by *commTxPoolNormalCommon* and/or *commTxPoolNormalCommonExt* i.e. indicate all entries of these fields to lower layers;
 - 6> else:
 - 7> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in *commTxPoolNormalCommon*;

- 5> else if *SystemInformationBlockType18* includes *commTxPoolExceptional*:
 - 6> from the moment the UE initiates connection establishment until receiving an RRCConnectionReconfiguration including sl-CommConfig or until receiving an RRCConnectionRelease or an RRCConnectionReject;
 - 7> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in *commTxPoolExceptional*;
- 2> else (i.e. out of coverage on sidelink carrier):
 - 3> if priorityList is included for the entries of preconfigComm in SL-Preconfiguration defined in 9.3:
 - 4> configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated *preconfigComm* i.e. indicate all entries of this field to lower layers and in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UEs own timing;

3> else:

4> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources that were preconfigured i.e. indicated by the first entry in *preconfigComm* in *SL-Preconfiguration* defined in 9.3 and in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UEs own timing;

The conditions for relay related sidelink communication are as follows:

- 1> if the transmission concerns sidelink relay communication; and the UE is capable of sidelink relay or sidelink remote operation:
 - 2> if the UE is in RRC_IDLE; and if the UE has a selected sidelink relay UE: configure lower layers to transmit the sidelink control information and the corresponding data using the resources, as specified previously in this section, only if the following condition is met:
 - 3> if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met; and if the UE configured lower layers with a pool of resources included in *SystemInformationBlockType18* (i.e. commTxPoolNormalCommon, commTxPoolNormalCommonExt or commTxPoolExceptional); and commTxAllowRelayCommon is included in *SystemInformationBlockType18*;
 - 2> if the UE is in RRC_CONNECTED: configure lower layers to transmit the sidelink control information and the corresponding data using the resources, as specified previously in this section, only if the following condition is met:
 - 3> if the UE configured lower layers with resources provided by dedicated signalling (i.e. *commTxResources*); and the UE is configured with *commTxAllowRelayDedicated* set to *true*;

5.10.5 Sidelink discovery monitoring

A UE capable of non-PS related sidelink discovery that is configured by upper layers to monitor non-PS related sidelink discovery announcements shall:

- 1> for each frequency the UE is configured to monitor non-PS related sidelink discovery announcements on, prioritising the frequencies included in *discInterFreqList*, if included in *SystemInformationBlockType19*:
 - 2> if the PCell or the cell the UE is camping on indicates the pool of resources to monitor sidelink discovery announcements on by discRxResourcesInterFreq in discResourcesNonPS within discInterFreqList in SystemInformationBlockType19:
 - 3> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by discRxResourcesInterFreqin discResourcesNonPS within SystemInformationBlockType19;
 - 2> else if the cell used for sidelink discovery monitoring broadcasts SystemInformationBlockType19:

- 3> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by *discRxPool* in *SystemInformationBlockType19*;
- 2> if the UE is configured with *discRxGapConfig* and requires sidelink discovery gaps to monitor sidelink discovery announcements on the concerned frequency;
 - 3> configure lower layers to monitor the concerned frequency using the sidelink discovery gaps indicated by discRxGapConfig;
- 2> else:
 - 3> configure lower layers to monitor the concerned frequency without affecting normal operation;

A UE capable of PS related sidelink discovery that is configured by upper layers to monitor PS related sidelink discovery announcements shall:

- 1> if out of coverage on the frequency, as defined in TS 36.304 [4, 11.4]:
 - 2> configure lower layers to monitor sidelink discovery announcements using the pool of resources that were preconfigured (i.e. indicated by *discRxPoolList* within *preconfigDisc* in *SL-Preconfiguration* defined in 9.3);
- 1> else if configured by upper layers to monitor non-relay PS related discovery announcements; and if the PCell or the cell the UE is camping on indicates a pool of resources to monitor sidelink discovery announcements on by discRxResourcesInterFreq in discResourcesPS within discInterFreqList in SystemInformationBlockType19:
 - 2> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by discRxResourcesInterFreq in discResourcesPS in SystemInformationBlockType19;
- 1> else if configured by upper layers to monitor PS related sidelink discovery announcements; and if the cell used for sidelink discovery monitoring broadcasts *SystemInformationBlockType19*:
 - 2> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by discRxPoolPS in SystemInformationBlockType19;
- 1> if the UE is configured with *discRxGapConfig* and requires sidelink discovery gaps to monitor sidelink discovery announcements on the concerned frequency;
 - 2> configure lower layers to monitor the concerned frequency using the sidelink discovery gaps indicated by discRxGapConfig;

1> else:

- 2> configure lower layers to monitor the concerned frequency without affecting normal operation;
- NOTE 1: The requirement not to affect normal UE operation also applies for the acquisition of sidelink discovery related system and synchronisation information from inter-frequency cells.
- NOTE 2: The UE is not required to monitor all pools simultaneously.
- NOTE 3: It is up to UE implementation to decide whether a cell is sufficiently good to be used to monitor sidelink discovery announcements.
- NOTE 4: If *discRxPool*, *discRxPoolPS* or *discRxResourcesInterFreq* includes one or more entries including *rxParameters*, the UE may only monitor such entries if the associated SLSSIDs are detected. When monitoring such pool(s) the UE applies the timing of the corresponding SLSS.

5.10.6 Sidelink discovery announcement

A UE capable of non-PS related sidelink discovery that is configured by upper layers to transmit non-PS related sidelink discovery announcements shall, for each frequency the UE is configured to transmit such announcements on:

- NOTE: In case the configured resources are insufficient it is up to UE implementation to decide which sidelink discovery announcements to transmit.
- 1> if the frequency used to transmit sidelink discovery announcements concerns the serving frequency (RRC_IDLE) or primary frequency (RRC_CONNECTED):

- 2> if the UE's serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is suitable as defined in TS 36.304 [4]:
 - 3> if the UE is in RRC_CONNECTED (i.e. PCell is used for sidelink discovery announcement):
 - 4> if the UE is configured with *discTxResources* set to *scheduled*:
 - 5> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by *scheduled* in *discTxResources*;
 - 4> else if the UE is configured with discTxPoolDedicated (i.e. discTxResources set to ue-Selected):
 - 5> select an entry of the list of resource pool entries in *discTxPoolDedicated* and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
 - 3> else if T300 is not running (i.e. UE in RRC_IDLE, announcing via serving cell):
 - 4> if *SystemInformationBlockType19* of the serving cell includes *discTxPoolCommon*:
 - 5> select an entry of the list of resource pool entries in *discTxPoolCommon* and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
- 1> else if, for the frequency used to transmit sidelink discovery announcements on, the UE is configured with dedicated resources (i.e. with *discTxResources-r12*, if *discTxCarrierFreq* is included in *discTxInterFreqInfo*, or with *discTxResources* within *discTxInfoInterFreqListAdd* in *discTxInterFreqInfo*); and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met:
 - 2> if the UE is configured with *discTxResources* set to *scheduled*:
 - 3> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by *scheduled* in *discTxResources*;
 - 2> else if the UE is configured with *discTxResources* set to *ue-Selected*:
 - 3> select an entry of the list of resource pool entries in *ue-Selected* and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
- 1> else if the frequency used to transmit sidelink discovery announcements on is included in *discInterFreqList* within *SystemInformationBlockType19* of the serving cell/ PCell, and *discTxResourcesInterFreq* within *discResourcesNonPS* in the corresponding entry of *discInterFreqList* is set to *discTxPoolCommon* (i.e. serving cell/ PCell broadcasts pool of resources) and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met; or
- 1> else if *discTxPoolCommon* is included in *SystemInformationBlockType19* acquired from cell selected on the sidelink discovery announcement frequency; and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met:
 - 2> select an entry of the list of resource pool entries in *discTxPoolCommon* and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
- 1> if the UE is configured with *discTxGapConfig* and requires sidelink discovery gaps to transmit sidelink discovery announcements on the concerned frequency;
 - 2> configure lower layers to transmit on the concerned frequency using the sidelink discovery gaps indicated by discTxGapConfig,
- 1> else:
 - 2> configure lower layers to transmit on the concerned frequency without affecting normal operation;

A UE capable of PS related sidelink discovery that is configured by upper layers to transmit PS related sidelink discovery announcements shall:

- 1> if out of coverage on the frequency used to transmit PS related sidelink discovery announcements as defined in TS 36.304 [4, 11.4] and the conditions for PS -related sidelink discovery operation as defined in 5.10.1b are met:
 - 2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or

- 2> if the UE is selecting a sidelink relay UE/ has a selected sidelink relay UE:
 - 3> configure lower layers to transmit sidelink discovery announcements using the pool of resources that were preconfigured and in accordance with the following;
 - 4> randomly select, using a uniform distribution, an entry of *preconfigDisc* in *SL-Preconfiguration* defined in 9.3;
 - 4> using the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UEs own timing;
- 1> else if the frequency used to transmit sidelink discovery announcements concerns the serving frequency (RRC_IDLE) or primary frequency (RRC_CONNECTED) and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:
 - 2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or
 - 2> if the UE is acting as sidelink relay UE; and if the UE is in RRC_IDLE; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or
 - 2> if the UE is acting as sidelink relay UE; and if the UE is in RRC_CONNECTED; or
 - 2> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:
 - 3> if the UE is configured with discTxPoolPS-Dedicated; or
 - 3> if the UE is in RRC_IDLE; and if discTxPoolPS-Common is included in SystemInformationBlockType19:
 - 4> select an entry of the list of resource pool entries and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
 - 3> else if the UE is configured with *discTxResourcesPS* set to *scheduled*:
 - 4> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by *scheduled* in *discTxResourcesPS*;
- 1> else if, for the frequency used to transmit sidelink discovery announcements on, the UE is configured with dedicated resources (i.e. with *discTxResourcesPS* in *discTxInterFreqInfo* within *sl-DiscConfig*); and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:
 - 2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:
 - 3> if the UE is configured with *discTxResourcesPS* set to *scheduled*:
 - 4> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by *scheduled* in *discTxResourcesPS*;
 - 3> else if the UE is configured with *discTxResourcesPS* set to *ue-Selected*:
 - 4> select an entry of the list of resource pool entries in *ue-Selected* and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
- 1> else if the frequency used to transmit sidelink discovery announcements on is included in *discInterFreqList* within *SystemInformationBlockType19* of the serving cell/ PCell, while *discTxResourcesInterFreq* within *discResourcesPS* in the corresponding entry of *discInterFreqList* is set to *discTxPoolCommon* (i.e. serving cell/ PCell broadcasts pool of resources) and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:
 - 2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:
 - 3> select an entry of the list of resource pool entries in *discTxPoolCommon* and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
- 1> else if discTxPoolPS-Common is included in SystemInformationBlockType19 acquired from cell selected on the sidelink discovery announcement frequency; and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

- 2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:
 - 3> select an entry of the list of resource pool entries in *discTxPoolPS-Common* and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;
- 1> if the UE is configured with *discTxGapConfig* and requires gaps to transmit sidelink discovery announcements on the concerned frequency;
 - 2> configure lower layers to transmit on the concerned frequency using the gaps indicated by discTxGapConfig,
- 1> else:
 - 2> configure lower layers to transmit on the concerned frequency without affecting normal operation;

5.10.6a Sidelink discovery announcement pool selection

A UE that is configured with a list of resource pool entries for sidelink discovery announcement transmission (i.e. by *SL-DiscTxPoolList*) shall:

- 1> if *poolSelection* is set to *rsrpBased*:
 - 2> select a pool from the list of pools the UE is configured with for which the RSRP measurement of the reference cell selected as defined in 5.10.6b, after applying the layer 3 filter defined by *quantityConfig* as specified in 5.5.3.2, is in-between *threshLow* and *threshHigh*;
- 1> else:
 - 2> randomly select, using a uniform distribution, a pool from the list of pools the UE is configured with;
- 1> configure lower layers to transmit the sidelink discovery announcement using the selected pool of resources;
- NOTE 1: When performing resource pool selection based on RSRP, the UE uses the latest results of the available measurements used for cell reselection evaluation in RRC_IDLE/ for measurement report triggering evaluation in RRC_CONNECTED, which are performed in accordance with the performance requirements specified in TS 36.133 [16].

5.10.6b Sidelink discovery announcement reference carrier selection

A UE capable of sidelink discovery that is configured by upper layers to transmit sidelink discovery announcements shall:

- 1> for each frequency the UE is transmitting sidelink discovery announcements on, select a cell to be used as reference for synchronisation and DL measurements in accordance with the following:
 - 2> if the frequency concerns the primary frequency:
 - 3> use the PCell as reference;
 - 2> else if the frequency concerns a secondary frequency:
 - 3> use the concerned SCell as reference;
 - 2> else if the UE is configured with *discTxRefCarrierDedicated* for the frequency:
 - 3> use the cell indicated by this field as reference;
 - 2> else if the UE is configured with refCarrierCommon for the frequency:
 - 3> use the serving cell (RRC_IDLE)/ PCell (RRC_CONNECTED) as reference;
 - 2> else:
 - 3> use the DL frequency paired with the one used to transmit sidelink discovery announcements on as reference;

5.10.7 Sidelink synchronisation information transmission

5.10.7.1 General

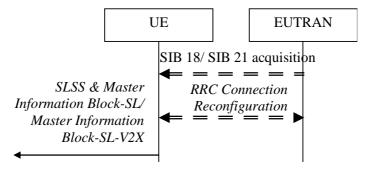


Figure 5.10.7.1-1: Synchronisation information transmission for sidelink communication or V2X sidelink communication, in (partial) coverage

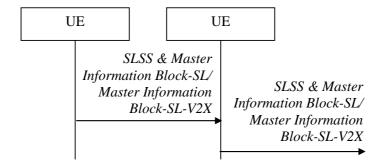


Figure 5.10.7.1-2: Synchronisation information transmission for sidelink communication or V2X sidelink communication / sidelink discovery, out of coverage

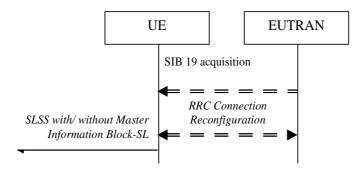


Figure 5.10.7.1-3: Synchronisation information transmission for sidelink discovery, in (partial) coverage

The purpose of this procedure is to provide synchronisation information to a UE. For sidelink discovery, the synchronisation information concerns a Sidelink Synchronisation Signal (SLSS) and, in case of PS related discovery, also timing information and some additional configuration parameters (i.e. the *MasterInformationBlock-SL* message), while for sidelink communication or V2X sidelink communication it concerns an SLSS and the *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message. A UE transmits synchronisation information either when E-UTRAN configures it to do so by dedicated signalling (i.e. network based), or when not configured by dedicated signalling (i.e. UE based) and E-UTRAN broadcasts (in coverage) or pre-configures a threshold (out of coverage).

The synchronisation information transmitted by the UE may be derived from information/ signals received from E-UTRAN (in coverage) or received from a UE acting as synchronisation reference for the transmitting UE or received from GNSS. In the remainder, the UE acting as synchronisation reference is referred to as SyncRef UE.

5.10.7.2 Initiation

A UE capable of SLSS transmission shall, when transmitting sidelink discovery announcements in accordance with 5.10.6 and when the following conditions are met:

- 1> if in coverage on the frequency used for sidelink discovery, as defined in TS 36.304 [4, 11.4]:
 - 2> if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on; or
 - 2> if networkControlledSyncTx is not configured; and syncTxThreshIC is included in SystemInformationBlockType19; and the RSRP measurement of the reference cell, selected as defined in 5.10.6b, is below the value of syncTxThreshIC:
 - 3> if the sidelink discovery announcements are not PS related; or if syncTxPeriodic is not included:
 - 4> transmit SLSS on the frequency used for sidelink discovery in accordance with 5.10.7.3 and TS 36.211 [21];
 - 3> else:
 - 4> transmit SLSS on the frequency used for sidelink discovery in accordance with 5.10.7.3 and TS 36.211 [21];
 - 4> transmit the *MasterInformationBlock-SL* message on the frequency used for sidelink discovery, in the same subframe as SLSS, and in accordance with 5.10.7.4;
- 1> else (i.e. out of coverage, PS):
 - 2> if *syncTxThreshOoC* is included in the preconfigured sidelink parameters (i.e. *SL-Preconfiguration* defined in 9.3); and the UE has not selected SyncRef UE or the S-RSRP measurement result of the selected SyncRef UE is below the value of *syncTxThreshOoC*:
 - 3> transmit SLSS on the frequency used for sidelink discovery in accordance with 5.10.7.3 and TS 36.211 [21];
 - 3> transmit the *MasterInformationBlock-SL* message on the frequency used for sidelink discovery, in the same subframe as SLSS, and in accordance with 5.10.7.4;

A UE capable of sidelink communication that is configured by upper layers to transmit sidelink communication shall, irrespective of whether or not it has data to transmit:

- 1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:
 - 2> if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on:
 - 3> transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
 - 3> transmit the *MasterInformationBlock-SL* message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

A UE shall, when transmitting sidelink communication in accordance with 5.10.4 and when the following conditions are met:

- 1> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
 - 2> if the UE is in RRC_CONNECTED; and networkControlledSyncTx is not configured; and syncTxThreshIC is included in SystemInformationBlockType18; and the RSRP measurement of the cell chosen for sidelink communication transmission is below the value of syncTxThreshIC; or
 - 2> if the UE is in RRC_IDLE; and *syncTxThreshIC* is included in *SystemInformationBlockType18*; and the RSRP measurement of the cell chosen for sidelink communication transmission is below the value of *syncTxThreshIC*:
 - 3> transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
 - 3> transmit the *MasterInformationBlock-SL* message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

- 1> else (i.e. out of coverage):
 - 2> if *syncTxThreshOoC* is included in the preconfigured sidelink parameters (i.e. *SL-Preconfiguration* defined in 9.3); and the UE has no selected SyncRef UE or the S-RSRP measurement result of the selected SyncRef UE is below the value of *syncTxThreshOoC*:
 - 3> transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
 - 3> transmit the *MasterInformationBlock-SL* message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

A UE capable of V2X sidelink communication and SLSS/PSBCH transmission shall, when transmitting non-P2X related V2X sidelink communication in accordance with 5.10.13, and if the conditions for V2X sidelink communication operation as defined in 5.10.1d are met and when the following conditions are met:

- 1> if in coverage on the frequency used for V2X sidelink communication, as defined in TS 36.304 [4, 11.4]; and has selected GNSS or the cell as synchronization reference as defined in 5.10.13.3; or
- 1> if out of coverage on the frequency used for V2X sidelink communication, as defined in TS 36.304 [4, 11.4], and the frequency used to transmit V2X sidelink communication is included in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration* or in *v2x-InterFreqInfoList* within *SystemInformationBlockType21* of the serving cell/ PCell; and has selected GNSS or the cell as synchronization reference as defined in 5.10.13.3:
 - 2> if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on; or
 - 2> if networkControlledSyncTx is not configured; and for the concerned frequency syncTxThreshIC is configured; and the RSRP measurement of the reference cell, selected as defined in 5.10.13.3, for V2X sidelink communication transmission is below the value of syncTxThreshIC:
 - 3> transmit SLSS on the frequency used for V2X sidelink communication in accordance with 5.10.7.3 and TS 36.211 [21];
 - 3> transmit the *MasterInformationBlock-SL-V2X* message on the frequency used for V2X sidelink communication, in the same subframe as SLSS, and in accordance with 5.10.7.4;

1> else:

- 2> for the frequency used for V2X sidelink communication, if *syncOffsetIndicators* is included in *SL-V2X-Preconfiguration*:
 - 3> if *syncTxThreshOoC* is included in *SL-V2X-Preconfiguration*; and the UE is not directly synchronized to GNSS, and the UE has no selected SyncRef UE or the S-RSRP measurement result of the selected SyncRef UE is below the value of *syncTxThreshOoC*; or
 - 3> if the UE selects GNSS as the synchronization reference source:
 - 4> transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
 - 4> transmit the *MasterInformationBlock-SL-V2X* message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

5.10.7.3 Transmission of SLSS

The UE shall select the SLSSID and the subframe in which to transmit SLSS as follows:

- 1> if triggered by sidelink discovery announcement and in coverage on the frequency used for sidelink discovery, as defined in TS 36.304 [4, 11.4]:
 - 2> select the SLSSID included in the entry of *discSyncConfig* included in the received *SystemInformationBlockType19*, that includes *txParameters*;
 - 2> use *syncOffsetIndicator* corresponding to the selected SLSSID;
 - 2> for each pool used for the transmission of discovery announcements (each corresponding to the selected SLSSID):

- 3> if a subframe indicated by *syncOffsetIndicator* corresponds to the first subframe of the discovery transmission pool;
 - 4> if *discTxGapConfig* is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:
 - 5> select the concerned subframe;
- 3> else
 - 4> if *discTxGapConfig* is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:
 - 5> select the subframe indicated by *syncOffsetIndicator* that precedes and which, in time domain, is nearest to the first subframe of the discovery transmission pool;
- 3> if the sidelink discovery announcements concern PS; and if syncTxPeriodic is included:
 - 4> additionally select each subframe that periodically occurs 40 subframes after the selected subframe;
- 1> if triggered by sidelink communication and in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
 - 2> select the SLSSID included in the entry of *commSyncConfig* that is included in the received *SystemInformationBlockType18* and includes *txParameters*;
 - 2> use syncOffsetIndicator corresponding to the selected SLSSID;
 - 2> if in RRC_CONNECTED; and if *networkControlledSyncTx* is configured and set to *on*:
 - 3> select the subframe(s) indicated by syncOffsetIndicator;
 - 2> else (when transmitting communication):
 - 3> select the subframe(s) indicated by *syncOffsetIndicator* within the SC period in which the UE intends to transmit sidelink control information or data:
- 1> if triggered by V2X sidelink communication and in coverage on the frequency used for V2X sidelink communication, as defined in TS 36.304 [4, 11.4]; or
- 1> if triggered by V2X sidelink communication, and out of coverage on the frequency used for V2X sidelink communication, and the concerned frequency is included in v2x-InterFreqInfoList in RRCConnectionReconfiguration or in v2x-InterFreqInfoList within SystemInformationBlockType21 of the serving cell/ PCell;
 - 2> if the UE has selected GNSS as synchronization reference in accordance with 5.10.8.2:
 - 3> select SLSSID 0;
 - 3> use *syncOffsetIndicator* included in the entry of *v2x-SyncConfig* corresponding to the concerned frequency in *v2x-InterFreqInfoList* or within *SystemInformationBlockType21*, that includes *txParameters* and *gnss-Sync*;
 - 3> select the subframe(s) indicated by syncOffsetIndicator;
 - 2> if the UE has selected a cell as synchronization reference in accordance with 5.10.8.2:
 - 3> select the SLSSID included in the entry of *v2x-SyncConfig* configured for the concerned frequency in *v2x-InterFreqInfoList* or within *SystemInformationBlockType21*, that includes *txParameters* and does not include *gnss-Sync*;
 - 3> use syncOffsetIndicator corresponding to the selected SLSSID;
 - 3> select the subframe(s) indicated by syncOffsetIndicator;
- 1> else if triggered by V2X sidelink communication and the UE has GNSS as the synchronization reference:

- 2> select SLSSID 0;
- 2> if *syncOffsetIndicator3* is configured for the frequency used for V2X sidelink communication in *SL-V2X-Preconfiguration*:
 - 3> select the subframe(s) indicated by syncOffsetIndicator3;
- 2 > else
 - 3> select the subframe(s) indicated by syncOffsetIndicator1;

1> else:

- 2> select the synchronisation reference UE (i.e. SyncRef UE) as defined in 5.10.8;
- 2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message received from this UE is set to *TRUE*; or
- 2> if the UE has a selected SyncRef UE and *inCoverage* in the *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message received from this UE is set to *FALSE* while the SLSS from this UE is part of the set defined for out of coverage, see TS 36.211 [21]:
 - 3> select the same SLSSID as the SLSSID of the selected SyncRef UE;
 - 3> select the subframe in which to transmit the SLSS according to the *syncOffsetIndicator1* or *syncOffsetIndicator2* included in the preconfigured sidelink parameters (i.e. *preconfigSync* in *SL-Preconfiguration* or *v2x-CommPreconfigSync* in *SL-V2X-Preconfiguration* defined in 9.3) corresponding to the concerned frequency, such that the subframe timing is different from the SLSS of the selected SyncRef UE;
- 2> else if the UE has a selected SyncRef UE and the SLSS from this UE was transmitted on the subframe indicated by *syncOffsetIndicator3* that is included in the *syncOffsetIndicators* in *SL-V2X-Preconfiguration*, and is corresponding to the frequency used for V2X sidelink communication:
 - 3> select SLSSID 169;
 - 3> select the subframe(s) indicated by syncOffsetIndicator2;
- 2> else if the UE has a selected SyncRef UE:
 - 3> select the SLSSID from the set defined for out of coverage having an index that is 168 more than the index of the SLSSID of the selected SyncRef UE, see TS 36.211 [21];
 - 3> select the subframe in which to transmit the SLSS according to *syncOffsetIndicator1* or *syncOffsetIndicator2* included in the preconfigured sidelink parameters (i.e. *preconfigSync* in *SL-Preconfiguration* or *v2x-CommPreconfigSync* in *SL-V2X-Preconfiguration* defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;
- 2> else (i.e. no SyncRef UE selected):
 - 3> if triggered by V2X sidelink communication, randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage except SLSSID 168 and 169, see TS 36.211 [21];
 - 3> else, randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage, see TS 36.211 [21];
 - 3> select the subframe in which to transmit the SLSS according to the *syncOffsetIndicator1* or *syncOffsetIndicator2* (arbitrary selection between these) included in the preconfigured sidelink parameters (i.e. *preconfigSync* in *SL-Preconfiguration* or *v2x-CommPreconfigSync* in *SL-V2X-Preconfiguration* defined in 9.3);

5.10.7.4 Transmission of *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message

The UE shall set the contents of the *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message as follows:

- 1> if in coverage on the frequency used for the sidelink operation that triggered this procedure as defined in TS 36.304 [4, 11.4]:
 - 2> set inCoverage to TRUE;
 - 2> set *sl-Bandwidth* to the value of *ul-Bandwidth* as included in the received *SystemInformationBlockType2* of the cell chosen for the concerned sidelink operation;
 - 2> if *tdd-Config* is included in the received *SystemInformationBlockType1*:
 - 3> set *subframeAssignmentSL* to the value representing the same meaning as of *subframeAssignment* that is included in *tdd-Config* in the received *SystemInformationBlockType1*;
 - 2> else:
 - 3> set *subframeAssignmentSL* to *none*;
 - 2> if triggered by sidelink communication; and if *syncInfoReserved* is included in an entry of *commSyncConfig* from the received *SystemInformationBlockType18*:
 - 3> set reserved to the value of syncInfoReserved in the received SystemInformationBlockType18;
 - 2> if triggered by sidelink discovery; and if *syncInfoReserved* is included in an entry of *discSyncConfig* from the received *SystemInformationBlockType19*:
 - 3> set reserved to the value of syncInfoReserved in the received SystemInformationBlockType19;
 - 2> if triggered by V2X sidelink communication; and if *syncInfoReserved* is included in an entry of *v2x-SyncConfig* from the received *SystemInformationBlockType21*:
 - 3> set reserved to the value of syncInfoReserved in the received SystemInformationBlockType21;
 - 2> else:
 - 3> set all bits in reserved to 0;
- 1> else if out of coverage on the frequency used for V2X sidelink communication as defined in TS 36.304 [4, 11.4]; and the concerned frequency is included in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration* or in *v2x-InterFreqInfoList* within *SystemInformationBlockType21* of the serving cell/ PCell:
 - 2> set inCoverage to TRUE;
 - 2> set sl-Bandwidth to the value of the corresponding field included in v2x-InterFreqInfoList;
 - 2> set *subframeAssignmentSL* and *reserved* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *v2x-CommPreconfigGeneral* in *SL-V2X-Preconfiguration* defined in 9.3);
- 1> else if out of coverage on the frequency used for V2X sidelink communication as defined in TS 36.304 [4, 11.4]; and the UE selects GNSS timing as the synchronization reference source and *syncOffsetIndicator3* is not included in *SL-V2X-Preconfiguration*:
 - 2> set inCoverage to TRUE;
 - 2> set *sl-Bandwidth*, *subframeAssignmentSL* and *reserved* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *v2x-CommPreconfigGeneral* in *SL-V2X-Preconfiguration* defined in 9.3);
- 1> else if the UE has a selected SyncRef UE (as defined in 5.10.8):
 - 2> set inCoverage to FALSE;

2> set *sl-Bandwidth*, *subframeAssignmentSL* and *reserved* to the value of the corresponding field included in the received *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X*;

1> else:

- 2> set inCoverage to FALSE;
- 2> set *sl-Bandwidth*, *subframeAssignmentSL* and *reserved* to the value of the corresponding field included in the preconfigured sidelink parameters (i.e. *preconfigGeneral* in *SL-Preconfiguration* or *v2x-CommPreconfigGeneral* in *SL-V2X-Preconfiguration* defined in 9.3);
- 1> set *directFrameNumber* and *directSubframeNumber* according to the subframe used to transmit the SLSS, as specified in 5.10.7.3;
- 1> submit the *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message to lower layers for transmission upon which the procedure ends;

5.10.7.5 Void

5.10.8 Sidelink synchronisation reference

5.10.8.1 General

The purpose of this procedure is to select a synchronisation reference and used a.o. when transmitting sidelink communication, V2X sidelink communication, sidelink discovery or synchronisation information.

5.10.8.2 Selection and reselection of synchronisation reference

The UE shall:

- 1> if triggered by V2X sidelink communication, and in coverage on the frequency for V2X sidelink communication; or
- 1> if triggered by V2X sidelink communication, and out of coverage on the frequency for V2X sidelink communication, and the frequency used to transmit V2X sidelink communication is included in v2x-InterFreqInfoList in RRCConnectionReconfiguration or in v2x-InterFreqInfoList within SystemInformationBlockType21 of the serving cell/ PCell:
 - 2> if typeTxSync is configured for the concerned frequency and set to enb:
 - 3> select a cell as the synchronization reference source as defined in 5.10.13.3;
 - 2> else if *typeTxSync* for the concerned frequency is not configured or is set to *gnss*, and GNSS is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:
 - 3> select GNSS as the synchronization reference source;
 - 2> else (i.e., there is no GNSS which is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]):
 - 3> search SLSSID=0 on the concerned frequency to detect candidate SLSS, in accordance with TS 36.133 [16];
 - 3> when evaluating the detected SLSS, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured *filterCoefficient* as defined in 9.3, before using the S-RSRP measurement results;
 - 3> if the S-RSRP of the SyncRef UE identified by the detected SLSS exceeds the minimum requirement defined in TS 36.133 [16]:
 - 4> select the SyncRef UE;
 - 3> else (i.e., no SLSSID=0 detected):
 - 4> select a cell as the synchronization reference source as defined in 5.10.13.3;

- 1> else, if triggered by V2X sidelink communication, and out of coverage on the frequency for V2X sidelink communication, and for the frequency used for V2X sidelink communication, if *syncPriority* in *SL-V2X-Preconfiguration* is set to *gnss* and GNSS is reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:
 - 2> select GNSS as the synchronization reference source;
- 1> else, for the frequency used for sidelink communication, V2X sidelink communication or sidelink discovery, if out of coverage on that frequency as defined in TS 36.304 [4, 11.4]:
 - 2> perform a full search (i.e. covering all subframes and all possible SLSSIDs) to detect candidate SLSS, in accordance with TS 36.133 [16]
 - 2> when evaluating the one or more detected SLSSIDs, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured *filterCoefficient* as defined in 9.3, before using the S-RSRP measurement results;
 - 2> if the UE has selected a SyncRef UE:
 - 3> if the S-RSRP of the strongest candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by *syncRefMinHyst* and the strongest candidate SyncRef UE belongs to the same priority group as the current SyncRef UE and the S-RSRP of the strongest candidate SyncRef UE exceeds the S-RSRP of the current SyncRef UE by *syncRefDiffHyst*; or
 - 3> if the S-RSRP of the candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by *syncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than the current SyncRef UE; or
 - 3> if GNSS becomes reliable in accordance with TS 36.101 [42] and TS 36.133 [16], and GNSS belongs to a higher priority group than the current SyncRef UE; or
 - 3> if the S-RSRP of the current SyncRef UE is less than the minimum requirement defined in TS 36.133 [16]:
 - 4> consider no SyncRef UE to be selected;
 - 2> if the UE has selected GNSS as the synchronization reference for V2X sidelink communication:
 - 3> if the S-RSRP of the candidate SyncRef UE exceeds the minimum requirement defined in TS 36.133 [16] by *syncRefMinHyst* and the candidate SyncRef UE belongs to a higher priority group than GNSS; or
 - 3> if GNSS becomes not reliable in accordance with TS 36.101 [42] and TS 36.133 [16]:
 - 4> consider GNSS not to be selected;
 - 2> if the UE has not selected a SyncRef UE and has not selected GNSS as synchronization reference source:
 - 3> if not concerning V2X sidelink communication, and if the UE detects one or more SLSSIDs for which the S-RSRP exceeds the minimum requirement defined in TS 36.133 [16] by *syncRefMinHyst* and for which the UE received the corresponding *MasterInformationBlock-SL* message (candidate SyncRef UEs), select a SyncRef UE according to the following priority group order:
 - 4> UEs of which *inCoverage*, included in the *MasterInformationBlock-SL* message received from this UE, is set to *TRUE*, starting with the UE with the highest S-RSRP result (priority group 1);
 - 4> UEs of which SLSSID is part of the set defined for in coverage, starting with the UE with the highest S-RSRP result (priority group 2);
 - 4> Other UEs, starting with the UE with the highest S-RSRP result (priority group 3);
 - 3> for V2X sidelink communication, if the UE detects one or more SLSSIDs for which the S-RSRP exceeds the minimum requirement defined in TS 36.133 [16] by *syncRefMinHyst* and for which the UE received the corresponding *MasterInformationBlock-SL-V2X* message (candidate SyncRef UEs), or if the UE detects GNSS that is reliable in accordance with TS 36.101 [42] and TS 36.133 [16], select a synchronization reference according to the following priority group order:
 - 4> if syncPriority corresponding to the concerned frequency in SL-V2X-Preconfiguration is set to enb:

- 5> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, starting with the UE with the highest S-RSRP result (priority group 1);
- 5> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 2);
- 5> GNSS that is reliable in accordance with TS 36.101 [42] and TS 36.133 [16] (priority group 3);
- 5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, or of which SLSSID is 0 and SLSS is transmitted on subframes indicated by *syncOffsetIndicator3*, starting with the UE with the highest S-RSRP result (priority group 4);
- 5> UEs of which SLSSID is 0 and is not transmitted on subframes indicated by *syncOffsetIndicator3*, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 5);
- 5> UEs of which SLSSID is 169, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 5);
- 5> Other UEs, starting with the UE with the highest S-RSRP result (priority group 6);
- 4> if syncPriority corresponding to the concerned frequency in SL-V2X-Preconfiguration is set to gnss:
 - 5> GNSS that is reliable in accordance with TS 36.101 [42] and TS 36.133 [16] (priority group 1);
 - 5> UEs of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, starting with the UE with the highest S-RSRP result (priority group 2);
 - 5> UEs of which SLSSID is 0, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *TRUE*, or of which SLSSID is 0 and SLSS is transmitted on subframes indicated by *syncOffsetIndicator3*, starting with the UE with the highest S-RSRP result (priority group 2);
 - 5> UE of which SLSSID is part of the set defined for in coverage, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 3);
 - 5> UEs of which SLSSID is 0 and is not transmitted on subframes indicated by *syncOffsetIndicator3*, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 3);
 - 5> UEs of which SLSSID is 169, and *inCoverage*, included in the *MasterInformationBlock-SL-V2X* message received from this UE, is set to *FALSE*, starting with the UE with the highest S-RSRP result (priority group 3);
 - 5> Other UEs, starting with the UE with the highest S-RSRP result (priority group 4);

5.10.9 Sidelink common control information

5.10.9.1 General

The sidelink common control information is carried by a single message, the *MasterInformationBlock-SL* (MIB-SL) message for sidelink discovery and sidelink communication or the *MasterInformationBlock-SL-V2X* (MIB-SL-V2X) message for V2X sidelink communication. The MIB-SL or MIB-SL-V2X includes timing information as well as some configuration parameters and is transmitted via SL-BCH.

The MIB-SL for sidelink discovery and sidelink communication uses a fixed schedule with a periodicity of 40 ms without repetitions. In particular, the MIB-SL is scheduled in subframes indicated by syncOffsetIndicator-r12 i.e. for which $(10*DFN + subframe number) \mod 40 = syncOffsetIndicator-r12$.

The MIB-SL-V2X for V2X sidelink communication uses a fixed schedule with a periodicity of 160 ms without repetitions. In particular, the MIB-SL-V2X is scheduled in subframes indicated by SL-OffsetIndicatorSync i.e. for which (10*DFN + subframe number) mod 160 = SL-OffsetIndicatorSync.

The sidelink common control information may change at any transmission i.e. neither a modification period nor a change notification mechanism is used.

A UE configured to receive or transmit sidelink communication or PS related sidelink discovery shall:

- 1> if the UE has a selected SyncRef UE, as specified in 5.10.8.2:
 - 2> ensure having a valid version of the *MasterInformationBlock-SL* message of that SyncRefUE;

A UE configured to receive or transmit V2X sidelink communication shall:

- 1> if the UE has a selected SyncRef UE, as specified in 5.10.8.2:
 - 2> ensure having a valid version of the *MasterInformationBlock-SL-V2X* message of that SyncRefUE;

5.10.9.2 Actions related to reception of *MasterInformationBlock-SL/MasterInformationBlock-SL-V2X* message

Upon receiving MasterInformationBlock-SL or MasterInformationBlock-SL-V2X, the UE shall:

1> apply the values of *sl-Bandwidth*, *subframeAssignmentSL*, *directFrameNumber* and *directSubframeNumber* included in the received *MasterInformationBlock-SL* or *MasterInformationBlock-SL-V2X* message;

5.10.10 Sidelink relay UE operation

5.10.10.1 General

This procedure is used by a UE supporting sidelink relay UE operation and involves evaluation of the AS-layer conditions that need to be met in order for upper layers to configure a sidelink relay UE to receive/ transmit relay related PS sidelink discovery/ relay related sidelink communication. The AS-layer conditions merely comprise of being configured with radio resources that can be used for transmission.

A UE that fulfils the criteria specified in 5.10.10.2 and 5.10.10.3 and that is configured by higher layers accordingly is acting as a sidelink relay UE.

5.10.10.2 AS-conditions for relay related sidelink communication transmission by sidelink relay UE

A UE capable of sidelink relay UE operation shall inform upper layers that it is configured with radio resources that can be used for relay related sidelink communication transmission if the following conditions are met:

1> if in RRC_CONNECTED; and if the UE is configured with *commTxResources*; and the UE is configured with *commTxAllowRelayDedicated* set to *true*;

5.10.10.3 AS-conditions for relay PS related sidelink discovery transmission by sidelink relay UE

A UE capable of sidelink relay UE operation shall inform upper layers that it is configured with radio resources that can be used for relay PS related sidelink discovery transmission if the following conditions are met:

- 1> if in RRC_IDLE; and if the UE's serving cell is suitable as defined in TS 36.304 [4]; and if SystemInformationBlockType19 includes discConfigPS including discTxPoolPS-Common and discConfigRelay; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met;
- 1> else if in RRC CONNECTED; and if discTxResourcesPS is configured;

5.10.10.4 Sidelink relay UE threshold conditions

A UE capable of sidelink relay UE operation shall:

- 1> if the threshold conditions specified in this section were not met:
 - 2> if neither threshHigh nor threshLow is included in relayUE-Config within SystemInformationBlockType19:
 - 3> consider the threshold conditions to be met (entry);
 - 2> else if *threshHigh* is not included in *relayUE-Config* within *SystemInformationBlockType19*; or the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshHigh* by *hystMax* (also included within *relayUE-Config*); and
 - 2> if *threshLow* is not included in *relayUE-Config* within *SystemInformationBlockType19*; or the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshLow* by *hystMin* (also included within *relayUE-Config*):
 - 3> consider the threshold conditions to be met (entry);

1> else:

- 2> if *threshHigh* is included in *relayUE-Config* within *SystemInformationBlockType19*; and the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshHigh* (also included within *relayUE-Config*); or
- 2> if *threshLow* is included in *relayUE-Config* within *SystemInformationBlockType19*; and the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshLow* (also included within *relayUE-Config*);
 - 3> consider the threshold conditions not to be met (leave);

5.10.11 Sidelink remote UE operation

5.10.11.1 General

This procedure is used by a UE supporting sidelink remote UE operation and involves evaluation of the AS-layer conditions that need to be met in order for upper layers to configure a sidelink remote UE to receive/ transmit relay related sidelink PS discovery/ relay related sidelink communication. The AS-layer conditions merely comprise of being configured with radio resources that can be used for transmission, as well as whether or not having a selected sidelink relay UE.

5.10.11.2 AS-conditions for relay related sidelink communication transmission by sidelink remote UE

A UE capable of sidelink remote UE operation shall inform upper layers whether it is configured with radio resources that can be used for relay related sidelink communication transmission if the following conditions are met:

- 1> if the UE is out of coverage; and is preconfigured with *SL-Preconfiguration* including *discTxPoolList* and *preconfigRelay*;
- 1> else if in RRC_IDLE; and if the UE's serving cell is suitable as defined in TS 36.304 [4]; and if SystemInformationBlockType18 includes commTxPoolNormalCommon and commTxAllowRelayCommon; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;
- 1> else if in RRC_CONNECTED; and if the UE is configured with *commTxResources*; and the UE is configured with *commTxAllowRelayDedicated* set to *true*;

5.10.11.3 AS-conditions for relay PS related sidelink discovery transmission by sidelink remote UE

A UE capable of sidelink remote UE operation shall inform upper layers whether it is configured with radio resources that can be used for relay PS related sidelink discovery transmission if the following conditions are met:

- 1> if the UE is out of coverage; and is preconfigured with *SL-Preconfiguration* including *discTxPoolList* and *preconfigRelay*;
- 1> else if in RRC_IDLE; and if the UE's serving cell is suitable as defined in TS 36.304 [4]; and if SystemInformationBlockType19 includes discConfigPS including discTxPoolPS-Common and discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;
- 1> else if in RRC_CONNECTED; and if *discTxResourcesPS* is configured;

5.10.11.4 Selection and reselection of sidelink relay UE

A UE capable of sidelink remote UE operation that is configured by upper layers to search for a sidelink relay UE shall:

- 1> if out of coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]; or
- 1> if the serving frequency is used for sidelink communication and the RSRP measurement of the cell on which the UE camps (RRC_IDLE)/ the PCell (RRC_CONNECTED) is below *threshHigh* within *remoteUE-Config*:
 - 2> search for candidate sidelink relay UEs, in accordance with TS 36.133 [16]
 - 2> when evaluating the one or more detected sidelink relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same ProSe Relay UE ID and using the *filterCoefficient* in *SystemInformationBlockType19* (in coverage) or the preconfigured *filterCoefficient* as defined in 9.3(out of coverage), before using the SD-RSRP measurement results;
- NOTE 1: The details of the interaction with upper layers are up to UE implementation.
 - 2> if the UE does not have a selected sidelink relay UE:
 - 3> select a candidate sidelink relay UE which SD-RSRP exceeds *q-RxLevMin* included in either *reselectionInfoIC* (in coverage) or *reselectionInfoOoC* (out of coverage) by *minHyst*;
 - 2> else if SD-RSRP of the currently selected sidelink relay UE is below *q-RxLevMin* included in either *reselectionInfoIC* (in coverage) or *reselectionInfoOoC* (out of coverage); orif upper layers indicate not to use the currently selected sidelink relay: (i.e. sidelink relay UE reselection):
 - 3> select a candidate sidelink relay UE which SD-RSRP exceeds *q-RxLevMin* included in either *reselectionInfoIC* (in coverage) or *reselectionInfoOoC* (out of coverage) by *minHyst*;
 - 2> else if the UE did not detect any candidate sidelink relay UE which SD-RSRP exceeds *q-RxLevMin* included in either *reselectionInfoIC* (in coverage) or *reselectionInfoOoC* (out of coverage) by *minHyst*:
 - 3> consider no sidelink relay UE to be selected;
- NOTE 2: The UE may perform sidelink relay UE reselection in a manner resulting in selection of the sidelink relay UE, amongst all candidate sidelink relay UEs meeting higher layer criteria, that has the best radio link quality. Further details, including interaction with upper layers, are up to UE implementation.

5.10.11.5 Sidelink remote UE threshold conditions

A UE capable of sidelink remote UE operation shall:

- 1> if the threshold conditions specified in this section were not met:
 - 2> if threshHigh is not included in remoteUE-Config within SystemInformationBlockType19; or
 - 2> if *threshHigh* is included in *remoteUE-Config* within *SystemInformationBlockType19*; and the RSRP measurement of the PCell, or the cell on which the UE camps, is below *threshHigh* by *hystMax* (also included within *remoteUE-Config*):

3> consider the threshold conditions to be met (entry);

1> else:

- 2> if *threshHigh* is included in *remoteUE-Config* within *SystemInformationBlockType19*; and the RSRP measurement of the PCell, or the cell on which the UE camps, is above *threshHigh* (also included within *remoteUE-Config*):
 - 3> consider the threshold conditions not to be met (leave);

5.10.12 V2X sidelink communication monitoring

A UE capable of V2X sidelink communication that is configured by upper layers to receive V2X sidelink communication shall:

- 1> if the conditions for sidelink operation as defined in 5.10.1d are met:
 - 2> if in coverage on the frequency used for V2X sidelink communication, as defined in TS 36.304 [4, 11.4]:
 - 3> if the frequency used to receive V2X sidelink communication is included in v2x-InterFreqInfoList within RRCConnectionReconfiguration or in v2x-InterFreqInfoList within SystemInformationBlockType21of the serving cell/Pcell, and v2x-CommRxPool is included in SL-V2X-InterFreqUE-Config within v2x-UE-ConfigList:
 - 4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated in *v2x-CommRxPool*;

3> else:

- 4> if the cell chosen for V2X sidelink communication reception broadcasts SystemInformationBlockType21 including v2x-CommRxPool in sl-V2X-ConfigCommon or,
- 4> if the UE is configured with v2x-CommRxPool included in mobilityControlInfoV2X in RRCConnectionReconfiguration:
 - 5> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated in *v2x-CommRxPool*;
- 2> else (i.e. out of coverage on the frequency used for V2X sidelink communication, as defined in TS 36.304 [4, 11.4]):
 - 3> if the frequency used to receive V2X sidelink communication is included in v2x-InterFreqInfoList within RRCConnectionReconfiguration or in v2x-InterFreqInfoList within SystemInformationBlockType21 of the serving cell/PCell, and v2x-CommRxPool is included in SL-V2X-InterFreqUE-Config within v2x-UE-ConfigList for the concerned frequency:
 - 4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated in *v2x-CommRxPool*;

3> else:

4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources that were preconfigured (i.e. *v2x-CommRxPoolList* in *SL-V2X-Preconfiguration* defined in 9.3);

5.10.13 V2X sidelink communication transmission

5.10.13.1 Transmission of V2X sidelink communication

A UE capable of V2X sidelink communication that is configured by upper layers to transmit V2X sidelink communication and has related data to be transmitted shall:

1> if the conditions for sidelink operation as defined in 5.10.1d are met:

- 2> if in coverage on the frequency used for V2X sidelink communication as defined in TS 36.304 [4, 11.4]; or
- 2> if the frequency used to transmit V2X sidelink communication is included in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration* or in *v2x-InterFreqInfoList* within *SystemInformationBlockType21*:
 - 3> if the UE is in RRC_CONNECTED and uses the PCell or the frequency included in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration* for V2X sidelink communication:
 - 4> if the UE is configured, by the current PCell with commTxResources set to scheduled:
 - 5> if T310 or T311 is running; and if the PCell at which the UE detected physical layer problems or radio link failure broadcasts *SystemInformationBlockType21* including *v2x-CommTxPoolExceptional* in *sl-V2X-ConfigCommon*, or *v2x-CommTxPoolExceptional* is included in *v2x-InterFreqInfoList* for the concerned frequency in *SystemInformationBlockType21* or *RRCConnectionReconfiguration*; or
 - 5> if T301 is running and the cell on which the UE initiated connection re-establishment broadcasts SystemInformationBlockType21 including v2x-CommTxPoolExceptional in sl-V2X-ConfigCommon, or v2x-CommTxPoolExceptional is included in v2x-InterFreqInfoList for the concerned frequency in SystemInformationBlockType21; or
 - 5> if T304 is running and the UE is configured with *v2x-CommTxPoolExceptional* included in *mobilityControlInfoV2X* in *RRCConnectionReconfiguration* or in *v2x-InterFreqInfoList* for the concerned frequency in *RRCConnectionReconfiguration*:
 - 6> configure lower layers to transmit the sidelink control information and the corresponding data based on random selection using the pool of resources indicated by *v2x-CommTxPoolExceptional* as defined in TS 36.321 [6];

5> else:

- 6> configure lower layers to request E-UTRAN to assign transmission resources for V2X sidelink communication:
- 4> else if the UE is configured with v2x-CommTxPoolNormalDedicated or v2x-CommTxPoolNormal in the entry of v2x-InterFreqInfoList for the concerned frequency in sl-V2X-ConfigDedicated in RRCConnectionReconfiguration and the UE is configured to transmit non-P2X related V2X sidelink communication:
 - 5> if a result of sensing on the resources configured in v2x-CommTxPoolNormalDedicated or v2x-CommTxPoolNormal in the entry of v2x-InterFreqInfoList for the concerned frequency in RRCConnectionReconfiguration is not available in accordance with TS 36.213 [23]:
 - 6> if v2x-CommTxPoolExceptional is included in mobilityControlInfoV2X in RRCConnectionReconfiguration (i.e., handover case); or
 - 6> if v2x-CommTxPoolExceptional is included in the entry of v2x-InterFreqInfoList for the concerned frequency in RRCConnectionReconfiguration; or
 - 6> if the PCell broadcasts SystemInformationBlockType21 including v2x-CommTxPoolExceptional in sl-V2X-ConfigCommon or v2x-CommTxPoolExceptional in v2x-InterFreqInfoList for the concerned frequency:
 - 7> configure lower layers to transmit the sidelink control information and the corresponding data based on random selection using the pool of resources indicated by v2x-CommTxPoolExceptional as defined in TS 36.321 [6];

5> else:

- 6> configure lower layers to transmit the sidelink control information and the corresponding data based on sensing (as defined in TS 36.321 [6] and TS 36.213 [23]) using one of the resource pools indicated by v2x-commTxPoolNormalDedicated or v2x-CommTxPoolNormal in the entry of v2x-InterFreqInfoList for the concerned frequency, which is selected according to 5.10.13.2;
- 4> else if the UE is configured with v2x-CommTxPoolNormalDedicated in sl-V2X-ConfigDedicated or p2x-CommTxPoolNormal in the entry of v2x-InterFreqInfoList for the concerned frequency in

RRCConnectionReconfiguration and the UE is configured to transmit P2X related V2X sidelink communication:

- 5> select a resource pool according to 5.10.13.2;
- 5> transmit P2X related V2X sidelink communication according to 5.10.13.1a;

3> else:

- 4> if the cell chosen for V2X sidelink communication transmission broadcasts *SystemInformationBlockType21*:
 - 5> if the UE is configured to transmit non-P2X related V2X sidelink communication, and if SystemInformationBlockType21 includes v2x-CommTxPoolNormalCommon or v2x-CommTxPoolNormal in v2x-InterFreqInfoList for the concerned frequency in sl-V2X-ConfigCommon and a result of sensing on the resources configured in v2x-CommTxPoolNormalCommon or v2x-CommTxPoolNormal in v2x-InterFreqInfoList for the concerned frequency is available in accordance with TS 36.213 [23]:
 - 6> configure lower layers to transmit the sidelink control information and the corresponding data based on sensing (as defined in TS 36.321 [6] and TS 36.213 [23]) using one of the resource pools indicated by v2x-CommTxPoolNormalCommon or v2x-CommTxPoolNormal in v2x-InterFreqInfoList for the concerned frequency, which is selected according to 5.10.13.2;
 - 5> else if the UE is configured to transmit P2X related V2X sidelink communication, and if SystemInformationBlockType21 includes p2x-CommTxPoolNormalCommon or p2x-CommTxPoolNormal in v2x-InterFreqInfoList for the concerned frequency in sl-V2X-ConfigCommon:
 - 6> select a resource pool from p2x-CommTxPoolNormalCommon or p2x-CommTxPoolNormal in v2x-InterFreqInfoList for the concerned frequency according to 5.10.13.2, but ignoring zoneConfig in SystemInformationBlockType21;
 - 6> transmit P2X related V2X sidelink communication according to 5.10.13.1a;
 - 5> else if *SystemInformationBlockType21* includes *v2x-CommTxPoolExceptional* in *sl-V2X-ConfigCommon* or *v2x-CommTxPoolExceptional* in *v2x-InterFreqInfoList* for the concerned frequency:
 - 6> from the moment the UE initiates connection establishment until receiving an RRCConnectionReconfiguration including sl-V2X-ConfigDedicated, or until receiving an RRCConnectionRelease or an RRCConnectionReject; or
 - 6> if the UE is in RRC_IDLE and a result of sensing on the resources configured in *v2x-CommTxPoolNormalCommon* or *v2x-CommTxPoolNormal* in *v2x-InterFreqInfoList* for the concerned frequency in *Systeminformationblocktype21* is not available in accordance with TS 36.213 [23]:
 - 7> configure lower layers to transmit the sidelink control information and the corresponding data based on random selection (as defined in TS 36.321 [6]) using the pool of resources indicated in *v2x-CommTxPoolExceptional*;

2> else:

3> configure lower layers to transmit the sidelink control information and the corresponding data based on sensing (as defined in TS 36.321 [6] and TS 36.213 [23]) using one of the resource pools indicated by v2x-CommTxPoolList in SL-V2X-Preconfiguration in case of non-P2X related V2X sidelink communication, which is selected according to 5.10.13.2, or using one of the resource pools indicated by p2x-CommTxPoolList in SL-V2X-Preconfiguration in case of P2X related V2X sidelink communication, which is selected according to 5.10.13.2, and in accordance with the timing of the selected reference as defined in 5.10.8;

The UE capable of non-P2X related V2X sidelink communication that is configured by upper layers to transmit V2X sidelink communication shall perform sensing on all pools of resources which may be used for transmission of the sidelink control information and the corresponding data. The pools of resources are indicated by *SL-V2X*-

Preconfiguration, v2x-CommTxPoolNormalCommon, v2x-CommTxPoolNormalDedicated in sl-V2X-ConfigDedicated, or v2x-CommTxPoolNormal in v2x-InterFreqInfoList for the concerned frequency, as configured above.

NOTE 1: If there are multiple frequencies for which normal or exceptional pools are configured, it is up to UE implementation which frequency is selected for V2X sidelink communication transmission.

5.10.13.1a Transmission of P2X related V2X sidelink communication

A UE configured to transmit P2X related V2X sidelink communication shall:

- 1> if *partialSensing* is included and *randomSelection* is not included in *resourceSelectionConfigP2X* of the pool selected; or
- 1> if both *partialSensing* and *randomSelection* are included in *resourceSelectionConfigP2X* of the pool selected, and the UE selects to use partial sensing:
 - 2> configure lower layers to transmit the sidelink control information and the corresponding data based on partial sensing (as defined in TS 36.321 [6] and TS 36.213 [23]) using the selected resource pool, if the UE supports partial sensing;
- 1> if partialSensing is not included and randomSelection is included in resourceSelectionConfigP2X of the pool selected.
 - 2> configure lower layers to transmit the sidelink control information and the corresponding data based on random selection (as defined in TS 36.321 [6] and TS 36.213 [23]) using the selected resource pool;
- 1> if both *partialSensing* and *randomSelection* is included in *resourceSelectionConfigP2X* of the pool selected, and the UE selects to use random selection:
 - 2> configure lower layers to transmit the sidelink control information and the corresponding data based on random selection using the selected resource pool and indicates to lower layers that transmissions of multiple MAC PDUs are allowed (as defined in TS 36.321 [6] and TS 36.213 [23]).

NOTE: If both *partialSensing* and *randomSelection* is included in *resourceSelectionConfigP2X* of the pool selected, the selection between partial sensing and random selection is left to UE implementation.

5.10.13.2 V2X sidelink communication transmission pool selection

For a frequency used for V2X sidelink communication, if *zoneConfig* is not ignored as specified in 5.10.13.1, the UE configured by upper layers for V2X sidelink communication shall only use the pool which corresponds to geographical coordinates of the UE, if *zoneConfig* is included in *SystemInformationBlockType21* of the serving cell (RRC_IDLE)/ PCell (RRC_CONNECTED) or in *RRCConnectionReconfiguration* for the concerned frequency, and the UE is configured to use resource pools provided by RRC signalling for the concerned frequency; or if *zoneConfig* is included in *SL-V2X-Preconfiguration* for the concerned frequency, and the UE is configured to use resource pools in *SL-V2X-Preconfiguration* for the frequency, according to 5.10.13.1. The UE shall only use the pool which is associated with the synchronization reference source selected in accordance with 5.10.8.2.

- 1> if the UE is configured to transmit on *p2x-CommTxPoolNormalCommon* or on *p2x-CommTxPoolNormal* in *v2x-InterFreqInfoList* in *SystemInformationBlockType21* according to 5.10.13.1; or
- 1> if the UE is configured to transmit on *p2x-CommTxPoolList-r14* in *SL-V2X-Preconfiguration* according to 5.10.13.1; or
- 1> if zoneConfig is not included in SystemInformationBlockType21 and the UE is configured to transmit on v2x-CommTxPoolNormalCommon or v2x-CommTxPoolNormalDedicated; or
- 1> if zoneConfig is included in SystemInformationBlockType21 and the UE is configured to transmit on v2x-CommTxPoolNormalDedicated for P2X related V2X sidelink communication and zoneID is not included in v2x-CommTxPoolNormalDedicated; or
- 1> if zoneConfig is not included in the entry of v2x-InterFreqInfoList for the concerned frequency and the UE is configured to transmit on v2x-CommTxPoolNormal in v2x-InterFreqInfoList or p2x-CommTxPoolNormal in v2x-InterFreqInfoList in RRCConnectionReconfiguration; or

- 1> if *zoneConfig* is not included in *SL-V2X-Preconfiguration* for the concerned frequency and the UE is configured to transmit on *v2x-CommTxPoolList* in *SL-V2X-Preconfiguration* for the concerned frequency:
 - 2> select the first pool associated with the synchronization reference source selected in accordance with 5.10.8.2;
- 1> if zoneConfig is included in SystemInformationBlockType21 and the UE is configured to transmit on v2x-CommTxPoolNormalCommon or v2x-CommTxPoolNormalDedicated for non-P2X related V2X sidelink communication; or
- 1> if zoneConfig is included in SystemInformationBlockType21 and the UE is configured to transmit on v2x-CommTxPoolNormalDedicated for P2X related V2X sidelink communication and zoneID is included in v2x-CommTxPoolNormalDedicated; or
- 1> if zoneConfig is included in the entry of v2x-InterFreqInfoList for the concerned frequency and the UE is configured to transmit on v2x-CommTxPoolNormal in v2x-InterFreqInfoList or p2x-CommTxPoolNormal in v2x-InterFreqInfoList in RRCConnectionReconfiguration; or
- 1> if *zoneConfig* is included in *SL-V2X-Preconfiguration* for the concerned frequency and the UE is configured to transmit on *v2x-CommTxPoolList* in *SL-V2X-Preconfiguration* for the concerned frequency:
 - 2> select the pool configured with *zoneID* equal to the zone identity determined below and associated with the synchronization reference source selected in accordance with 5.10.8.2;

The UE shall determine an identity of the zone (i.e. Zone_id) in which it is located using the following formulae, if *zoneConfig* is included in *SystemInformationBlockType21* or in *SL-V2X-Preconfiguration*:

$$x_1$$
= Floor (x / L) Mod Nx ;
 y_1 = Floor (y / W) Mod Ny ;
Zone_id = $y_1 * Nx + x_1$.

The parameters in the formulae are defined as follows:

L is the value of *zoneLength* included in *zoneConfig* in *SystemInformationBlockType21* or in *SL-V2X-Preconfiguration*;

W is the value of zoneWidth included in zoneConfig in SystemInformationBlockType21 or in SL-V2X-Preconfiguration;

Nx is the value of zoneIdLongiMod included in zoneConfig in SystemInformationBlockType21 or in SL-V2X-Preconfiguration;

Ny is the value of zoneIdLatiMod included in zoneConfig in SystemInformationBlockType21 or in SL-V2X-Preconfiguration;

x is the distance in longitude between UE's current location and geographical coordinates (0, 0) and it is expressed in meters:

y is the distance in latitude between UE's current location and geographical coordinates (0, 0) and it is expressed in meters.

The UE shall select a pool of resources which includes a *zoneID* equals to the Zone_id calculated according to above mentioned formulae and indicated by *v2x-CommTxPoolNormalDedicated*, *v2x-CommTxPoolNormalCommon*, *v2x-CommTxPoolNormal* in *v2x-InterFreqInfoList* or *p2x-CommTxPoolNormal* in *v2x-InterFreqInfoList* in *RRCConnectionReconfiguration*, or *v2x-CommTxPoolList* according to 5.10.13.1.

NOTE 1: The UE uses its latest geographical coordinates to perform resource pool selection.

5.10.13.3 V2X sidelink communication transmission reference cell selection

A UE capable of V2X sidelink communication that is configured by upper layers to transmit V2X sidelink communication shall:

- 1> for each frequency used to transmit V2X sidelink communication, select a cell to be used as reference for synchronisation and DL measurements in accordance with the following:
 - 2> if the frequency concerns the primary frequency:
 - 3> use the PCell (RRC_CONNECTED) or the serving cell (RRC_IDLE) as reference;
 - 2> else if the frequency concerns a secondary frequency:
 - 3> use the concerned SCell as reference;
 - 2> else if the UE is in coverage of the concerned frequency:
 - 3> use the DL frequency paired with the one used to transmit V2X sidelink communication as reference;
 - 2> else (i.e., out of coverage on the concerned frequency):
 - 3> use the PCell (RRC_CONNECTED) or the serving cell (RRC_IDLE) as reference, if needed;

5.10.14 DFN derivation from GNSS

When the UE selects GNSS as the synchronization reference source, the DFN used for V2X sidelink communication is derived from the current UTC time, by the following formulae:

DFN= Floor (0.1*(Tcurrent -Tref-offsetDFN)) mod 1024

SubframeNumber= Floor (Tcurrent -Tref-offsetDFN) mod 10

Where:

Tcurrent is the current UTC time that obtained from GNSS. This value is expressed in milliseconds;

Tref is the reference UTC time 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Thursday, December 31, 1899 and Friday, January 1, 1900). This value is expressed in milliseconds;

OffsetDFN is the value offsetDFN if configured, otherwise it is zero. This value is expressed in milliseconds.

NOTE: In case of leap second change event, how V2X UE obtains the scheduled time of leap second change to adjust *Tcurrent* correspondingly is left to UE implementation. How V2X UE handles the sudden discontinuity of DFN is left to UE implementation.

6 Protocol data units, formats and parameters (tabular & ASN.1)

6.1 General

The contents of each RRC message is specified in sub-clause 6.2 using ASN.1 to specify the message syntax and using tables when needed to provide further detailed information about the fields specified in the message syntax. The syntax of the information elements that are defined as stand-alone abstract types is further specified in a similar manner in sub-clause 6.3.

The need for fields to be present in a message or an abstract type, i.e., the ASN.1 fields that are specified as OPTIONAL in the abstract notation (ASN.1), is specified by means of comment text tags attached to the OPTIONAL statement in the abstract syntax. All comment text tags are available for use in the downlink direction only. The meaning of each tag is specified in table 6.1-1.

Table 6.1-1: Meaning of abbreviations used to specify the need for fields to be present

Abbreviation	Meaning
Cond conditionTag	Conditionally present
(Used in downlink only)	A field for which the need is specified by means of conditions. For each <i>conditionTag</i> , the need is specified in a tabular form following the ASN.1 segment. In case, according to the conditions, a field is not present, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality) unless explicitly stated otherwise (e.g. in the conditional presence table or in the description of the field itself).
Need OP	Optionally present
(Used in downlink only)	A field that is optional to signal. For downlink messages, the UE is not required to take any special action on absence of the field beyond what is specified in the procedural text or the field description table following the ASN.1 segment. The UE behaviour on absence should be captured either in the procedural text or in the field description.
Need ON	Optionally present, No action
(Used in downlink only)	A field that is optional to signal. If the message is received by the UE, and in case the field is absent, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality).
Need OR	Optionally present, Release
(Used in downlink only)	A field that is optional to signal. If the message is received by the UE, and in case the field is absent, the UE shall discontinue/ stop using/ delete any existing value (and/ or the associated functionality).

Any field with Need ON in system information shall be interpreted as Need OR.

Need codes may not be specified for a parent extension field/ extension group, used in downlink, which includes one or more child extension fields. Upon absence of such a parent extension field/ extension group, the UE shall:

- For each individual child extension field, including extensions that are mandatory to include in the optional group, act in accordance with the need code that is defined for the extension;
- Apply this behaviour not only for child extension fields included directly within the optional parent extension field/ extension group, but also for extension fields defined at further nesting levels as long as for none of the fields in-between the concerned extension field and the parent extension field a need code is specified;

NOTE 1: The above applies for groups of non critical extensions using double brackets (referred to as extension groups), as well as non-critical extensions at the end of a message or at the end of a structure contained in a BIT STRING or OCTET STRING (referred to as parent extension fields).

Need codes, conditions and ASN.1 defaults specified for a particular (child) field only apply in case the (parent) field including the particular field is present. This rule does not apply for optional parent extension fields/ extension groups without need codes.

NOTE 2: The previous rule implies that E-UTRAN has to include such a parent extension field to release a child field that is either:

- Optional with need OR, or
- Conditional while the UE releases the child field when absent.

The handling of need codes as specified in the previous is illustrated by means of an example, as shown in the following ASN.1.

```
field3
                                       InformationElement3
                                                                    OPTIONAL,
                                                                               -- Need ON
                                                                    OPTIONAL
   nonCriticalExtension
                                       RRCMessage-v940-IEs
}
RRCMessage-v940-IEs ::=
                                    SEQUENCE {
                                       InformationElement4
                                                                   OPTIONAL,
   field4
                                                                               -- Need OR
   nonCriticalExtension
                                       SEQUENCE {}
                                                                    OPTIONAL
InformationElement1 ::=
                            SEQUENCE {
   field11
                                   InformationElement11
                                                                   OPTIONAL,
                                                                               -- Need ON
                                                                    OPTIONAL,
   field12
                                   InformationElement12
                                                                              -- Need OR
                                       InformationElement13
   [[ field13
                                                                   OPTIONAL,
                                                                              -- Need OR
       field14
                                       InformationElement14
                                                                    OPTIONAL
                                                                               -- Need ON
}
field21
                                   InformationElement11
                                                                    OPTIONAL,
                                                                               -- Need OR
-- ASN1STOP
```

The handling of need codes as specified in the previous implies that:

- if field2 in RRCMessage-r8-IEs is absent, the UE does not modify field21;
- if field2 in RRCMessage-r8-IEs is present but does not include field21, the UE releases field21;
- if the extension group containing field13 is absent, the UE releases field13 and does not modify field14;
- if nonCriticalExtension defined by IE RRCMessage-v8a0-IEs is absent, the UE does not modify field3 and releases field4;

In the ASN.1 of this specification, the first bit of a bit string refers to the leftmost bit, unless stated otherwise.

6.2 RRC messages

NOTE: The messages included in this section reflect the current status of the discussions. Additional messages may be included at a later stage.

6.2.1 General message structure

EUTRA-RRC-Definitions

This ASN.1 segment is the start of the E-UTRA RRC PDU definitions.

```
-- ASN1START

EUTRA-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN
-- ASN1STOP
```


The *BCCH-BCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE via BCH on the BCCH logical channel.

```
BCCH-BCH-MessageType ::= MasterInformationBlock
-- ASN1STOP
```

BCCH-BCH-Message-MBMS

The *BCCH-BCH-Message-MBMS* class is the set of RRC messages that may be sent from the E-UTRAN to the UE via BCH on the BCCH logical channel in an MBMS-dedicated cell.

BCCH-DL-SCH-Message

The *BCCH-DL-SCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel.

BCCH-DL-SCH-Message-BR

The *BCCH-DL-SCH-Message-BR* class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BR-BCCH logical channel.

BCCH-DL-SCH-Message-MBMS

The BCCH-DL-SCH-Message-MBMS class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel in an MBMS-dedicated cell.

- MCCH-Message

The *MCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the MCCH logical channel.

```
-- ASN1START
MCCH-Message ::=
                    SEQUENCE {
                         MCCH-MessageType
   message
MCCH-MessageType ::= CHOICE {
                             CHOICE {
       mbsfnAreaConfiguration-r9 MBSFNAreaConfiguration-r9
                    CHOICE {
   later
                                     CHOICE {
       c2
          mbmsCountingRequest-r10
                                       MBMSCountingRequest-r10
       messageClassExtension    SEQUENCE {}
-- ASN1STOP
```

PCCH-Message

The *PCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

DL-CCCH-Message

The *DL-CCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.

```
-- ASN1START

DL-CCCH-Message ::= SEQUENCE {
```

- DL-DCCH-Message

The *DL-DCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE or from the E-UTRAN to the RN on the downlink DCCH logical channel.

```
-- ASN1START
{\tt DL-DCCH-Message} \; ::= \; {\tt SEQUENCE} \; \; \{ \;
                                                                                                                                         DL-DCCH-MessageType
DL-DCCH-MessageType ::= CHOICE {
                                                                                                                                    CHOICE {
                                       csfbParametersResponseCDMA2000 CSFBParametersResponseCDMA2000,
dlInformationTransfer DLInformationTransfer,
handoverFromEUTRAPreparationRequest HandoverFromEUTRAPreparationRequest,
mobilityFromEUTRACommand,
DRAGGER ARTICLE PROPERTY OF THE PROPERTY OF THE
                                          rrcConnectionReconfiguration
                                                                                                                                                                                                                                                         RRCConnectionReconfiguration,
                                         rrcConnectionRelease
                                                                                                                                                                                                                                                   RRCConnectionRelease,
                                          securityModeCommand
                                                                                                                                                                                                                                                          SecurityModeCommand,
                                                                                                                                                                                                                                                     UECapabilityEnquiry,

      ueCapabilityEnquiry
      CounterCheck,

      counterCheck
      UEInformationRequest-r9,

      loggedMeasurementConfiguration-r10
      LoggedMeasurementConfiguration-r10,

      RNReconfiguration-r10,
      RNReconfiguration-r13,

                                          spare3 NULL, spare2 NULL, spare1 NULL
                    messageClassExtension SEQUENCE {}
-- ASN1STOP
```

UL-CCCH-Message

The *UL-CCCH-Message* class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink CCCH logical channel.

-- ASN1STOP

UL-DCCH-Message

The *UL-DCCH-Message* class is the set of RRC messages that may be sent from the UE to the E-UTRAN or from the RN to the E-UTRAN on the uplink DCCH logical channel.

```
-- ASN1START
UL-DCCH-Message ::= SEQUENCE {
                     UL-DCCH-MessageType
    message
UL-DCCH-MessageType ::= CHOICE {
                              CHOICE {
         csfbParametersRequestCDMA2000
                                                          CSFBParametersRequestCDMA2000,
         measurementReport
                                                          MeasurementReport,
        rrcConnectionReconfigurationComplete RRCConnectionReconfigurationComplete, rrcConnectionReestablishmentComplete RRCConnectionReestablishmentComplete,
        rrcConnectionReestablishmentComplete RRCConnectionReestablis rrcConnectionSetupComplete RRCConnectionSetupComplete,
         securityModeComplete
                                                       SecurityModeComplete,
         securityModeFailure
                                                     SecurityModeFailure,
         ueCapabilityInformation
                                                     UECapabilityInformation,
         ulHandoverPreparationTransfer
                                                          ULHandoverPreparationTransfer,
         ulInformationTransfer
                                                          ULInformationTransfer,
         counterCheckResponse
                                                          CounterCheckResponse,
         ueInformationResponse-r9
                                                          UEInformationResponse-r9,
                                                     ProximityIndication-r9,
         proximityIndication-r9
         rnReconfigurationComplete-r10
                                                         RNReconfigurationComplete-r10,
         mbmsCountingResponse-r10
                                                          MBMSCountingResponse-r10,
         interFreqRSTDMeasurementIndication-r10 InterFreqRSTDMeasurementIndication-r10
    messageClassExtension CHOICE {
                                        CHOICE {
             ueAssistanceInformation-r11
                                                     UEAssistanceInformation-r11,
             inDeviceCoexIndication-rll
                                                      InDeviceCoexIndication-r11,
             mbmsInterestIndication-r11
                                                    MBMSInterestIndication-r11,
             scgFailureInformation-r12
                                                     SCGFailureInformation-r12,
             sidelinkUEInformation-r12
                                                          SidelinkUEInformation-r12,
             \begin{tabular}{lll} wlanConnectionStatusReport-r13 & WLANConnectionStatusReport-r13, \\ rrcConnectionResumeComplete-r13 & RRCConnectionResumeComplete-r13, \\ \end{tabular}
             spare9 NULL, spare8 NULL, spare7 NULL,
             spare6 NULL, spare5 NULL, spare4 NULL,
             spare3 NULL, spare2 NULL, spare1 NULL
         },
         messageClassExtensionFuture-r11 SEQUENCE {}
}
-- ASN1STOP
```

SC-MCCH-Message

The *SC-MCCH-Message* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the SC-MCCH logical channel.

```
messageClassExtensionFuture-r14 SEQUENCE {}
}
-- ASN1STOP
```

6.2.2 Message definitions

CounterCheck

The *CounterCheck* message is used by the E-UTRAN to indicate the current COUNT MSB values associated to each DRB and to request the UE to compare these to its COUNT MSB values and to report the comparison results to E-UTRAN.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

CounterCheck message

```
-- ASN1START
CounterCheck ::=
                          SEQUENCE {
   rrc-TransactionIdentifier
                                      RRC-TransactionIdentifier.
   criticalExtensions
                                      CHOICE {
                                          CHOICE {
       c1
           counterCheck-r8
                                              CounterCheck-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                          SEQUENCE {}
   }
}
CounterCheck-r8-IEs ::= SEQUENCE {
   drb-CountMSB-InfoList
                                     DRB-CountMSB-InfoList,
   nonCriticalExtension
                                      CounterCheck-v8a0-IEs
                                                                         OPTIONAL
CounterCheck-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                      OCTET STRING
                                                                          OPTIONAL,
   nonCriticalExtension
                                      SEQUENCE {}
DRB-CountMSB-InfoList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-CountMSB-Info
DRB-CountMSB-Info ::= SEQUENCE {
   drb-Identity
                                  DRB-Identity,
   countMSB-Uplink
                                  INTEGER(0..33554431),
   countMSB-Downlink
                                  INTEGER(0..33554431)
-- ASN1STOP
```

CounterCheck field descriptions

count-MSB-Downlink

Indicates the value of 25 MSBs from downlink COUNT associated to this DRB.

count-MSB-Uplink

Indicates the value of 25 MSBs from uplink COUNT associated to this DRB.

drb-CountMSB-InfoList

Indicates the MSBs of the COUNT values of the DRBs.

CounterCheckResponse

The CounterCheckResponse message is used by the UE to respond to a CounterCheck message.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

CounterCheckResponse message

```
-- ASN1START
   nterCheckResponse ::=
rrc-TransactionIdentifier
CounterCheckResponse ::=
                                  SEQUENCE {
                                RRC-TransactionIdentifier,
CHOICE {
   criticalExtensions
       counterCheckResponse-r8
       criticalExtensionsFuture
                                         CounterCheckResponse-r8-IEs,
                                         SEQUENCE {}
CounterCheckResponse-r8-IEs ::= SEQUENCE {
   drb-CountInfoList DRB-CountInfoList,
   nonCriticalExtension
                                     CounterCheckResponse-v8a0-IEs
                                                                      OPTIONAL
CounterCheckResponse-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
                                                                        OPTIONAL,
   nonCriticalExtension
                                     SEQUENCE {}
                                                                        OPTIONAL
DRB-CountInfoList ::=
                             SEQUENCE (SIZE (0..maxDRB)) OF DRB-CountInfo
DRB-Countinfo ::= SEQUENCE {
   drb-Identity
                                  DRB-Identity,
                                 INTEGER(0..4294967295),
   count-Uplink
   count-Downlink
                                 INTEGER(0..4294967295)
-- ASN1STOP
```

CounterCheckResponse field descriptions

count-Downlink

Indicates the value of downlink COUNT associated to this DRB.

count-Uplink

Indicates the value of uplink COUNT associated to this DRB.

drb-CountInfoList

Indicates the COUNT values of the DRBs.

– CSFBParametersRequestCDMA2000

The *CSFBParametersRequestCDMA2000* message is used by the UE to obtain the CDMA2000 1xRTT Parameters from the network. The UE needs these parameters to generate the CDMA2000 1xRTT Registration message used to register with the CDMA2000 1xRTT Network which is required to support CSFB to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

CSFBParametersRequestCDMA2000 message

```
CSFBParametersRequestCDMA2000 ::= SEQUENCE {
   criticalExtensions
                            CHOICE {
      criticalExtensionsFuture
                                    SEQUENCE { }
CSFBParametersRequestCDMA2000-r8-IEs ::= SEQUENCE {
   nonCriticalExtension
                                CSFBParametersRequestCDMA2000-v8a0-IEs OPTIONAL
CSFBParametersRequestCDMA2000-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                OCTET STRING
                                                              OPTIONAL,
   nonCriticalExtension
                                SEQUENCE {}
                                                              OPTIONAL
-- ASN1STOP
```

CSFBParametersResponseCDMA2000

The *CSFBParametersResponseCDMA2000* message is used to provide the CDMA2000 1xRTT Parameters to the UE so the UE can register with the CDMA2000 1xRTT Network to support CSFB to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

```
CSFBParametersResponseCDMA2000 message
-- ASN1START
CSFBParametersResponseCDMA2000 ::= SEQUENCE {
   rrc-TransactionIdentifier RRC-TransactionIdentifier,
                                        CHOICE {
    criticalExtensions
       csfbParametersResponseCDMA2000-r8
                                               CSFBParametersResponseCDMA2000-r8-IEs,
        criticalExtensionsFuture
                                               SEQUENCE {}
    }
}
CSFBParametersResponseCDMA2000-r8-IEs ::= SEQUENCE
   mobilityParameters
                                       RAND-CDMA2000,
                                       MobilityParametersCDMA2000,
   nonCriticalExtension
                                       CSFBParametersResponseCDMA2000-v8a0-IEs OPTIONAL
CSFBParametersResponseCDMA2000-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
nonCriticalExtension SEQUENCE {}
                                                                           OPTIONAL,
   nonCriticalExtension
                                       SEQUENCE {}
                                                                           OPTIONAL
-- ASN1STOP
```

DLInformationTransfer

The DLInformationTransfer message is used for the downlink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet. If SRB2 is suspended, E-UTRAN does not send this message until SRB2 is resumed.)

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

DLInformationTransfer message

```
-- ASN1START
                                     SEQUENCE {
DLInformationTransfer ::=
    rrc-TransactionIdentifier
                                        RRC-TransactionIdentifier,
    criticalExtensions
                                        CHOICE {
                                             CHOICE {
            dlInformationTransfer-r8
                                                 DLInformationTransfer-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                             SEQUENCE {}
}
DLInformationTransfer-r8-IEs ::=
                                   SEQUENCE {
                                   CHOICE {
   dedicatedInfoType
       dedicatedInfoCDMA2000-1XRTT DedicatedInfoCDMA dedicatedInfoCDMA2000-HRPD DedicatedInfoCDMA
                                             DedicatedInfoCDMA2000,
                                           DedicatedInfoCDMA2000
    nonCriticalExtension
                                       DLInformationTransfer-v8a0-IEs
                                                                              OPTIONAL
DLInformationTransfer-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension
                                        OCTET STRING
                                                                              OPTIONAL.
    nonCriticalExtension
                                         SEQUENCE {}
                                                                              OPTIONAL
-- ASN1STOP
```

HandoverFromEUTRAPreparationRequest (CDMA2000)

The *HandoverFromEUTRAPreparationRequest* message is used to trigger the handover preparation procedure with a CDMA2000 RAT. This message is also used to trigger a tunneled preparation procedure with a CDMA2000 1xRTT RAT to obtain traffic channel resources for the enhanced CS fallback to CDMA2000 1xRTT, which may also involve a concurrent preparation for handover to CDMA2000 HRPD. Also, this message is used to trigger the dual Rx/Tx redirection procedure with a CDMA2000 1xRTT RAT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

HandoverFromEUTRAPreparationRequest message

```
-- ASN1START
HandoverFromEUTRAPreparationRequest ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions
                                            CHOICE {
                                                 CHOICE {
        c1
             hand over {\tt From EUTRAP reparation Request-r8}
                                                      HandoverFromEUTRAPreparationRequest-r8-IEs,
             spare3 NULL, spare2 NULL, spare1 NULL
         \verb|criticalExtensionsFuture| \\
                                                 SEQUENCE {}
}
{\tt HandoverFromEUTRAPreparationRequest-r8-IEs} \ ::= \ {\tt SEQUENCE} \ \{
    cdma2000-Type
                                        CDMA2000-Type,
                                                                        OPTIONAL, -- Cond cdma2000-Type
OPTIONAL, -- Cond cdma2000-Type
                                       RAND-CDMA2000
                                        MobilityParametersCDMA2000 OPTIONAL,
    mobilityParameters
                                       HandoverFromEUTRAPreparationRequest-v890-IEs
    nonCriticalExtension
HandoverFromEUTRAPreparationRequest-v890-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension HandoverFromEUTRAPreparationRequest-v920-IEs
    nonCriticalExtension
                                                                                               OPTIONAL
```

```
}
HandoverFromEUTRAPreparationRequest-v920-IEs ::= SEQUENCE {
                                                                        -- Cond cdma2000-Type
    concurrPrepCDMA2000-HRPD-r9 BOOLEAN
                                                             OPTIONAL,
    nonCriticalExtension
                                    HandoverFromEUTRAPreparationRequest-v1020-IEs
HandoverFromEUTRAPreparationRequest-v1020-IEs ::= SEQUENCE {
    redirectCarrierCDMA2000-1XRTT-r10 CarrierFreaCDMA2000
nonCriticalExtension
                                                                 OPTIONAL,
                                                                             -- Cond cdma2000-1XRTT
                                       CarrierFreqCDMA2000
                                                                 OPTIONAL,
                                                                             -- Cond dualRxTxRedirect
   nonCriticalExtension
                                                                 OPTIONAL
-- ASN1STOP
```

HandoverFromEUTRAPreparationRequest field descriptions concurrPrepCDMA2000-HRPD Value TRUE indicates that upper layers should initiate concurrent preparation for handover to CDMA2000 HRPD in addition to preparation for enhanced CS fallback to CDMA2000 1xRTT. dualRxTxRedirectIndicator Value TRUE indicates that the second radio of the dual Rx/Tx UE is being redirected to CDMA2000 1xRTT [51]. redirectCarrierCDMA2000-1XRTT Used to indicate the CDMA2000 1xRTT carrier frequency where the UE is being redirected to.

Conditional presence	Explanation
cdma2000-1XRTT	The field is optionally present, need ON, if the <i>cdma2000-Type</i> = <i>type1XRTT</i> ; otherwise it
	is not present.
cdma2000-Type	The field is mandatory present if the <i>cdma2000-Type</i> = <i>type1XRTT</i> ; otherwise it is not
	present.
dualRxTxRedirect	The field is optionally present, need ON, if dualRxTxRedirectIndicator is present;
	otherwise it is not present.

InDeviceCoexIndication

The *InDeviceCoexIndication* message is used to inform E-UTRAN about IDC problems which can not be solved by the UE itself, as well as to provide information that may assist E-UTRAN when resolving these problems.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

InDeviceCoexIndication message

```
-- ASN1START
InDeviceCoexIndication-r11 ::=
                                   SEQUENCE {
                                      CHOICE {
   criticalExtensions
                                          CHOICE {
       c1
            inDeviceCoexIndication-r11
                                                   InDeviceCoexIndication-r11-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
                                          SEQUENCE {}
       criticalExtensionsFuture
}
InDeviceCoexIndication-r11-IEs ::= SEQUENCE {
   affectedCarrierFreqList-r11 AffectedCarrierFreqList-r11
                                                                                 OPTIONAL,
   tdm-AssistanceInfo-r11
                                      TDM-AssistanceInfo-r11
                                                                                 OPTIONAL,
   lateNonCriticalExtension
                                      OCTET STRING
                                                                                 OPTIONAL,
                                      InDeviceCoexIndication-v11d0-IEs
   nonCriticalExtension
                                                                                 OPTIONAL
InDeviceCoexIndication-v11d0-IEs ::=
                                      SEQUENCE {
   ul-CA-AssistanceInfo-r11
                                      SEQUENCE {
```

```
affectedCarrierFreqCombList-r11 AffectedCarrierFreqCombList-r11
                                                                                OPTIONAL,
        victimSystemType-r11
                                            VictimSystemType-r11
                                                                                 OPTIONAL,
   nonCriticalExtension
                                        InDeviceCoexIndication-v1310-IEs
    OPTIONAL
}
InDeviceCoexIndication-v1310-IEs ::= SEQUENCE {
    affectedCarrierFreqList-v1310 AffectedCarrierFreqList-v1310 OPTIONAL, affectedCarrierFreqCombList-r13 AffectedCarrierFreqCombList-r13 OPTIONAL,
   nonCriticalExtension
                                            InDeviceCoexIndication-v1360-IEs
InDeviceCoexIndication-v1360-IEs ::=
                                       SEQUENCE {
    hardwareSharingProblem-r13 ENUMERATED {true}
                                                                             OPTIONAL,
   nonCriticalExtension
                                        SEQUENCE {}
                                                                             OPTIONAL
AffectedCarrierFreqList-r11 ::= SEQUENCE (SIZE (1..maxFreqIDC-r11)) OF AffectedCarrierFreq-r11
AffectedCarrierFreqList-v1310 ::= SEQUENCE (SIZE (1..maxFreqIDC-r11)) OF AffectedCarrierFreq-v1310
AffectedCarrierFreq-rl1 ::= SEQUENCE {
    carrierFreq-r11
                                MeasObjectId,
    interferenceDirection-r11     ENUMERATED {eutra, other, both, spare}
}
AffectedCarrierFreq-v1310 ::= SEQUENCE {
   carrierFreg-v1310
                                    MeasObjectId-v1310
                                                                                     OPTIONAL
AffectedCarrierFreqCombList-r11 ::= SEQUENCE (SIZE (1..maxCombIDC-r11)) OF AffectedCarrierFreqComb-
AffectedCarrierFreqCombList-r13 ::= SEQUENCE (SIZE (1..maxCombIDC-r11)) OF AffectedCarrierFreqComb-
AffectedCarrierFreqComb-r11 ::= SEQUENCE (SIZE (2..maxServCell-r10)) OF MeasObjectId
AffectedCarrierFreqComb-r13 ::= SEQUENCE (SIZE (2..maxServCell-r13)) OF MeasObjectId-r13
TDM-AssistanceInfo-r11 ::= CHOICE {
                                        SEQUENCE {
   drx-AssistanceInfo-r11
                                            ENUMERATED {sf40, sf64, sf80, sf128, sf160,
        drx-CycleLength-r11
                                                 sf256, spare2, spare1},
       drx-Offset-r11
                                             INTEGER (0..255)
                                                                OPTIONAL,
                                             ENUMERATED {sf20, sf30, sf40, sf60, sf80,
       drx-ActiveTime-r11
                                                  sf100, spare2, spare1}
    idc-SubframePatternList-rll IDC-SubframePatternList-rll,
}
IDC-SubframePatternList-r11 ::= SEQUENCE (SIZE (1..maxSubframePatternIDC-r11)) OF IDC-
SubframePattern-r11
IDC-SubframePattern-r11 ::= CHOICE {
    subframePatternFDD-r11
                                        BIT STRING (SIZE (4)),
                                        CHOICE {
    subframePatternTDD-r11
        subframeConfig0-r11
                                           BIT STRING (SIZE (70)),
       subframeConfig0-r11
subframeConfig1-5-r11
                                            BIT STRING (SIZE (10)),
        subframeConfig6-r11
                                            BIT STRING (SIZE (60))
    },
}
VictimSystemType-r11 ::= SEQUENCE {
                                        ENUMERATED {true}
                                                                         OPTIONAL,
   qps-r11
                                        ENUMERATED {true}
    glonass-r11
                                                                         OPTIONAL.
   bds-r11
                                        ENUMERATED
                                                    {true}
                                                                         OPTIONAL,
   galileo-r11
                                        ENUMERATED {true}
                                                                        OPTIONAL,
    wlan-r11
                                        ENUMERATED
                                                    {true}
                                                                         OPTIONAL,
   bluetooth-r11
                                        ENUMERATED {true}
                                                                         OPTIONAL
}
-- ASN1STOP
```

InDeviceCoexIndication field descriptions

AffectedCarrierFreq

If carrierFreq-v1310 is included, carrierFreq-r11 is ignored by eNB.

affectedCarrierFreqCombList

Indicates a list of E-UTRA carrier frequencies that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from E-UTRA when configured with UL CA. *affectedCarrierFreqCombList-r13* is used when more than 5 serving cells are configured or affected combinations contain *MeasObjectId* larger than 32. If *affectedCarrierFreqCombList-r13* is included, *affectedCarrierFreqCombList-r11* shall not be included.

affectedCarrierFreqList

List of E-UTRAN includes affected by IDC problems. If E-UTRAN includes affectedCarrierFreqList-v1310 it includes the same number of entries, and listed in the same order, as in affectedCarrierFreqList-r11.

drx-ActiveTime

Indicates the desired active time that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf20 corresponds to 20 subframes, sf30 corresponds to 30 subframes and so on.

drx-CycleLength

Indicates the desired DRX cycle length that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf64 corresponds to 64 subframes and so on.

drx-Offset

Indicates the desired DRX starting offset that the E-UTRAN is recommended to configure. The UE shall set the value of drx-Offset smaller than the value of drx-CycleLength. The starting frame and subframe satisfy the relation: [(SFN * 10) + subframe number] modulo (drx-CycleLength) = drx-Offset.

hardwareSharingProblem

Indicates whether the UE has hardware sharing problems that the UE cannot solve by itself. The field is present (i.e. value *true*), if the UE has such hardware sharing problems. Otherwise the field is absent.

idc-SubframePatternList

A list of one or more subframe patterns indicating which HARQ process E-UTRAN is requested to abstain from using. Value 0 indicates that E-UTRAN is requested to abstain from using the subframe. For FDD, the radio frame in which the pattern starts (i.e. the radio frame in which the first/leftmost bit of the *subframePatternFDD* corresponds to subframe #0) occurs when SFN mod 2 = 0. For TDD, the first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. The UE shall indicate a subframe pattern that follows HARQ time line, as specified in TS 36.213 [23], i.e, if a subframe is set to 1 in the subframe pattern, also the corresponding subframes carrying the potential UL grant [23, 8.0], the UL HARQ retransmission [23, 8.0] and the DL/UL HARQ feedback [23, 7.3, 8.3 and 9.1.2] shall be set to 1.

interferenceDirection

Indicates the direction of IDC interference. Value *eutra* indicates that only E-UTRA is victim of IDC interference, value *other* indicates that only another radio is victim of IDC interference and value *both* indicates that both E-UTRA and another radio are victims of IDC interference. The other radio refers to either the ISM radio or GNSS (see 3GPP TR 36.816 [63]).

victimSystemType

Indicate the list of victim system types to which IDC interference is caused from E-UTRA when configured with UL CA. Value *gps*, *glonass*, *bds* and *galileo* indicates the type of GNSS. Value *wlan* indicates WLAN and value *bluetooth* indicates Bluetooth.

InterFreqRSTDMeasurementIndication

The *InterFreqRSTDMeasurementIndication* message is used to indicate that the UE is going to either start or stop OTDOA inter-frequency RSTD measurement which requires measurement gaps as specified in TS 36.133 [16, 8.1.2.6]. The *InterFreqRSTDMeasurementIndication* message is also used to indicate to the network that the UE is going to start/stop OTDOA intra-frequency RSTD measurements which require measurement gaps.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

InterFreqRSTDMeasurementIndication message

```
-- ASN1START

InterFreqRSTDMeasurementIndication-r10 ::= SEQUENCE {
    criticalExtensions CHOICE {
        c1 CHOICE {
        interFreqRSTDMeasurementIndication-r10 InterFreqRSTDMeasurementIndication-r10-IEs,
        spare3 NULL, spare2 NULL, spare1 NULL
```

```
criticalExtensionsFuture
                                             SEQUENCE { }
}
InterFreqRSTDMeasurementIndication-r10-IEs ::=
    rstd-InterFreqIndication-r10
                                        CHOICE {
                                             SEOUENCE {
        start
            rstd-InterFreqInfoList-r10
                                                     RSTD-InterFreqInfoList-r10
                                             NULL
        stop
    lateNonCriticalExtension
                                         OCTET STRING
                                                                              OPTIONAL.
    nonCriticalExtension
                                         SEQUENCE {}
                                                                              OPTIONAL
RSTD-InterFreqInfoList-r10 ::= SEQUENCE (SIZE(1..maxRSTD-Freq-r10)) OF RSTD-InterFreqInfo-r10
RSTD-InterFreqInfo-r10 ::=
                                SEQUENCE {
    carrierFreq-r10
                                    ARFCN-ValueEUTRA,
    measPRS-Offset-r10
                                    INTEGER (0..39),
        carrierFreq-v1090
                                    ARFCN-ValueEUTRA-v9e0
                                                                          OPTIONAL
-- ASN1STOP
```

InterFreqRSTDMeasurementIndication field descriptions

carrierFred

The EARFCN value of the carrier received from upper layers for which the UE needs to perform the inter-frequency RSTD measurements. If the UE includes *carrierFreq-v1090*, it shall set *carrierFreq-r10* to *maxEARFCN*. In case the UE starts intra-frequency RSTD measurements the *carrierFreq* indicates the carrier frequency of the serving cell.

measPRS-Offset

Indicates the requested gap offset for performing inter-frequency or intra-frequency RSTD measurements. It is the smallest subframe offset from the beginning of subframe 0 of SFN=0 of the serving cell of the requested gap for measuring PRS positioning occasions in the carrier frequency *carrierFreq* for which the UE needs to perform the interfrequency or intra-frequency RSTD measurements. The PRS positioning occasion information is received from upper layers. The value of *measPRS-Offset* is obtained by mapping the starting subframe of the PRS positioning occasion in the measured cell onto the corresponding subframe in the serving cell and is calculated as the serving cell's number of subframes from SFN=0 mod 40.

The UE shall take into account any additional time required by the UE to start PRS measurements on the other carrier when it does this mapping for determining the *measPRS-Offset*.

NOTE: Figure 6.2.2-1 illustrates the measPRS-Offset field.

rstd-InterFreqIndication

Indicates the inter-frequency or intra-frequency RSTD measurement action, i.e. the UE is going to start or stop inter-frequency or intra-frequency RSTD measurement.

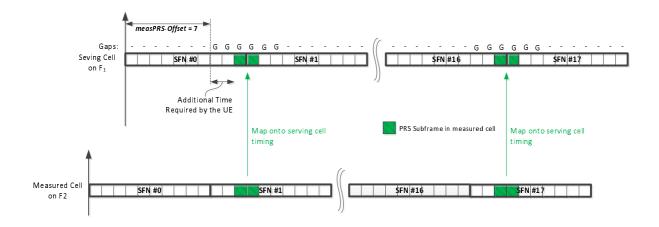


Figure 6.2.2-1 (informative): Exemplary calculation of measPRS-Offset field.

LoggedMeasurementConfiguration

The *LoggedMeasurementConfiguration* message is used by E-UTRAN to configure the UE to perform logging of measurement results while in RRC_IDLE or to perform logging of measurement results for MBSFN while in both RRC_IDLE and RRC_CONNECTED. It is used to transfer the logged measurement configuration for network performance optimisation, see TS 37.320 [60].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

LoggedMeasurementConfiguration message

```
-- ASN1START
{\tt LoggedMeasurementConfiguration-r10 ::= SEQUENCE } \{
     criticalExtensions
                                                    CHOICE {
              loggedMeasurementConfiguration-r10
                                                               LoggedMeasurementConfiguration-r10-IEs,
              spare3 NULL, spare2 NULL, spare1 NULL
         criticalExtensionsFuture
                                                           SEQUENCE {}
    }
}
LoggedMeasurementConfiguration-r10-IEs ::= SEQUENCE {
    traceReference-r10 TraceReference-r10,
traceRecordingSessionRef-r10 OCTET STRING (SIZE (2)),
tce-Id-r10 OCTET STRING (SIZE (1)),
absoluteTimeInfo-r10 AbsoluteTimeInfo-r10,
areaConfiguration-r10 LoggingDuration-r10,
loggingInterval-r10 LoggingInterval-r10,
nonCriticalExtension LoggedMeasurementConfigur
                                                                             OPTIONAL, -- Need OR
    nonCriticalExtension
                                           LoggedMeasurementConfiguration-v1080-IEs
}
LoggedMeasurementConfiguration-v1080-IEs ::= SEQUENCE {
    {\tt lateNonCriticalExtension-r10} \qquad {\tt OCTET\ STRING}
                                                                                        OPTIONAL,
    nonCriticalExtension
                                           LoggedMeasurementConfiguration-v1130-IEs OPTIONAL
LoggedMeasurementConfiguration-v1130-IEs ::= SEQUENCE {
    plmn-IdentityList-r11 PLMN-IdentityList3-r11
areaConfiguration-v1130 AreaConfiguration-v1130
                                                                              OPTIONAL,
                                           AreaConfiguration-v1130
                                                                              OPTIONAL,
                                                                                            -- Need OR
    nonCriticalExtension
                                          LoggedMeasurementConfiguration-v1250-IEs
                                                                                                 OPTIONAL
LoggedMeasurementConfiguration-v1250-IEs ::= SEQUENCE {
    targetMBSFN-AreaList-r12 TargetMBSFN-AreaList-r12
                                                                              OPTIONAL,
                                                                                             -- Need OP
    nonCriticalExtension
                                           SEQUENCE {}
                                                                              OPTIONAL
TargetMBSFN-AreaList-r12 ::=
                                                SEQUENCE (SIZE (0..maxMBSFN-Area)) OF TargetMBSFN-Area-r12
TargetMBSFN-Area-r12 ::=
                                                SEQUENCE {
    mbsfn-AreaId-r12
                                                MBSFN-AreaId-r12
                                                                             OPTIONAL, -- Need OR
    carrierFreq-r12
                                                 ARFCN-ValueEUTRA-r9,
-- ASN1STOP
```

LoggedMeasurementConfiguration field descriptions

absoluteTimeInfo

Indicates the absolute time in the current cell.

areaConfiguration

Used to restrict the area in which the UE performs measurement logging to cells broadcasting either one of the included cell identities or one of the included tracking area codes/ identities.

plmn-IdentityList

Indicates a set of PLMNs defining when the UE performs measurement logging as well as the associated status indication and information retrieval i.e. the UE performs these actions when the RPLMN is part of this set of PLMNs.

targetMBSFN-AreaList

Used to indicate logging of MBSFN measurements and further restrict the area and frequencies for which the UE performs measurement logging for MBSFN. If both MBSFN area id and carrier frequency are present, a specific MBSFN area is indicated. If only carrier frequency is present, all MBSFN areas on that carrier frequency are indicated. If there is no entry in the list, any MBSFN area is indicated.

tce-ld

Parameter Trace Collection Entity Id: See TS 32.422 [58].

traceRecordingSessionRef

Parameter Trace Recording Session Reference: See TS 32.422 [58]

– MasterInformationBlock

The MasterInformationBlock includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

MasterInformationBlock

MasterInformationBlock field descriptions

dl-Bandwidth

Parameter: transmission bandwidth configuration, N_{RB} in downlink, see TS 36.101 [42, table 5.6-1]. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.

phich-Confid

Specifies the PHICH configuration. If the UE is a BL UE or UE in CE, it shall ignore this field.

schedulingInfoSIB1-BR

This field contains an index to a table that defines *SystemInformationBlockType1-BR* scheduling information. The table is specified in TS 36.213 [23, Table 7.1.6-1 and Table 7.1.7.2.7-1]. Value 0 means that *SystemInformationBlockType1-BR* is not scheduled.

systemFrameNumber

Defines the 8 most significant bits of the SFN. As indicated in TS 36.211 [21, 6.6.1], the 2 least significant bits of the SFN are acquired implicitly in the P-BCH decoding, i.e. timing of 40ms P-BCH TTI indicates 2 least significant bits (within 40ms P-BCH TTI, the first radio frame: 00, the second radio frame: 01, the third radio frame: 10, the last radio frame: 11). One value applies for all serving cells of a Cell Group (i.e. MCG or SCG). The associated functionality is common (i.e. not performed independently for each cell).

MasterInformationBlock-MBMS

The MasterInformationBlock-MBMS includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

MasterInformationBlock-MBMS

MasterInformationBlock-MBMS field descriptions

additionalNonMBSFNSubframes

Configures additional non-MBSFN subframes where *SystemInformationBlockType1-MBMS* and *SystemInformation-MBMS* may be transmitted. Value 0, 1, 2, 3 mean zero, one, two, three additional non-MBSFN subframes are configured after each subframe which has PBCH.

dl-Bandwidth-MBMS

Parameter: transmission bandwidth configuration, N_{RB} in downlink, see TS 36.101 [42, table 5.6-1]. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.

systemFrameNumber

Defines the 6 most significant bits of the SFN of the MBMS-dedicated cell. As indicated in TS 36.211 [21, 6.6.1], the 4 least significant bits of the SFN are acquired implicitly in the P-BCH decoding, i.e. timing of 160ms P-BCH TTI indicates 4 least significant bits (within 40ms P-BCH TTI, the first radio frame: 00, the fourth radio frame: 01, the eighth radio frame: 10, the last radio frame: 11).

MBMSCountingRequest

The *MBMSCountingRequest* message is used by E-UTRAN to count the UEs that are receiving or interested to receive specific MBMS services.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: MCCH

Direction: E-UTRAN to UE

MBMSCountingRequest message

```
-- ASN1START
MBMSCountingRequest-r10 ::=
                               SEQUENCE {
    countingRequestList-r10
                               CountingRequestList-r10,
    lateNonCriticalExtension
                                   OCTET STRING
                                                                       OPTIONAL,
   nonCriticalExtension
                                   SEQUENCE {}
}
CountingRequestList-r10 ::= SEQUENCE (SIZE (1..maxServiceCount)) OF CountingRequestInfo-r10
CountingRequestInfo-r10 ::=
                               SEOUENCE {
    tmgi-r10
                                       TMGI-r9,
```

```
}
-- ASN1STOP
```

MBMSCountingResponse

The MBMSCountingResponse message is used by the UE to respond to an MBMSCountingRequest message.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

MBMSCountingResponse message

```
-- ASN1START
                                          SEQUENCE {
MBMSCountingResponse-r10 ::=
                                          CHOICE {
    criticalExtensions
        c1
            countingResponse-r10
                                              CHOICE {
                                                  MBMSCountingResponse-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                              SEQUENCE { }
    }
}
{\tt MBMSCountingResponse-r10-IEs} \ ::= \ {\tt SEQUENCE} \ \{
                                    INTEGER (0..maxMBSFN-Area-1)
   mbsfn-AreaIndex-r10
                                                                                             OPTIONAL,
   mbsfn-AreaIndex-r10
countingResponseList-r10
lateNonCriticalExtension
                                     CountingResponseList-r10
                                                                           OPTIONAL,
                                     OCTET STRING
                                                                            OPTIONAL.
    nonCriticalExtension
                                     SEQUENCE {}
                                                                            OPTIONAL
CountingResponseList-r10 ::=
                                      SEQUENCE (SIZE (1..maxServiceCount)) OF CountingResponseInfo-r10
CountingResponseInfo-r10 ::=
                                      SEQUENCE {
    countingResponseService-r10 INTEGER (0..maxServiceCount-1),
-- ASN1STOP
```

MBMSCountingResponse field descriptions

countingResponseLis

List of MBMS services which the UE is receiving or interested to receive. Value 0 for field *countingResponseService* corresponds to the first entry in *countingRequestList* within *MBMSCountingRequest*, value 1 corresponds to the second entry in this list and so on.

mbsfn-Arealndex

Index of the entry in field *mbsfn-AreaInfoList* within *SystemInformationBlockType13*. Value 0 corresponds to the first entry in *mbsfn-AreaInfoList* within *SystemInformationBlockType13*, value 1 corresponds to the second entry in this list and so on.

MBMSInterestIndication

The *MBMSInterestIndication* message is used to inform E-UTRAN that the UE is receiving/interested to receive or no longer receiving/ interested to receive MBMS via an MRB or SC-MRB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

MBMSInterestIndication message

```
-- ASN1START
MBMSInterestIndication-r11 ::=
                                     SEOUENCE {
            criticalExtensions
                                                MBMSInterestIndication-r11-IEs,
        criticalExtensionsFuture
                                              SEQUENCE {}
    }
}
MBMSInterestIndication-r11-IEs ::= SEQUENCE {
   mbms-FreqList-rl1 CarrierFreqListMBMS-rl1 OPTIONAL,
mbms-Priority-rl1 ENUMERATED {true} OPTIONAL,
lsteNcoCriticalExtension OCTET_STRING
    mbms-Priority III
lateNonCriticalExtension
                                         OCTET STRING
                                                                           OPTIONAL.
                                         MBMSInterestIndication-v1310-IEs
    nonCriticalExtension
                                                                               OPTIONAL
{\tt MBMSInterestIndication-v1310-IEs} \ ::= \ \ {\tt SEQUENCE} \ \{
                                         MBMS-ServiceList-r13
    mbms-Services-r13
                                                                               OPTIONAL.
    nonCriticalExtension
                                          SEQUENCE {}
                                                                           OPTIONAL
-- ASN1STOP
```

MBMSInterestIndication field descriptions

mbms-FreqList

List of MBMS frequencies on which the UE is receiving or interested to receive MBMS via an MRB or SC-MRB.

mbms-Priority

Indicates whether the UE prioritises MBMS reception above unicast reception. The field is present (i.e. value *true*), if the UE prioritises reception of all listed MBMS frequencies above reception of any of the unicast bearers. Otherwise the field is absent.

MBSFNAreaConfiguration

The MBSFNAreaConfiguration message contains the MBMS control information applicable for an MBSFN area. For each MBSFN area included in SystemInformationBlockType13 E-UTRAN configures an MCCH (i.e. the MCCH identifies the MBSFN area) and signals the MBSFNAreaConfiguration message.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: MCCH

Direction: E-UTRAN to UE

MBSFNAreaConfiguration message

```
-- ASN1START

MBSFNAreaConfiguration-r9 ::= SEQUENCE {
```

```
commonSF-Alloc-r9
                                       CommonSF-AllocPatternList-r9,
    commonSF-AllocPeriod-r9
                                       ENUMERATED {
                                               rf4, rf8, rf16, rf32, rf64, rf128, rf256},
    pmch-InfoList-r9
                                       PMCH-InfoList-r9,
    nonCriticalExtension
                                       MBSFNAreaConfiguration-v930-IEs OPTIONAL
}
MBSFNAreaConfiguration-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension
                                       OCTET STRING
                                                                           OPTIONAL,
    nonCriticalExtension
                                       MBSFNAreaConfiguration-v1250-IEs
                                                                           OPTIONAL
MBSFNAreaConfiguration-v1250-IEs ::= SEQUENCE {
                                                                           OPTIONAL,
    pmch-InfoListExt-r12
                                       PMCH-InfoListExt-r12
                                                                                       -- Need OR
    nonCriticalExtension
                                       MBSFNAreaConfiguration-v1430-IEs
}
MBSFNAreaConfiguration-v1430-IEs ::= SEQUENCE {
    commonSF-Alloc-r14
                                       CommonSF-AllocPatternList-r14,
    nonCriticalExtension
                                       SEQUENCE {}
                                                                           OPTIONAL
CommonSF-AllocPatternList-r9 ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-
SubframeConfig
CommonSF-AllocPatternList-r14 ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-
SubframeConfig-v1430
-- ASN1STOP
```

MBSFNAreaConfiguration field descriptions

commonSF-Alloc

Indicates the subframes allocated to the MBSFN area. E-UTRAN always sets this field to cover at least the subframes configured by *SystemInformationBlockType13* for this MCCH, regardless of whether any MBMS sessions are ongoing.

commonSF-AllocPeriod

Indicates the period during which resources corresponding with field *commonSF-Alloc* are divided between the (P)MCH that are configured for this MBSFN area. The subframe allocation patterns, as defined by *commonSF-Alloc*, repeat continously during this period. Value rf4 corresponds to 4 radio frames, rf8 corresponds to 8 radio frames and so on. The *commonSF-AllocPeriod* starts in the radio frames for which: SFN mod *commonSF-AllocPeriod* = 0.

pmch-InfoList

EUTRAN may include *pmch-InfoListExt* even if *pmch-InfoList* does not include *maxPMCH-PerMBSFN* entries. EUTRAN configures at most *maxPMCH-PerMBSFN* entries i.e. across *pmch-InfoList* and *pmch-InfoListExt*.

MeasurementReport

The MeasurementReport message is used for the indication of measurement results.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

MeasurementReport message

MobilityFromEUTRACommand

The *MobilityFromEUTRACommand* message is used to command handover or a cell change from E-UTRA to another RAT (3GPP or non-3GPP), or enhanced CS fallback to CDMA2000 1xRTT.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

MobilityFromEUTRACommand message

```
-- ASN1START
MobilityFromEUTRACommand ::=
                                    SEOUENCE {
    rrc-TransactionIdentifier
                                    RRC-TransactionIdentifier,
    criticalExtensions
                                        CHOICE {
                                         CHOICE {
            mobilityFromEUTRACommand-r8 MobilityFromEUTRACommand-r8-IEs, mobilityFromEUTRACommand-r9 MobilityFromEUTRACommand-r9
                                               MobilityFromEUTRACommand-r9-IEs,
            spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                           SEQUENCE { }
    }
MobilityFromEUTRACommand-r8-IEs ::= SEQUENCE {
   cs-FallbackIndicator
                                       BOOLEAN,
                                        CHOICE {
   purpose
        handover
                                            Handover,
        cellChangeOrder
                                            CellChangeOrder
    nonCriticalExtension
                                        MobilityFromEUTRACommand-v8a0-IEs OPTIONAL
MobilityFromEUTRACommand-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension
                                        OCTET STRING
                                                                            OPTIONAL.
                                        MobilityFromEUTRACommand-v8d0-IEs OPTIONAL
    nonCriticalExtension
MobilityFromEUTRACommand-v8d0-IEs ::= SEQUENCE {
    bandIndicator
                                        BandIndicatorGERAN
                                                                    OPTIONAL,
                                                                                 -- Cond GERAN
    nonCriticalExtension
                                        SEQUENCE {}
                                                                    OPTIONAL
MobilityFromEUTRACommand-r9-IEs ::= SEQUENCE {
    cs-FallbackIndicator
                                        BOOLEAN,
                                        CHOICE {
    purpose
       handover
                                            Handover,
        cellChangeOrder
                                            CellChangeOrder,
        e-CSFB-r9
                                            E-CSFB-r9,
    nonCriticalExtension
                                       MobilityFromEUTRACommand-v930-IEs OPTIONAL
MobilityFromEUTRACommand-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension
                                        OCTET STRING
                                                                            OPTIONAL,
                                        MobilityFromEUTRACommand-v960-IES OPTIONAL
   nonCriticalExtension
```

```
}
MobilityFromEUTRACommand-v960-IEs ::= SEQUENCE {
                                         BandIndicatorGERAN OPTIONAL, -- Cond GERAN SEQUENCE {}
    bandIndicator
    nonCriticalExtension
}
Handover ::=
                                      SEQUENCE {
                                         ENUMERATED {
   targetRAT-Type
                                           utra, geran, cdma2000-1XRTT, cdma2000-HRPD, spare4, spare3, spare2, spare1, ...},
   targetRAT-MessageContainer OCTET STRING,
nas-SecurityParamFromEUTRA OCTET STRING (SIZE (1)) OPTIONAL, -- Cond UTRAGERAN
SI-OrPSI-GERAN OPTIONAL -- Cond PSHO
CellChangeOrder ::= SEQUENCE {
                                            ENUMERATED {
    t304
                                                ms100, ms200, ms500, ms1000,
                                                ms2000, ms4000, ms8000, ms10000-v1310},
    targetRAT-Type
                                            CHOICE {
                                              SEQUENCE {
            geran
                                                PhysCellIdGERAN,
               physCellId
                                                    CarrierFreqGERAN,
                 carrierFreq
                networkControlOrder
                                                    BIT STRING (SIZE (2)) OPTIONAL, -- Need OP
SI-OrPSI-GERAN OPTIONAL -- Need OP
                 systemInformation
             },
             . . .
}
SI-OrPSI-GERAN ::=
                                       CHOICE {
                                           SystemInfoListGERAN,
   si
    psi
                                           SystemInfoListGERAN
}
E-CSFB-r9 ::=
                                      SEQUENCE {
   OPTIONAL, -- Need ON
   } OPTIONAL, -- Need OP
messageContCDMA2000-HRPD-r9 OCTET STRING OPTIONAL, -- Cond concHO
redirectCarrierCDMA2000-HRPD-r9 CarrierFreqCDMA2000 OPTIONAL -- Cond concRedir
}
-- ASN1STOP
```

MobilityFromEUTRACommand field descriptions

bandIndicator

Indicates how to interpret the ARFCN of the BCCH carrier.

carrierFreq

contains the carrier frequency of the target GERAN cell.

cs-FallbackIndicator

Value true indicates that the CS fallback procedure to UTRAN or GERAN is triggered.

messageContCDMA2000-1XRTT

This field contains a message specified in CDMA2000 1xRTT standard that either tells the UE to move to specific 1xRTT target cell(s) or indicates a failure to allocate resources for the enhanced CS fallback to CDMA2000 1xRTT.

messageContCDMA2000-HRPD

This field contains a message specified in CDMA2000 HRPD standard that either tells the UE to move to specific HRPD target cell(s) or indicates a failure to allocate resources for the handover to CDMA2000 HRPD.

mobilityCDMA2000-HRPD

This field indicates whether or not mobility to CDMA2000 HRPD is to be performed by the UE and it also indicates the type of mobility to CDMA2000 HRPD that is to be performed; If this field is not present the UE shall perform only the enhanced CS fallback to CDMA2000 1xRTT.

nas-SecurityParamFromEUTRA

Used to deliver the key synchronisation and Key freshness for the E-UTRAN to UTRAN handovers as specified in TS 33.401. The content of the parameter is defined in TS24.301.

networkControlOrder

Parameter NETWORK_CONTROL_ORDER in TS 44.060 [36].

purpose

Indicates which type of mobility procedure the UE is requested to perform. EUTRAN always applies value *e-CSFB* in case of enhanced CS fallback to CDMA2000 (e.g. also when that procedure results in handover to CDMA2000 1XRTT only, in handover to CDMA2000 HRPD only or in redirection to CDMA2000 HRPD only).

redirectCarrierCDMA2000-HRPD

The *redirectCarrierCDMA2000-HRPD* indicates a CDMA2000 carrier frequency and is used to redirect the UE to a HRPD carrier frequency.

SystemInfoListGERAN

If purpose = CellChangeOrder and if the field is not present, the UE has to acquire SI/PSI from the GERAN cell.

t304

Timer T304 as described in section 7.3. Value ms100 corresponds with 100 ms, ms200 corresponds with 200 ms and so on. EUTRAN includes extended value *ms10000-v1310* only when UE supports CE.

targetRAT-Type

Indicates the target RAT type.

targetRAT-MessageContainer

The field contains a message specified in another standard, as indicated by the *targetRAT-Type*, and carries information about the target cell identifier(s) and radio parameters relevant for the target radio access technology. NOTE 1.

A complete message is included, as specified in the other standard.

Conditional presence	Explanation
concHO	The field is mandatory present if the <i>mobilityCDMA2000-HRPD</i> is set to " <i>handover</i> ";
	otherwise the field is optional present, need ON.
concRedir	The field is mandatory present if the mobilityCDMA2000-HRPD is set to "redirection";
	otherwise the field is not present.
GERAN	The field should be present if the <i>purpose</i> is set to "handover" and the targetRAT-Type is
	set to "geran"; otherwise the field is not present
PSH0	The field is mandatory present in case of PS handover toward GERAN; otherwise the
	field is optionally present, but not used by the UE
UTRAGERAN	The field is mandatory present if the targetRAT-Type is set to "utra" or "geran"; otherwise
	the field is not present

NOTE 1: The correspondence between the value of the *targetRAT-Type*, the standard to apply and the message contained within the *targetRAT-MessageContainer* is shown in the table below:

targetRAT-Type	Standard to apply	targetRAT-MessageContainer
cdma2000-1XRTT	C.S0001 or later, C.S0007 or later, C.S0008 or	
	later	
cdma2000-HRPD	C.S0024 or later	
geran	GSM TS 04.18, version 8.5.0 or later, or 3GPP TS 44.018 (clause 9.1.15)	HANDOVER COMMAND
	3GPP TS 44.060, version 6.13.0 or later (clause 11.2.43)	PS HANDOVER COMMAND
	3GPP TS 44.060, version 7.6.0 or later (clause 11.2.46)	DTM HANDOVER COMMAND
utra	3GPP TS 25.331 (clause 10.2.16a)	HANDOVER TO UTRAN COMMAND

– Paging

The *Paging* message is used for the notification of one or more UEs.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: PCCH

Direction: E-UTRAN to UE

Paging message

```
-- ASN1START
   ging ::= SEQUENCE {
  pagingRecordList
    systemInf ::
Paging ::=
    pagingRecordList PagingRecordList systemInfoModification ENUMERATED {true}
                                                                            OPTIONAL,
                                                                                         -- Need ON
                                                                           OPTIONAL,
                                    ENUMERATED {true}
Paging-v890-IEs
                                                                            OPTIONAL,
    etws-Indication
                                                                                        -- Need ON
   etws-Indication
nonCriticalExtension
                                                                            OPTIONAL
}
Paging-v890-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING
                                                                                 OPTIONAL,
    nonCriticalExtension
                                     Paging-v920-IEs
                                                                                 OPTIONAL
Paging-v920-IEs ::= SEQUENCE {
    cmas-Indication-r9 ENUMERATED {true}
    nonCriticalExtension Paging-v1130-
                                                               OPTIONAL,
                                                                                         -- Need ON
                                         Paging-v1130-IEs
}
                        SEQUENCE {
Paging-v1130-IEs ::=
   eab-ParamModification-rl1 ENUMERATED {true}
nonCriticalExtension Paging-v1310-IEs
                                                                            OPTIONAL,
                                                                                         -- Need ON
                                                                            OPTIONAL
}
                                SEQUENCE {
Paging-v1310-IEs ::=
  redistributionIndication-r13 ENUMERATED {true}
                                                                          OPTIONAL,
                                                                                         --Need ON
    systemInfoModification-eDRX-r13 ENUMERATED {true}
                                                                            OPTIONAL,
                                                                                         -- Need ON
    nonCriticalExtension
                                      SEQUENCE {}
                                                                            OPTIONAL
PagingRecordList ::=
                                     SEQUENCE (SIZE (1..maxPageRec)) OF PagingRecord
                          SEQUENCE {
PagingRecord ::=
    ue-Identity
                                         PagingUE-Identity,
    cn-Domain
                                          ENUMERATED {ps, cs},
PagingUE-Identity ::= s-TMSI
                                      CHOICE {
   s-TMSI
                                         S-TMSI,
    imsi
                                          IMSI,
```

```
IMSI ::= SEQUENCE (SIZE (6..21)) OF IMSI-Digit

IMSI-Digit ::= INTEGER (0..9)

-- ASN1STOP
```

Paging field descriptions

cmas-Indication

If present: indication of a CMAS notification.

cn-Domain

Indicates the origin of paging.

eab-ParamModification

If present: indication of an EAB parameters (SIB14) modification.

etws-Indication

If present: indication of an ETWS primary notification and/ or ETWS secondary notification.

imsi

The International Mobile Subscriber Identity, a globally unique permanent subscriber identity, see TS 23.003 [27]. The first element contains the first IMSI digit, the second element contains the second IMSI digit and so on.

redistributionIndication

If present: indication to trigger E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10]

systemInfoModification

If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14. This indication does not apply to UEs using eDRX cycle longer than the BCCH modification period.

systemInfoModification-eDRX

If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14. This indication applies only to UEs using eDRX cycle longer than the BCCH modification period.

ue-Identity

Provides the NAS identity of the UE that is being paged.

ProximityIndication

The *ProximityIndication* message is used to indicate that the UE is entering or leaving the proximity of one or more CSG member cell(s).

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

ProximityIndication message

```
-- ASN1START
ProximityIndication-r9 ::= SEQUENCE {
    criticalExtensions
                                         CHOICE {
                                            CHOICE {
        c1
            proximityIndication-r9
                                                ProximityIndication-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                            SEQUENCE { }
    }
ProximityIndication-r9-IEs ::= SEQUENCE {
                                         ENUMERATED {entering, leaving},
    type-r9
    carrierFreq-r9
                                         CHOICE {
        eutra-r9
                                             ARFCN-ValueEUTRA,
                                             ARFCN-ValueUTRA,
       utra-r9
        eutra2-v9e0
                                             ARFCN-ValueEUTRA-v9e0
    nonCriticalExtension
                                         ProximityIndication-v930-IEs
    OPTIONAL
```

ProximityIndication field descriptions

carrierFreq

Indicates the RAT and frequency of the CSG member cell(s), for which the proximity indication is sent. For E-UTRA and UTRA frequencies, the UE shall set the ARFCN according to a band it previously considered suitable for accessing (one of) the CSG member cell(s), for which the proximity indication is sent.

tvpe

Used to indicate whether the UE is entering or leaving the proximity of CSG member cell(s).

– RNReconfiguration

The RNReconfiguration is a command to modify the RN subframe configuration and/or to convey changed system information.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to RN

RNReconfiguration message

```
-- ASN1START
RNReconfiguration-r10 ::= SEQUENCE {
   CHOICE {
rnReconfiguration-r10 RNReconfiguration-r10-IEs,
       c1
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                    SEQUENCE {}
                                SEQUENCE {
    RN-SystemInfo-r10
    RN-SubframeConfig-r10
RNReconfiguration-r10-IEs ::=
                                SEQUENCE {
   rn-SystemInfo-r10
rn-SubframeConfig-r10
lateNonCriticalExtension
                                                                OPTIONAL,
                                                                           -- Need ON
                                                                OPTIONAL, -- Need ON
                                     OCTET STRING
                                                                    OPTIONAL,
                                     SEQUENCE {}
   nonCriticalExtension
                                                                    OPTIONAL
}
RN-SystemInfo-r10 ::=
                             SEQUENCE {
   systemInformationBlockType1-r10 OCTET STRING (CONTAINING SystemInformationBlockType1)
   OPTIONAL, -- Need ON
   systemInformationBlockType2-r10 SystemInformationBlockType2 OPTIONAL, -- Need ON
}
-- ASN1STOP
```

RNReconfigurationComplete

The RNReconfigurationComplete message is used to confirm the successful completion of an RN reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: RN to E-UTRAN

RNReconfigurationComplete message

```
-- ASN1START
RNReconfigurationComplete-r10 ::=
                                        SEQUENCE {
    rrc-TransactionIdentifier
                                           RRC-TransactionIdentifier,
    criticalExtensions
                                           CHOICE {
                                               CHOICE {
        c1
            rnReconfigurationComplete-r10
                                                   RNReconfigurationComplete-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
                                               SEQUENCE {}
        criticalExtensionsFuture
}
RNReconfigurationComplete-r10-IEs ::= SEQUENCE {
OCTET STRING
    lateNonCriticalExtension
                                                                       OPTIONAL,
                                           SEQUENCE {}
    nonCriticalExtension
                                                                       OPTIONAL
-- ASN1STOP
```

RRCConnectionReconfiguration

The RRCConnectionReconfiguration message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) including any associated dedicated NAS information and security configuration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

RRCConnectionReconfiguration message

```
-- ASN1START
RRCConnectionReconfiguration ::=
                                     SEQUENCE {
    rrc-TransactionIdentifier
                                         RRC-TransactionIdentifier,
    criticalExtensions
                                         CHOICE {
        c1
                                              CHOICE {
            {\tt rrcConnectionReconfiguration-r8}
                                                  RRCConnectionReconfiguration-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        \verb|criticalExtensionsFuture| \\
}
RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
    measConfig
                                         MeasConfig
                                                                           OPTIONAL,
                                                                                        -- Need ON
                                                                                       -- Cond HO
    mobilityControlInfo
                                         MobilityControlInfo
                                                                           OPTIONAL,
    dedicatedInfoNASList
                                         SEQUENCE (SIZE(1..maxDRB)) OF
                                              DedicatedInfoNAS
                                                                           OPTIONAL,
                                                                                      -- Cond nonHO
   radioResourceConfigDedicated RadioResourceConfigDedicated OPTIONAL, -- Cond HO-toEUTRA securityConfigHO OPTIONAL, -- Cond HO
                                                                                      -- Cond HO
    securityConfigHO
                                         SecurityConfigHO
                                                                           OPTIONAL.
                                         RRCConnectionReconfiguration-v890-IEs OPTIONAL
    nonCriticalExtension
```

```
RRCConnectionReconfiguration-v890-IEs ::= SEQUENCE {
      lateNonCriticalExtension OCTET STRING (CONTAINING RRCConnectionReconfiguration-v8m0-
IEs) OPTIONAL,
     nonCriticalExtension
                                                            RRCConnectionReconfiguration-v920-IEs OPTIONAL
 - Late non-critical extensions:
RRCConnectionReconfiguration-v8m0-IEs ::= SEQUENCE {
      -- Following field is only for pre REL-10 late non-critical extensions
      lateNonCriticalExtension OCTET STRING
     nonCriticalExtension
                                                              RRCConnectionReconfiguration-v10i0-IEs OPTIONAL
}
RRCConnectionReconfiguration-v10i0-IEs ::= SEQUENCE {
      antennaInfoDedicatedPCell-v10i0 AntennaInfoDedicated-v10i0 OPTIONAL,
                                                              RRCConnectionReconfiguration-v1010-IEs
     nonCriticalExtension
                                                                                                                                    OPTIONAL
RRCConnectionReconfiguration-v1010-IEs ::= SEQUENCE {
     mobilityControlInfo-v1010
sCellToAddModList-v1010
                                                        MobilityControlInfo-v1010 OPTIONAL,
SCellToAddModList-v1010 OPTIONAL, -- Need ON
      -- Following field is only for late non-critical extensions from REL-10 to REL-11
      lateNonCriticalExtension
                                                              OCTET STRING
                                                                                                                        OPTIONAL,
     nonCriticalExtension
                                                              RRCConnectionReconfiguration-v12f0-IES OPTIONAL
}
RRCConnectionReconfiguration-v12f0-IEs ::= SEQUENCE {
     scg-Configuration-v12f0 SCG-Configuration-v12f0 OPTIONAL,
                                                                                                                        -- Cond nonFullConfig
      -- Following field is only for late non-critical extensions from REL-12
      lateNonCriticalExtension OCTET STRING
                                                                                                                 OPTIONAL,
      nonCriticalExtension
                                                              RRCConnectionReconfiguration-v1370-IEs
                                                                                                                                    OPTIONAL
RRCConnectionReconfiguration-v1370-IEs ::= SEQUENCE {
      radio Resource Config Dedicated-v1370 \quad Radio Resource Config Dedicated-v1370 \quad OPTIONAL\,, \; -- \; Need \; ONCORRESOURCE CONFIGURATION CONTROL From the configuration of the conf
      sCellToAddModListExt-v1370
                                                              SCellToAddModListExt-v1370 OPTIONAL, -- Need ON
      -- Following field is only for late non-critical extensions from REL-13 onwards
                                                                    SEQUENCE {}
     nonCriticalExtension
 -- Regular non-critical extensions:
RRCConnectionReconfiguration-v920-IEs ::= SEQUENCE {
                                    OtherConfig-r9 OPTIONAL, -- Need ON
ENUMERATED {true} OPTIONAL, -- Cond HO-Reestab
     otherConfig-r9
     fullConfig-r9
     nonCriticalExtension
                                                            RRCConnectionReconfiguration-v1020-IEs OPTIONAL
}
RRCConnectionReconfiguration-v1020-IEs ::= SEQUENCE {
      sCellToReleaseList-r10 SCellToReleaseList-r10 OPTIONAL, -- Need ON sCellToAddModList-r10 SCellToAddModList-r10 OPTIONAL, -- Need ON
     nonCriticalExtension
                                                              RRCConnectionReconfiguration-v1130-IEs OPTIONAL
}
RRCConnectionReconfiguration-v1130-IEs ::= SEQUENCE {
   systemInformationBlockType1Dedicated-r11 OCTET STRING (CONTAINING
SystemInformationBlockType1)
     OPTIONAL, -- Need ON

RRCConnectionReconfiguration-v1250-IEs OPTIONAL
RRCConnectionReconfiguration-v1250-IEs ::= SEQUENCE {
      wlan-OffloadInfo-r12
                                                               CHOICE {
           release
                                                                            SEQUENCE {
                  wlan-OffloadConfigDedicated-r12
                                                                            WLAN-OffloadConfig-r12,
                                                                                 ENUMERATED {min5, min10, min20, min30, min60,
                  t350-r12
                                                                             min120, min180, spare1} OPTIONAL -- Need OR
           }
                                                             OPTIONAL, SCG-Configuration-r12 OPTIONAL, -- Cond
                                                                                                                                      -- Need ON
      scg-Configuration-r12
nonFullConfig
    sl-SyncTxControl-r12
                                                             SL-SyncTxControl-r12
SL-DiscConfig-r12
                                                                                                                  OPTIONAL,
                                                                                                                                      -- Need ON
                                                                                                                 OPTIONAL, -- Need ON
      sl-DiscConfig-r12
      sl-CommConfig-r12
                                                              SL-CommConfig-r12
      nonCriticalExtension
                                                              RRCConnectionReconfiguration-v1310-IEs OPTIONAL
RRCConnectionReconfiguration-v1310-IEs ::= SEQUENCE {
```

```
-- Need ON
   sCellToAddModListExt-r13
                                      SCellToAddModListExt-r13
                                                                     OPTIONAL,
                                                                                 -- Need ON
                                   LWA-Configuration-r13
                                                                                -- Need ON
   lwa-Configuration-r13
                                                                    OPTIONAL,
                                     LWIP-Configuration-r13
   lwip-Configuration-r13
                                                                   OPTIONAL,
                                                                                -- Need ON
                                     RCLWI-Configuration-r13
   rclwi-Configuration-r13
                                                                    OPTIONAL,
                                                                                -- Need ON
   nonCriticalExtension
                                     RRCConnectionReconfiguration-v1430-IEs
   OPTIONAL
}
RRCConnectionReconfiguration-v1430-IEs ::= SEQUENCE {
   sl-V2X-ConfigDedicated-r14 SL-V2X-ConfigDedicated-r14 SCellToAddModListExt-v1430 SCellToAddModListExt-v1430
                                                               OPTIONAL, -- Need ON OPTIONAL, -- Need ON
   sCellToAddModListExt-v1430 SCellToAddModListExt-v1430 perCC-GapIndicationRequest-r14 ENUMERATED{true}
                                                                     OPTIONAL,
                                                                                -- Need ON
   systemInformationBlockType2Dedicated-r14
                                            OCTET STRING (CONTAINING
SystemInformationBlockType2)
                                                                     OPTIONAL,
                                                                                 -- Cond nonHO
   nonCriticalExtension
                                  SEOUENCE {}
                                                                     OPTIONAL
SL-SyncTxControl-r12 ::=
                                  SEQUENCE {
   networkControlledSyncTx-r12
                                   ENUMERATED {on, off}
                                                                    OPTIONAL
                                                                                 -- Need OP
PSCellToAddMod-r12 ::=
                                  SEQUENCE {
   sCellIndex-r12
                                     SCellIndex-r10,
   cellIdentification-r12
                                      SEQUENCE {
       physCellId-r12
                                         PhysCellId,
       dl-CarrierFreq-r12
                                         ARFCN-ValueEUTRA-r9
                                                                     OPTIONAL,
                                                                               -- Cond SCellAdd
   radioResourceConfigCommonPSCell-r12 RadioResourceConfigCommonPSCell-r12 OPTIONAL, -- Cond
SCellAdd.
   radioResourceConfigDedicatedPSCell-r12 RadioResourceConfigDedicatedPSCell-r12 OPTIONAL,
Cond SCellAdd2
   [[ antennaInfoDedicatedPSCell-v1280
                                            AntennaInfoDedicated-v10i0 OPTIONAL -- Need ON
   ]],
                                                                    -- Need ON
       sCellIndex-r13
                                     SCellIndex-r13 OPTIONAL
   ]],
   [[ radioResourceConfigDedicatedPSCell-v1370 RadioResourceConfigDedicatedPSCell-v1370
   OPTIONAL -- Need ON
   ]]
}
PSCellToAddMod-v12f0 ::=
                                      SEOUENCE {
   radioResourceConfigCommonPSCell-r12 RadioResourceConfigCommonPSCell-v12f0 OPTIONAL
}
                                      SEQUENCE {
PSCellToAddMod-v1440 ::=
   radioResourceConfigCommonPSCell-r14
                                        RadioResourceConfigCommonPSCell-v1440 OPTIONAL
PowerCoordinationInfo-r12 ::= SEQUENCE {
   p-MeNB-r12
                                      INTEGER (1..16),
   p-SeNB-r12
                                      INTEGER (1..16),
   powerControlMode-r12
                                      INTEGER (1..2)
}
SCellToAddModList-r10 ::=
                             SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-r10
SCellToAddModList-v1010 ::=
                             SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-v1010
SCellToAddModListExt-r13 ::=
                             SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-r13
SCellToAddModListExt-v1370 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-v1370
SCellToAddModListExt-v1430 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-v1430
SCellToAddMod-r10 ::=
                              SEQUENCE {
   sCellIndex-r10
                               SCellIndex-r10,
   cellIdentification-r10
                                      SEQUENCE {
       physCellId-r10
                                         PhysCellId,
       dl-CarrierFreq-r10
                                         ARFCN-ValueEUTRA
                                                                 OPTIONAL,
                                                                             -- Cond SCellAdd
   radioResourceConfigCommonSCell-r10
                                        RadioResourceConfigCommonSCell-r10 OPTIONAL, -- Cond
SCellAdd
   radioResourceConfigDedicatedSCell-r10 RadioResourceConfigDedicatedSCell-r10 OPTIONAL,
Cond SCellAdd2
   [[ dl-CarrierFreq-v1090
                           ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Cond EARFCN-max
```

```
[[ antennaInfoDedicatedSCell-v10i0
                                        AntennaInfoDedicated-v10i0 OPTIONAL
   ]],
   [[ srs-SwitchFromServCellIndex-r14 INTEGER (0.. 31) OPTIONAL -- Need ON
}
SCellToAddMod-v1010 ::=
                              SEQUENCE {
   radioResourceConfigCommonSCell-v1010
                                             RadioResourceConfigCommonSCell-v1010 OPTIONAL
SCellToAddModExt-r13 ::=
                                 SEQUENCE {
                                 SCellIndex-r13,
   sCellIndex-r13
   cellIdentification-r13
                                      SEQUENCE {
       physCellId-r13
                                          PhysCellId,
                                          ARFCN-ValueEUTRA-r9
       dl-CarrierFreg-r13
                                                                 OPTIONAL,
                                                                            -- Cond SCellAdd
   radioResourceConfigCommonSCell-r13 RadioResourceConfigCommonSCell-r10 OPTIONAL, -- Cond
SCellAdd
   radioResourceConfigDedicatedSCell-r13 RadioResourceConfigDedicatedSCell-r10 OPTIONAL, --
Cond SCellAdd2
   antennaInfoDedicatedSCell-r13
                                        AntennaInfoDedicated-v10i0
                                                                        OPTIONAL
                                                                                     -- Need ON
SCellToAddModExt-v1370 ::=
                                  SEQUENCE {
   radioResourceConfigCommonSCell-v1370
                                              RadioResourceConfigCommonSCell-v1010 OPTIONAL
SCellToAddModExt-v1430 ::=
                                 SEQUENCE {
   srs-SwitchFromServCellIndex-r14 INTEGER (0.. 31)
                                                                   OPTIONAL, -- Need ON
SCellToReleaseList-r10 ::=
                                 SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellIndex-r10
SCellToReleaseListExt-r13 ::=
                                     SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellIndex-r13
SCG-Configuration-r12 ::=
                                  CHOICE {
   release
                                      NULT.
                                      SEQUENCE {
   setup
                                       SEQUENCE {
           powerCoordinationInfo-r12 INTEGER (0.. 65535)

...
       scg-ConfigPartMCG-r12
          scg-Counter-r12
                                                                        OPTIONAL, -- Need ON
                                              PowerCoordinationInfo-r12 OPTIONAL, -- Need ON
                                                                     OPTIONAL, -- Need ON
       scg-ConfigPartSCG-r12
                                        SCG-ConfigPartSCG-r12
                                                                     OPTIONAL
                                                                                 -- Need ON
}
SCG-Configuration-v12f0 ::=
                                CHOICE {
   release
                                      NULL,
                                      SEQUENCE {
   setup
                                          SCG-ConfigPartSCG-v12f0 OPTIONAL
       scg-ConfigPartSCG-v12f0
                                                                                     -- Need ON
}
SCG-ConfigPartSCG-r12 ::=
                                 SEOUENCE {
   radioResourceConfigDedicatedSCG-r12 RadioResourceConfigDedicatedSCG-r12 OPTIONAL, -- Need ON
   radioResourceConfiguration
sCellToReleaseListSCG-r12
SCellToReleaseList
PSCellToAddMod-r12
PSCellToAddMod-r12
                                      SCellToReleaseList-r10 OPTIONAL, -- Need ON PSCellToAddMod-r12 OPTIONAL, -- Need ON
                                     SCellToAddModList-r10
                                                                 OPTIONAL,
   mobilityControlInfoSCG-r12
   sCellToAddModListSCG-r12
                                                                             -- Need ON
                                      MobilityControlInfoSCG-r12 OPTIONAL,
                                                                            -- Need ON
   [ [
   SCellToReleaseListSCG-Ext-r13 SCellToReleaseListExt-r13 SCellToAddModListExt-r13 SCellToAddModListExt-r13
                                                                        OPTIONAL, -- Need ON
                                              SCellToAddModListExt-r13 OPTIONAL
   sCellToAddModListSCG-Ext-r13
                                                                                     -- Need ON
    ]],
   [ [
   sCellToAddModListSCG-Ext-v1370 SCellToAddModListExt-v1370 OPTIONAL -- Need ON
    ]],
   pSCellToAddMod-v1440
                                      PSCellToAddMod-v1440
                                                                OPTIONAL -- Need ON
}
SCG-ConfigPartSCG-v12f0 ::= SEQUENCE { pSCellToAddMod-v12f0 PSCell
                                                             OPTIONAL,
                                      PSCellToAddMod-v12f0
                                                                                  -- Need ON
   sCellToAddModListSCG-v12f0 SCellToAddModList-v1010 OPTIONAL -- Need ON
```

RRCConnectionReconfiguration field descriptions

dedicatedInfoNASList

This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list.

fullConfig

Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message.

keyChangeIndicator

true is used only in an intra-cell handover when a K_{eNB} key is derived from a K_{ASME} key taken into use through the latest successful NAS SMC procedure, as described in TS 33.401 [32] for K_{eNB} re-keying. false is used in an intra-LTE handover when the new K_{eNB} key is obtained from the current K_{eNB} key or from the NH as described in TS 33.401 [32].

Iwa-Configuration

This field is used to provide parameters for LWA configuration. E-UTRAN does not simultaneously configure LWA with DC, LWIP or RCLWI for a UE.

Iwip-Configuration

This field is used to provide parameters for LWIP configuration. E-UTRAN does not simultaneously configure LWIP with DC, LWA or RCLWI for a UE.

nas-securityParamToEUTRA

This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this field, although it affects activation of AS- security after inter-RAT handover to E-UTRA. The content is defined in TS 24.301.

networkControlledSyncTx

This field indicates whether the UE shall transmit synchronisation information (i.e. become synchronisation source). Value *On* indicates the UE to transmit synchronisation information while value *Off* indicates the UE to not transmit such information.

nextHopChainingCount

Parameter NCC: See TS 33.401 [32]

perCC-GapIndicationRequest

Indicates that UE shall include perCC-GapIndicationList and numFreqEffective in the

RRCConnectionReconfigurationComplete message. numFreqEffectiveReduced may also be included if frequencies are configured for reduced measurement performance.

p-MeNB

Indicates the guaranteed power for the MeNB, as specified in TS 36.213 [23]. The value N corresponds to N-1 in TS 36.213 [23].

powerControlMode

Indicates the power control mode used in DC. Value 1 corresponds to DC power control mode 1 and value 2 indicates DC power control mode 2, as specified in TS 36.213 [23].

p-SeNB

Indicates the guaranteed power for the SeNB as specified in TS 36.213 [23, Table 5.1.4.2-1]. The value N corresponds to N-1 in TS 36.213 [23].

rclwi-Configuration

WLAN traffic steering command as specified in 5.6.16.2. E-UTRAN does not simultaneously configure RCLWI with DC, LWA or LWIP for a UE.

sCellIndex

In case of DC, the SCellIndex is unique within the scope of the UE i.e. an SCG cell can not use the same value as used for an MCG cell. For pSCellToAddMod, if sCellIndex-r13 is present the UE shall ignore sCellIndex-r12. sCellIndex-r13 in sCellToAddModListExt-r13 shall not have same values as sCellIndex-r10 in sCellToAddModListExt-r10.

sCellToAddModList, sCellToAddModListExt

Indicates the SCell to be added or modified. Field *sCellToAddModList* is used to add the first 4 SCells for a UE with *sCellIndex-r10* while *sCellToAddModListExt* is used to add the rest. If E-UTRAN includes *SCellToAddModListExt-v1430* it includes the same number of entries, and listed in the same order, as in *SCellToAddModListExt-r13*. If E-UTRAN includes *SCellToAddModList-v1010* it includes the same number of entries, and listed in the same order, as in *SCellToAddModList-r10*. If E-UTRAN includes *SCellToAddModListExt-v1370* it includes the same number of entries, and listed in the same order, as in *SCellToAddModListExt-r13*.

$s Cell To Add ModList SCG, \, s Cell To Add ModList SCG-Ext$

Indicates the SCG cell to be added or modified. The field is used for SCG cells other than the PSCell (which is added/modified by field pSCellToAddMod). Field sCellToAddModListSCG is used to add the first 4 SCells for a UE with sCellIndex-r10 while sCellToAddModListSCG-Ext is used to add the rest. If E-UTRAN includes sCellToAddModListSCG-v10l0 it includes the same number of entries, and listed in the same order, as in sCellToAddModListSCG-r12. If E-UTRAN includes sCellToAddModListSCG-Ext-v1370 it includes the same number of entries, and listed in the same order, as in sCellToAddModListSCG-Ext-r13.

sCellToReleaseListSCG, sCellToReleaseListSCG-Ext

Indicates the SCG cell to be released. The field is also used to release the PSCell e.g. upon change of PSCell, upon system information change for the PSCell.

scg-Counter

A counter used upon initial configuration of SCG security as well as upon refresh of S-K_{eNB}. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.

RRCConnectionReconfiguration field descriptions

sI-V2X-ConfigDedicated

Indicates sidelink configuration for non-P2X related V2X sidelink communication as well as P2X related V2X sidelink communication.

srs-SwitchFromServCellIndex

Indicates the serving cell whose UL transmission may be interrupted during SRS transmission on a PUSCH-less cell. During SRS transmission on a PUSCH-less cell, the UE may temporarily suspend the UL transmission on a serving cell with PUSCH in the same CG to allow the PUSCH-less cell to transmit SRS. The PUSCH-less cell is always a TDD cell but the serving cell with PUSCH may be either a FDD or TDD cell.

systemInformationBlockType1Dedicated

This field is used to transfer SystemInformationBlockType1 or SystemInformationBlockType1-BR to the UE.

system Information Block Type 2 Dedicated

This field is used to transfer BR version of SystemInformationBlockType2 to BL UEs or UEs in CE.

t350

Timer T350 as described in section 7.3. Value minN corresponds to N minutes.

Conditional presence	Explanation
EARFCN-max	The field is mandatory present if <i>dl-CarrierFreq-r10</i> is included and set to <i>maxEARFCN</i> .
	Otherwise the field is not present.
fullConfig	This field is mandatory present for handover within E-UTRA when the fullConfig is
-	included; otherwise it is optionally present, Need OP.
НО	The field is mandatory present in case of handover within E-UTRA or to E-UTRA;
	otherwise the field is not present.
HO-Reestab	This field is optionally present, need ON, in case of handover within E-UTRA or upon the
	first reconfiguration after RRC connection re-establishment; otherwise the field is not
	present.
HO-toEUTRA	The field is mandatory present in case of handover to E-UTRA or for reconfigurations
	when <i>fullConfig</i> is included; otherwise the field is optionally present, need ON.
nonFullConfig	The field is not present when the <i>fullConfig</i> is included or in case of handover to E-UTRA;
	otherwise it is optional present, need ON.
nonHO	The field is not present in case of handover within E-UTRA or to E-UTRA; otherwise it is
	optional present, need ON.
SCellAdd	The field is mandatory present upon SCell addition; otherwise it is not present.
SCellAdd2	The field is mandatory present upon SCell addition; otherwise it is optionally present,
	need ON.

RRCConnectionReconfigurationComplete

The RRCConnectionReconfigurationComplete message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionReconfigurationComplete message

```
lateNonCriticalExtension
                                      OCTET STRING
                                                                         OPTIONAL,
                                      RRCConnectionReconfigurationComplete-v1020-IEs OPTIONAL
   nonCriticalExtension
}
RRCConnectionReconfigurationComplete-v1020-IEs ::= SEQUENCE {
   rlf-InfoAvailable-rl0 ENUMERATED {true}
                                                                     OPTIONAL,
   logMeasAvailable-r10
                                      ENUMERATED {true}
                                                                     OPTIONAL,
   nonCriticalExtension
                                      RRCConnectionReconfigurationComplete-v1130-IEs OPTIONAL
}
RRCConnectionReconfigurationComplete-v1130-IEs ::= SEQUENCE {
   connEstFailInfoAvailable-r11
                                      ENUMERATED {true}
                                                                     OPTIONAL.
   nonCriticalExtension
                                      RRCConnectionReconfigurationComplete-v1250-IEs OPTIONAL
RRCConnectionReconfigurationComplete-v1250-IEs ::= SEQUENCE {
   logMeasAvailableMBSFN-r12
                                      ENUMERATED {true}
                                                                     OPTIONAL.
   nonCriticalExtension
                                      RRCConnectionReconfigurationComplete-v1430-IEs
       OPTIONAL
}
RRCConnectionReconfigurationComplete-v1430-IEs ::= SEQUENCE {
   perCC-GapIndicationList-r14
numFreqEffective-r14
INTEGER (1..12)
                                                                     OPTIONAL,
                                                                     OPTIONAL.
   numFreqEffectiveReduced-r14
                                      INTEGER (1..12)
                                                                     OPTIONAL,
   nonCriticalExtension
                                      SEQUENCE {}
                                                                     OPTIONAL
-- ASN1STOP
```

RRCConnectionReconfigurationComplete field descriptions

numFreqEffective

This field is used to indicate the number of effective frequencies that a UE measures in series according to TS 36.133 [16]. Simultaneous measurement in parallel on multiple frequencies can be equivalent to a single effective frequency. The frequencies configured for reduced measurement performance should not be included.

numFreqEffectiveReduced

This field is used to indicate the number of effective frequencies that a UE measures in series according to TS 36.133 [16] for frequencies configured for reduced measurement performance. Simultaneous measurement in parallel on multiple frequencies can be equivalent to a single effective frequency.

perCC-GapIndicationList

This field is used to indicate per CC measurement gap preference by the UE.

RRCConnectionReestablishment

The RRCConnectionReestablishment message is used to re-establish SRB1.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

RRCConnectionReestablishment message

```
-- ASN1START
RRCConnectionReestablishment ::=
                                    SEQUENCE {
                                       RRC-TransactionIdentifier,
    rrc-TransactionIdentifier
                                        CHOICE {
    criticalExtensions
                                            CHOICE {
        c1
            rrcConnectionReestablishment-r8
                                                RRCConnectionReestablishment-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4
                                                NULT.
            spare3 NULL, spare2 NULL, spare1
                                                NULL
        criticalExtensionsFuture
                                           SEQUENCE { }
    }
```

RRCConnectionReestablishmentComplete

The RRCConnectionReestablishmentComplete message is used to confirm the successful completion of an RRC connection re-establishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionReestablishmentComplete message

```
-- ASN1START
{\tt RRCConnectionReestablishmentComplete} \ ::= \ {\tt SEQUENCE} \ \big\{
    rrc-TransactionIdentifier RRC-TransactionIdentifier CHOICE {
                                        RRC-TransactionIdentifier,
       rrcConnectionReestablishmentComplete-r8
                                            RRCConnectionReestablishmentComplete-r8-IEs,
        criticalExtensionsFuture
                                            SEQUENCE { }
}
RRCConnectionReestablishmentComplete-r8-IEs ::= SEQUENCE {
   nonCriticalExtension
                                      RRCConnectionReestablishmentComplete-v920-IEs OPTIONAL
{\tt RRCConnectionReestablishmentComplete-v920-IEs} \ ::= \ {\tt SEQUENCE} \ \big\{
   rlf-InfoAvailable-r9
nonCriticalExtension
                                       ENUMERATED {true}
                                                                         OPTIONAL,
                                        RRCConnectionReestablishmentComplete-v8a0-IEs
RRCConnectionReestablishmentComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING
    nonCriticalExtension
                                        RRCConnectionReestablishmentComplete-v1020-IEs OPTIONAL
RRCConnectionReestablishmentComplete-v1020-IEs ::= SEQUENCE {
    logMeasAvailable-r10 ENUMERATED {true}
nonCriticalExtension RRCConnectionReest.
                                                                         OPTIONAL,
                                        RRCConnectionReestablishmentComplete-v1130-IEs OPTIONAL
   nonCriticalExtension
RRCConnectionReestablishmentComplete-v1130-IEs ::= SEQUENCE {
   connEstFailInfoAvailable-r11 ENUMERATED {true}
                                                                         OPTIONAL,
    nonCriticalExtension
                                        RRCConnectionReestablishmentComplete-v1250-IEs OPTIONAL
RRCConnectionReestablishmentComplete-v1250-IEs ::= SEQUENCE {
    logMeasAvailableMBSFN-r12 ENUMERATED {true}
                                                                         OPTIONAL,
    nonCriticalExtension
                                        SEQUENCE {}
                                                                         OPTIONAL
-- ASN1STOP
```

RRCConnectionReestablishmentComplete field descriptions

rlf-InfoAvailable

This field is used to indicate the availability of radio link failure or handover failure related measurements

RRCConnectionReestablishmentReject

The RRCConnectionReestablishmentReject message is used to indicate the rejection of an RRC connection reestablishment request.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

RRCConnectionReestablishmentReject message

```
-- ASN1START
RRCConnectionReestablishmentReject ::= SEQUENCE {
   criticalExtensions
                                        CHOICE {
       rrcConnectionReestablishmentReject-r8
                                            RRCConnectionReestablishmentReject-r8-IEs,
       criticalExtensionsFuture
                                            SEQUENCE {}
}
RRCConnectionReestablishmentReject-r8-IEs ::= SEQUENCE {
                                        RRCConnectionReestablishmentReject-v8a0-IEs OPTIONAL
   nonCriticalExtension
RRCConnectionReestablishmentReject-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
nonCriticalExtension SEQUENCE {}
                                                                              OPTIONAL.
   nonCriticalExtension
                                        SEQUENCE {}
                                                                              OPTIONAL
-- ASN1STOP
```

RRCConnectionReestablishmentRequest

The RRCConnectionReestablishmentRequest message is used to request the reestablishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

RRCConnectionReestablishmentRequest message

```
-- ASN1START
RRCConnectionReestablishmentRequest ::= SEQUENCE {
                                   CHOICE {
   criticalExtensions
       rrcConnectionReestablishmentRequest-r8
                                         RRCConnectionReestablishmentRequest-r8-IEs,
       criticalExtensionsFuture
                                         SEQUENCE { }
   }
RRCConnectionReestablishmentRequest-r8-IEs ::= SEQUENCE {
                        ReestabUE-Identity,
   ue-Identity
   reestablishmentCause
                                     ReestablishmentCause,
   spare
                                      BIT STRING (SIZE (2))
```

RRCConnectionReestablishmentRequest field descriptions

physCellId

The Physical Cell Identity of the PCell the UE was connected to prior to the failure.

reestablishmentCause

Indicates the failure cause that triggered the re-establishment procedure. eNB is not expected to reject a RRCConnectionReestablishmentRequest due to unknown cause value being used by the UE.

ue-Identity

UE identity included to retrieve UE context and to facilitate contention resolution by lower layers.

RRCConnectionReject

The RRCConnectionReject message is used to reject the RRC connection establishment.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

RRCConnectionReject message

```
-- ASN1START
RRCConnectionReject ::=
                                  SEQUENCE {
                                  CHOICE {
   criticalExtensions
                                   CHOICE {
       c1
           rrcConnectionReject-r8
                                             RRCConnectionReject-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
                                         SEQUENCE { }
       criticalExtensionsFuture
RRCConnectionReject-r8-IEs ::= SEQUENCE {
   waitTime
                                     INTEGER (1..16),
   nonCriticalExtension
                                     RRCConnectionReject-v8a0-IEs
                                                                      OPTIONAL
RRCConnectionReject-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
                                                                       OPTIONAL,
                                     RRCConnectionReject-v1020-IEs
   nonCriticalExtension
                                                                       OPTIONAL
RRCConnectionReject-v1020-IEs ::= SEQUENCE {
   extendedWaitTime-r10
                                     INTEGER (1..1800)
                                                                       OPTIONAL,
                                                                                   -- Need ON
   nonCriticalExtension
                                     RRCConnectionReject-v1130-IEs
                                                                       OPTIONAL
RRCConnectionReject-v1130-IEs ::= SEQUENCE {
   deprioritisationReq-rl1 SEQUENCE {
    deprioritisationType-rl1 ENUMER
                                     ENUMERATED {frequency, e-utra},
       deprioritisationTimer-rl1
                                       ENUMERATED {min5, min10, min15, min30}
                                                                        OPTIONAL,
                                                                                   -- Need ON
   nonCriticalExtension
                              RRCConnectionReject-v1320-IEs
   OPTIONAL
```

RRCConnectionReject field descriptions

deprioritisationReg

Indicates whether the current frequency or RAT is to be de-prioritised. The UE shall be able to store a depriotisation request for up to 8 frequencies (applicable when receiving another frequency specific deprioritisation request before T325 expiry).

deprioritisationTimer

Indicates the period for which either the current carrier frequency or E-UTRA is deprioritised. Value *minN* corresponds to N minutes.

extendedWaitTime

Value in seconds for the wait time for Delay Tolerant access requests.

rrc-SuspendIndication

If present, this field indicates that the UE should remain suspended and not release its stored context.

waitTime

Wait time value in seconds.

RRCConnectionRelease

The RRCConnectionRelease message is used to command the release of an RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

RRCConnectionRelease message

```
-- ASN1START
                                  SEQUENCE {
RRCConnectionRelease ::=
                              RRC-TransactionIdentifier,
CHOICE {
   rrc-TransactionIdentifier
   criticalExtensions
                                      CHOICE {
           rrcConnectionRelease-r8 CHOICE {
       c1
                                              RRCConnectionRelease-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                          SEQUENCE { }
   }
RRCConnectionRelease-r8-IEs ::= SEQUENCE {
                                 ReleaseCause,
   releaseCause
   idleModeMobilityControlInfo RedIrectedCarrierInfo OPTIONAL, idleModeMobilityControlInfo OPTIONAL, nonCriticalExtension RRCConnectionRelease-v890-IEs OPTIONAL
                                                                                     -- Need ON
                                                                                     -- Need OP
   nonCriticalExtension
RRCConnectionRelease-v890-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                 OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs)
   OPTIONAL,
   nonCriticalExtension
                                      RRCConnectionRelease-v920-IEs
                                                                        OPTIONAL
 - Late non critical extensions
RRCConnectionRelease-v9e0-IEs ::= SEQUENCE {
   redirectedCarrierInfo-v9e0
                                      RedirectedCarrierInfo-v9e0
                                                                          OPTIONAL.
                                                                                     -- Cond
NoRedirect-r8
   OPTIONAL,
                                                                                     -- Cond
IdleInfoEUTRA
   nonCriticalExtension
                                      SEQUENCE {}
                                                                          OPTIONAL
```

```
}
-- Regular non critical extensions
RRCConnectionRelease-v920-IEs ::= SEQUENCE {
   cellInfoList-r9
                                      CHOICE {
       geran-r9
                                        CellInfoListGERAN-r9,
       utra-FDD-r9
                                          CellInfoListUTRA-FDD-r9,
       utra-TDD-r9
                                          CellInfoListUTRA-TDD-r9.
       utra-TDD-r10
                                          CellInfoListUTRA-TDD-r10
                                                                  OPTIONAL, -- Cond Redirection
                                                                      OPTIONAL
   nonCriticalExtension
                                      RRCConnectionRelease-v1020-IEs
}
RRCConnectionRelease-v1020-IEs ::= SEQUENCE {
   extendedWaitTime-r10 INTEGER (1..1800) OPTIONAL, -- Need ON
   nonCriticalExtension
                                      RRCConnectionRelease-v1320-IEs
                                                                                  OPTIONAL
RRCConnectionRelease-v1320-IEs::= SEQUENCE {
                         ResumeIdentity-r13
  resumeIdentity-r13
                                                                    OPTIONAL, -- Need OR
   nonCriticalExtension
                                      SEQUENCE {}
                                                                     OPTIONAL
ReleaseCause ::=
                             ENUMERATED {loadBalancingTAUrequired,
                                           other, cs-FallbackHighPriority-v1020, rrc-Suspend-v1320}
RedirectedCarrierInfo ::=
                                  CHOICE {
   eutra
                                      ARFCN-ValueEUTRA,
                                       CarrierFreqsGERAN,
   geran
   utra-FDD
                                      ARFCN-ValueUTRA,
   utra-TDD
                                      ARFCN-ValueUTRA,
   cdma2000-HRPD
                                      CarrierFreqCDMA2000,
   cdma2000-1xRTT
                                      CarrierFreqCDMA2000,
   utra-TDD-r10
                                      CarrierFreqListUTRA-TDD-r10
}
eutra-v9e0
                                         ARFCN-ValueEUTRA-v9e0
CarrierFreqListUTRA-TDD-r10 ::=
                                  SEQUENCE (SIZE (1..maxFreqUTRA-TDD-r10)) OF ARFCN-ValueUTRA
IdleModeMobilityControlInfo ::= SEQUENCE {
                                     FreqsPriorityListGERAN OPTIONAL,
FreqPriorityListUTRA-FDD OPTIONAL,
FreqPriorityListUTRA-TDD OPTIONAL,
BandClassPriorityListHRPD OPTIONAL,
BandClassPriorityList1XRTT OPTIONAL,
ENUMERATED {
                                  FreqPriorityListEUTRA
FreqsPriorityListGERAN
   freqPriorityListEUTRA
                                                                                      -- Need ON
                                                                                     -- Need ON
   freqPriorityListGERAN
   freqPriorityListUTRA-FDD
freqPriorityListUTRA-TDD
                                                                                     -- Need ON
                                                                                     -- Need ON
   bandClassPriorityListHRPD
   bandClassPriorityList1XRTT
                                                                                     -- Need ON
   +320
                                          min5, min10, min20, min30, min60, min120, min180,
                                          spare1}
                                                                      OPTIONAL, -- Need OR
   ...,
[[ freqPriorityListExtEUTRA-r12
                                         FreqPriorityListExtEUTRA-r12
                                                                             OPTIONAL
Need ON
  ]],
[[ freqPriorityListEUTRA-v1310
                                                                            OPTIONAL,
                                       FreqPriorityListEUTRA-v1310
Need ON
       freqPriorityListExtEUTRA-v1310
                                         FreqPriorityListExtEUTRA-v1310
                                                                             OPTIONAL
Need ON
  ]]
IdleModeMobilityControlInfo-v9e0 ::= SEQUENCE {
   freqPriorityListEUTRA-v9e0 SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v9e0
FreqPriorityListEUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA
FreqPriorityListExtEUTRA-r12 ::=
                                      SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-r12
FreqPriorityListEUTRA-v1310 ::=
                                     SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v1310
FreqPriorityListExtEUTRA-v1310 ::=
                                     SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v1310
                        SEQUENCE {
FreqPriorityEUTRA ::=
```

```
carrierFreq
                                     ARFCN-ValueEUTRA,
   cellReselectionPriority
                                      CellReselectionPriority
}
FreqPriorityEUTRA-v9e0 ::=
                                 SEQUENCE {
                                      ARFCN-ValueEUTRA-v9e0
   carrierFreq-v9e0
                                                                OPTIONAL -- Cond EARFCN-max
FreqPriorityEUTRA-r12 ::=
                                      SEQUENCE {
   carrierFreq-r12
                                          ARFCN-ValueEUTRA-r9,
   cellReselectionPriority-r12
                                          CellReselectionPriority
FreqPriorityEUTRA-v1310 ::=
                                     SEQUENCE {
   cellReselectionSubPriority-r13
                                             CellReselectionSubPriority-r13
                                                                                 OPTIONAL
Need ON
FreqsPriorityListGERAN ::=
                                  SEQUENCE (SIZE (1..maxGNFG)) OF FreqsPriorityGERAN
FreqsPriorityGERAN ::=
                                   SEOUENCE {
   carrierFreqs
                                       CarrierFreqsGERAN,
   cellReselectionPriority
                                       CellReselectionPriority
                                  SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF FreqPriorityUTRA-FDD
FreqPriorityListUTRA-FDD ::=
FreqPriorityUTRA-FDD ::=
                                  SEQUENCE {
   carrierFreq
                                      ARFCN-ValueUTRA,
   cellReselectionPriority
                                       CellReselectionPriority
FreqPriorityListUTRA-TDD ::=
                                  SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF FreqPriorityUTRA-TDD
FreqPriorityUTRA-TDD ::=
                                   SEQUENCE {
   carrierFreq
                                       ARFCN-ValueUTRA,
   cellReselectionPriority
                                       CellReselectionPriority
BandClassPriorityListHRPD ::=
                                  SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriorityHRPD
BandClassPriorityHRPD ::=
                                  SEQUENCE {
                                      BandclassCDMA2000,
   bandClass
   cellReselectionPriority
                                       CellReselectionPriority
}
BandClassPriorityList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriority1XRTT
BandClassPriority1XRTT ::=
                                   SEQUENCE {
   bandClass
                                      BandclassCDMA2000,
   cellReselectionPriority
                                       CellReselectionPriority
}
CellInfoListGERAN-r9 ::=
                             SEQUENCE (SIZE (1..maxCellInfoGERAN-r9)) OF CellInfoGERAN-r9
CellInfoGERAN-r9 ::=
                                   SEQUENCE {
   physCellId-r9
                                      PhysCellIdGERAN,
   carrierFreq-r9
                                       CarrierFreqGERAN,
   systemInformation-r9
                                       SystemInfoListGERAN
}
CellInfoListUTRA-FDD-r9 ::=
                                  SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-FDD-r9
CellInfoUTRA-FDD-r9 ::=
                                   SEOUENCE {
                                      PhysCellIdUTRA-FDD,
   physCellId-r9
   utra-BCCH-Container-r9
                                       OCTET STRING
CellInfoListUTRA-TDD-r9 ::=
                                  SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r9
CellInfoUTRA-TDD-r9 ::=
                                   SEQUENCE {
                                       PhysCellIdUTRA-TDD,
   physCellId-r9
   utra-BCCH-Container-r9
                                       OCTET STRING
                                   SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r10
CellInfoListUTRA-TDD-r10 ::=
                                   SEQUENCE {
CellInfoUTRA-TDD-r10 ::=
```

```
physCellId-r10 PhysCellIdUTRA-TDD,
carrierFreq-r10 ARFCN-ValueUTRA,
utra-BCCH-Container-r10 OCTET STRING

-- ASN1STOP
```

RRCConnectionRelease field descriptions

carrierFreq or bandClass

The carrier frequency (UTRA and E-UTRA) and band class (HRPD and 1xRTT) for which the associated cellReselectionPriority is applied.

carrierFregs

The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.

cellInfoList

Used to provide system information of one or more cells on the redirected inter-RAT carrier frequency. The system information can be used if, upon redirection, the UE selects an inter-RAT cell indicated by the *physCellId* and *carrierFreq* (GERAN and UTRA TDD) or by the *physCellId* (other RATs). The choice shall match the *redirectedCarrierInfo*. In particular, E-UTRAN only applies value *utra-TDD-r10* in case *redirectedCarrierInfo* is set to *utra-TDD-r10*.

extendedWaitTime

Value in seconds for the wait time for Delay Tolerant access requests.

freqPriorityListX

Provides a cell reselection priority for each frequency, by means of separate lists for each RAT (including E-UTRA). The UE shall be able to store at least 3 occurrences of *FreqsPriorityGERAN*. If E-UTRAN includes *freqPriorityListEUTRA-v9e0* and/or *freqPriorityListEUTRA-v1310* it includes the same number of entries, and listed in the same order, as in *freqPriorityListEUTRA* (i.e. without suffix). Field *freqPriorityListExt* includes additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. EUTRAN only includes *freqPriorityListExtEUTRA* if *freqPriorityListEUTRA* (i.e. without suffix) includes *maxFreq* entries. If E-UTRAN includes *freqPriorityListExtEUTRA-v1310* it includes the same number of entries, and listed in the same order, as in *freqPriorityListExtEUTRA-r12*.

idleModeMobilityControlInfo

Provides dedicated cell reselection priorities. Used for cell reselection as specified in TS 36.304 [4]. For E-UTRA and UTRA frequencies, a UE that supports multi-band cells for the concerned RAT considers the dedicated priorities to be common for all overlapping bands (i.e. regardless of the ARFCN that is used).

redirectedCarrierInfo

The redirectedCarrierInfo indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an E-UTRA or an inter-RAT carrier frequency, by means of the cell selection upon leaving RRC_CONNECTED as specified in TS 36.304 [4].

releaseCause

The *releaseCause* is used to indicate the reason for releasing the RRC Connection. The cause value *cs-FallbackHighPriority* is only applicable when *redirectedCarrierInfo* is present with the value set to *utra-FDD*, *utra-TDD* or *utra-TDD-r10*.

E-UTRAN should not set the *releaseCause* to *loadBalancingTAURequired* or to *cs-FallbackHighPriority* if the *extendedWaitTime* is present.

systemInformation

Container for system information of the GERAN cell i.e. one or more System Information (SI) messages as defined in TS 44.018 [45, table 9.1.1].

t320

Timer T320 as described in section 7.3. Value minN corresponds to N minutes.

utra-BCCH-Container

Contains System Information Container message as defined in TS 25.331 [19].

Conditional presence	Explanation
EARFCN-max	The field is mandatory present if the corresponding <i>carrierFreq</i> (i.e. without suffix) is set to
	maxEARFCN. Otherwise the field is not present.
IdleInfoEUTRA	The field is optionally present, need OP, if the IdleModeMobilityControlInfo (i.e. without
	suffix) is included and includes freqPriorityListEUTRA; otherwise the field is not present.
NoRedirect-r8	The field is optionally present, need OP, if the redirectedCarrierInfo (i.e. without suffix) is
	not included; otherwise the field is not present.
Redirection	The field is optionally present, need ON, if the redirectedCarrierInfo is included and set to
	geran, utra-FDD, utra-TDD or utra-TDD-r10; otherwise the field is not present.

RRCConnectionRequest

The RRCConnectionRequest message is used to request the establishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

RRCConnectionRequest message

```
-- ASN1START
RRCConnectionRequest ::=
                                   SEQUENCE {
                                   CHOICE {
   criticalExtensions
                                          RRCConnectionRequest-r8-IEs,
       rrcConnectionRequest-r8
                                           SEQUENCE { }
       criticalExtensionsFuture
}
RRCConnectionRequest-r8-IEs ::= SEQUENCE {
   establishmentCause
    ue-Identity
                                      InitialUE-Identity,
                                       EstablishmentCause,
    spare
                                      BIT STRING (SIZE (1))
InitialUE-Identity ::=
                                   CHOICE {
                                       S-TMSI,
                                       BIT STRING (SIZE (40))
   randomValue
EstablishmentCause ::=
                                   ENUMERATED {
                                       emergency, highPriorityAccess, mt-Access, mo-Signalling,
                                       mo-Data, delayTolerantAccess-v1020, mo-VoiceCall-v1280,
spare1}
-- ASN1STOP
```

RRCConnectionRequest field descriptions

establishmentCause

Provides the establishment cause for the RRC connection request as provided by the upper layers. W.r.t. the cause value names: highPriorityAccess concerns AC11..AC15, 'mt' stands for 'Mobile Terminating' and 'mo' for 'Mobile Originating. eNB is not expected to reject a *RRCConnectionRequest* due to unknown cause value being used by the UE.

random Value

Integer value in the range 0 to $2^{40} - 1$.

ue-Identity

UE identity included to facilitate contention resolution by lower layers.

RRCConnectionResume

The RRCConnectionResume message is used to resume the suspended RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

RRCConnectionResume message

```
spare3
                                                NULL,
            spare2
                                                NULL,
                                                NULL
            spare1
        criticalExtensionsFuture
                                            SEQUENCE { }
}
RRCConnectionResume-r13-IEs ::= SEQUENCE {
   radioResourceConfigDedicated-r13 RadioResourceConfigDedicated
                                                                           OPTIONAL,
                                                                                        -- Need ON
                                           NextHopChainingCount,
   nextHopChainingCount-r13
                                        MeasConfig
AntennaInfoDedicated-v10i0
ENUMERATED {true}
   measConfig-r13
                                                                            OPTIONAL.
                                                                                        -- Need ON
   antennaInfoDedicatedPCell-r13
                                                                                        -- Need ON
                                                                           OPTIONAL,
   drb-ContinueROHC-r13
                                                                           OPTIONAL,
                                                                                        -- Need OP
    {\tt lateNonCriticalExtension}
                                           OCTET STRING
                                                                            OPTIONAL,
   rrcConnectionResume-v1430-IEs
                                           RRCConnectionResume-v1430-IEs OPTIONAL
RRCConnectionResume-v1430-IEs ::= SEQUENCE {
                       OtherConfig-r9
    otherConfig-r14
                                                            OPTIONAL,
                                                                                -- Need ON
   nonCriticalExtension
                               SEQUENCE {}
                                                            OPTIONAL
-- ASN1STOP
```

RRCConnectionResume field descriptions

drb-ContinueROHC

This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset.

RRCConnectionResumeComplete

The *RRCConnectionResumeComplete* message is used to confirm the successful completion of an RRC connection resumption

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionResumeComplete message

```
-- ASN1START
RRCConnectionResumeComplete-r13 ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
                                               CHOICE {
    criticalExtensions
                                                         RRCConnectionResumeComplete-r13-IEs,
        rrcConnectionResumeComplete-r13
                                                         SEQUENCE {}
        criticalExtensionsFuture
RRCConnectionResumeComplete-r13-IEs ::= SEQUENCE {
    selectedPLMN-Identity-r13 INTEGER (1..maxPLMN-r11)
dedicatedInfoNAS-r13 DedicatedInfoNAS
r1f-InfoAvailable-r13 ENUMERATED {true}
                                                                                         OPTIONAL,
                                                                                          OPTIONAL,
                                                                                         OPTIONAL,
    rogMeasAvailable-r13 ENUMERATED {true} connEstFailInfoAvailable-r13 ENUMERATED {true} mobilityState-r13
                                                                                         OPTIONAL,
                                                                                         OPTIONAL,
    mobilityState-r13
                                           ENUMERATED {normal, medium, high, spare}
                                                                                              OPTIONAL,
    mobilityHistoryAvail-r13
                                                                                         OPTIONAL,
                                            ENUMERATED {true}
    logMeasAvailableMBSFN-r13
                                          ENUMERATED (true)
                                                                                         OPTIONAL,
                                                                                OPTIONAL,
    lateNonCriticalExtension
                                            OCTET STRING
    nonCriticalExtension
                                            SEQUENCE {}
                                                                                OPTIONAL
-- ASN1STOP
```

RRCConnectionResumeComplete field descriptions

selectedPLMN-Identity

Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in SIB1. 1 if the 1st PLMN is selected from the 1st *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList*, then the PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on.

RRCConnectionResumeRequest

The RRCConnectionResumeRequest message is used to request the resumption of a suspended RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

RRCConnectionResumeRequest message

```
-- ASN1START
RRCConnectionResumeRequest-r13 ::= SEQUENCE {
                                           CHOICE {
    criticalExtensions
       rrcConnectionResumeRequest-r13
                                                RRCConnectionResumeRequest-r13-IEs,
        criticalExtensionsFuture
                                                SEQUENCE {}
}
RRCConnectionResumeRequest-r13-IEs ::=
                                            SEQUENCE {
   resumeIdentity-r13
                                                    CHOICE {
                                                       ResumeIdentity-r13,
       resumeTD-r13
        truncatedResumeID-r13
                                                        BIT STRING (SIZE (24))
   shortResumeMAC-I-r13
                                                       BIT STRING (SIZE (16)),
   resumeCause-r13
                                                    ResumeCause,
    spare
                                                    BIT STRING (SIZE (1))
ResumeCause ::=
                            ENUMERATED {
                                        emergency, highPriorityAccess, mt-Access, mo-Signalling,
                                        mo-Data, delayTolerantAccess-v1020, mo-VoiceCall-v1280,
spare1}
-- ASN1STOP
```

RRCConnectionResumeRequest field descriptions

resumeCause

Provides the resume cause for the RRC connection resume request as provided by the upper layers.

resumeldentity

UE identity to facilitate UE context retrieval at eNB

shortResumeMAC-I

Authentication token to facilitate UE authentication at eNB

RRCConnectionSetup

The RRCConnectionSetup message is used to establish SRB1.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

RRCConnectionSetup message

```
-- ASN1START
RRCConnectionSetup ::=
                                  SEQUENCE {
                                 RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
   criticalExtensions
                                      CHOICE {
                                          CHOICE {
       c1
           rrcConnectionSetup-r8
                                              RRCConnectionSetup-r8-IEs,
           spare7 NULL,
           spare6 NULL, spare5 NULL, spare4 NULL,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
   }
}
RRCConnectionSetup-r8-IEs ::=
                                 SEQUENCE {
   radioResourceConfigDedicated RadioResourceConfigDedicated,
   nonCriticalExtension
                                                                         OPTIONAL
                                     RRCConnectionSetup-v8a0-IEs
RRCConnectionSetup-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                      OCTET STRING
                                                                         OPTIONAL,
                                      SEQUENCE {}
   nonCriticalExtension
                                                                         OPTIONAL
-- ASN1STOP
```

RRCConnectionSetupComplete

The *RRCConnectionSetupComplete* message is used to confirm the successful completion of an RRC connection establishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionSetupComplete message

```
-- ASN1START
RRCConnectionSetupComplete ::=
                                   SEQUENCE {
   rrc-TransactionIdentifier
                                   RRC-TransactionIdentifier,
   criticalExtensions
                                       CHOICE {
       c1
                                          CHOICE {
           rrcConnectionSetupComplete-r8
                                              RRCConnectionSetupComplete-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
                                          SEQUENCE {}
       criticalExtensionsFuture
   }
}
RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
   selectedPLMN-Identity
                                      INTEGER (1..maxPLMN-r11),
                                      RegisteredMME
   registeredMME
                                                                          OPTIONAL,
   dedicatedInfoNAS
                                      DedicatedInfoNAS,
   nonCriticalExtension
                                      RRCConnectionSetupComplete-v8a0-IEs OPTIONAL
}
```

```
RRCConnectionSetupComplete-v8a0-IEs ::= SEQUENCE {
     lateNonCriticalExtension OCTET STRING

RRCConnectionSetupComplete-v1020-IES OPTIONAL
}
RRCConnectionSetupComplete-v1020-IEs ::= SEQUENCE {
    gummei-Type-r10 ENUMERATED {native, mapped} OPTIONAL, rlf-InfoAvailable-r10 ENUMERATED {true} OPTIONAL, logMeasAvailable-r10 ENUMERATED {true} OPTIONAL, rn-SubframeConfigReq-r10 ENUMERATED {required, notRequired} OPTIONAL, nonCriticalExtension RRCConnectionSetupComplete-v1130-IEs OPTIONAL
RRCConnectionSetupComplete-v1130-IEs ::= SEQUENCE {
    OPTIONAL,
                                                                                                           OPTIONAL
RRCConnectionSetupComplete-v1250-IEs ::= SEQUENCE {
    mobilityState-r12 ENUMERATED {normal, medium, high, spare} mobilityHistoryAvail-r12 ENUMERATED {true} OPTIONAL, logMeasAvailableMBSFN-r12 ENUMERATED {true} OPTIONAL, nonCriticalExtension RRCConnectionSetupComplete-v1320-IEs
                                                                                                           OPTIONAL,
    OPTIONAL
}
RRCConnectionSetupComplete-v1320-IEs ::= SEQUENCE {
    ce-ModeB-r13
                                                 ENUMERATED {supported}
                                                                                                           OPTIONAL,
    s-TMSI-r13
                                                  S-TMSI
                                                                                                           OPTIONAL,
    attachWithoutPDN-Connectivity-r13 ENUMERATED {true}
up-CIoT-EPS-Optimisation-r13 ENUMERATED {true}
cp-CIoT-EPS-Optimisation-r13 ENUMERATED {true}
nonCriticalExtension RRCConnectionSetu
                                                                                                           OPTIONAL.
                                                                                                           OPTIONAL,
                                                                                                           OPTIONAL,
                                                RRCConnectionSetupComplete-v1330-IEs
}
RRCConnectionSetupComplete-v1330-IEs ::= SEQUENCE {
    ue-CE-NeedULGaps-r13
                                                      ENUMERATED {true}
     nonCriticalExtension
                                                  RRCConnectionSetupComplete-v1430-IEs OPTIONAL
}
RRCConnectionSetupComplete-v1430-IEs ::= SEQUENCE {
                                                 INTEGER (0..65535)
SEQUENCE {}
    dcn-ID-r14
                                                                                           OPTIONAL.
                                                  SEQUENCE {}
     nonCriticalExtension
                                                                                          OPTIONAL
}
RegisteredMME ::=
                                            SEQUENCE {
   plmn-Identity
                                              PLMN-Identity
                                                                                               OPTIONAL.
     mmegi
                                                   BIT STRING (SIZE (16)),
     mmec
                                                  MMEC
}
-- ASN1STOP
```

RRCConnectionSetupComplete field descriptions

attachWithoutPDN-Connectivity

This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers and specified in TS 24.301 [35].

cp-CloT-EPS-Optimisation

This field is included when the UE supports the Control plane CIoT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35].

ce-ModeB

Indicates whether the UE supports operation in CE mode B, as specified in TS 36.306 [5].

dcn-ID

The Dedicated Core Network Identity, see TS 23.401 [41].

gummei-Type

This field is used to indicate whether the GUMMEI included is native (assigned by EPC) or mapped (from 2G/3G identifiers).

mmegi

Provides the Group Identity of the registered MME within the PLMN, as provided by upper layers, see TS 23.003 [27].

mobilityState

This field indicates the UE mobility state (as defined in TS 36.304 [4, 5.2.4.3]) just prior to UE going into RRC_CONNECTED state. The UE indicates the value of *medium* and *high* when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value *normal*.

registeredMME

This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers.

rn-SubframeConfigReq

If present, this field indicates that the connection establishment is for an RN and whether a subframe configuration is requested or not.

selectedPLMN-Identity

Index of the PLMN selected by the UE from the *plmn-IdentityList* fields included in SIB1. 1 if the 1st PLMN is selected from the 1st *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList*, then the PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on.

up-CloT-EPS-Optimisation

This field is included when the UE supports the User plane CloT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35].

ue-CE-NeedULGaps

Indicates whether the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5].

SCGFailureInformation

The SCGFailureInformation message is used to provide information regarding failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

SCGFailureInformation message

```
-- ASN1START
SCGFailureInformation-r12 ::=
                                    SEQUENCE {
    criticalExtensions
                                        CHOICE {
                                             CHOICE {
        c1
            scgFailureInformation-r12
                                                SCGFailureInformation-r12-IEs.
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture
                                            SEQUENCE { }
}
SCGFailureInformation-r12-IEs ::=
                                   SEQUENCE {
    failureReportSCG-r12
                                        FailureReportSCG-r12
                                                                         OPTIONAL.
    nonCriticalExtension
                                         SCGFailureInformation-v1310-IEs OPTIONAL
}
```

```
SCGFailureInformation-v1310-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                     OCTET STRING (CONTAINING SCGFailureInformation-v12d0-IEs)
                  OPTIONAL,
   nonCriticalExtension
                                     SEQUENCE {}
                                                                        OPTIONAL
 - Late non-critical extensions:
SCGFailureInformation-v12d0-IEs ::= SEQUENCE {
                                     FailureReportSCG-v12d0
   failureReportSCG-v12d0
                                                                        OPTIONAL,
   nonCriticalExtension
                                      SEQUENCE {}
                                                                        OPTIONAL
}
-- Regular non-critical extensions:
FailureReportSCG-r12 ::= SEQUENCE {
   failureType-r12
                                    ENUMERATED {t313-Expiry, randomAccessProblem,
                                           rlc-MaxNumRetx, scg-ChangeFailure },
   measResultServFreqList-r12
                                     MeasResultServFreqList-r10 OPTIONAL,
   measResultNeighCells-r12
                                     MeasResultList2EUTRA-r9
                                                                   OPTIONAL,
   [[ failureType-v1290
                                     ENUMERATED {maxUL-TimingDiff-v1290} OPTIONAL
   ]],
   [[ measResultServFreqListExt-r13 MeasResultServFreqListExt-r13
    ]]
}
FailureReportSCG-v12d0 ::= SEQUENCE {
   measResultNeighCells-v12d0
                                     MeasResultList2EUTRA-v9e0
                                                                        OPTIONAL
-- ASN1STOP
```

SCPTMConfiguration

The SCPTMConfiguration message contains the control information applicable for MBMS services transmitted via SC-MRB.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: SC-MCCH
Direction: E-UTRAN to UE

SCPTMConfiguration message

```
-- ASN1START
SCPTMConfiguration-r13 ::= SEQUENCE {
    sc-mtch-InfoList-r13 SC-MTC
                                   SC-MTCH-InfoList-r13,
SCPTM-NeighbourCellList-r13
    scptm-NeighbourCellList-r13
                                                                              OPTIONAL,
                                                                                            -- Need OP
    lateNonCriticalExtension OCTET STRING
                                                                              OPTIONAL,
                                      SCPTMConfiguration-v1340
    nonCriticalExtension
                                                                                                OPTIONAL
SCPTMConfiguration-v1340 ::= SEQUENCE {
    p-b-r13
                                                                     OPTIONAL,
                                            INTEGER (0..3)
                                                                                   -- Need ON
    nonCriticalExtension
                                            SEQUENCE {}
                                                                      OPTIONAL
-- ASN1STOP
```

SCPTMConfiguration field descriptions

sc-mtch-InfoList

Provides the configuration of each SC-MTCH in the current cell.

scptm-NeighbourCellList

List of neighbour cells providing MBMS services via SC-MRB. When absent, the UE shall assume that MBMS services listed in the *SCPTMConfiguration* message are not provided via SC-MRB in any neighbour cell.

p-b

Parameter: P_R for the PDSCH scrambled by G-RNTI, see TS 36.213 [23, Table 5.2-1].

SCPTMConfiguration-BR

The SCPTMConfiguration-BR message contains the control information applicable for MBMS services transmitted via SC-MRB for BL UEs or UEs in CE.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: SC-MCCH
Direction: E-UTRAN to UE

SCPTMConfiguration-BR message

```
-- ASN1START
SCPTMConfiguration-BR-r14 ::= SEQUENCE {
                               SC-MTCH-InfoList-BR-r14,
   sc-mtch-InfoList-r14
   scptm-NeighbourCellList-r14
                                  SCPTM-NeighbourCellList-r13
                                                                      OPTIONAL,
                                                                                  -- Need OP
   p-b-r14
                                  INTEGER (0..3)
                                                                      OPTIONAL,
                                                                                  -- Need OR
   lateNonCriticalExtension
                                  OCTET STRING
                                                                      OPTIONAL,
   nonCriticalExtension
                                   SEQUENCE {}
                                                                      OPTIONAL
}
-- ASN1STOP
```

SCPTMConfiguration-BR field descriptions

p-b

Parameter: P_B for the PDSCH scrambled by G-RNTI, see TS 36.213 [23, Table 5.2-1].

sc-mtch-InfoList

Provides the configuration of each SC-MTCH in the current cell for BL UEs or UEs in CE.

scptm-NeighbourCellList

List of neighbour cells providing MBMS services via SC-MRB. When absent, the BL UE or UE in CE shall assume that MBMS services listed in the *SCPTMConfiguration-BR* message are not provided via SC-MRB in any neighbour cell.

SecurityModeCommand

The SecurityModeCommand message is used to command the activation of AS security.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

SecurityModeCommand message

```
-- ASN1START

SecurityModeCommand ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions CHOICE {
```

```
SecurityModeCommand-r8
Spare? Nutr
       c1
                                              SecurityModeCommand-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                           SEQUENCE {}
   }
}
SecurityModeCommand-r8-IEs ::= SEQUENCE {
   securityConfigSMC
nonCriticalExtension
   securityConfigSMC
                                      SecurityConfigSMC,
                                      SecurityModeCommand-v8a0-IEs
                                                                         OPTIONAL
SecurityModeCommand-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
                                                                          OPTIONAL,
                                      SEQUENCE {}
   nonCriticalExtension
                                                                          OPTIONAL
   urityConfigSMC ::= SEQUENCE {
securityAlgorithmConfig Securi
SecurityConfigSMC ::=
                                      SecurityAlgorithmConfig,
-- ASN1STOP
```

SecurityModeComplete

The SecurityModeComplete message is used to confirm the successful completion of a security mode command.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

SecurityModeComplete message

```
-- ASN1START
    urityModeComplete ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions CHOICE {
        securityModeComplete-r8 SecurityModeComplete-r
        criticalExtensionsFuture SEQUENCE {}
SecurityModeComplete ::=
                                                    SecurityModeComplete-r8-IEs,
}
SecurityModeComplete-r8-IEs ::= SEQUENCE {
    nonCriticalExtension
                                                    SecurityModeComplete-v8a0-IEs
     OPTIONAL
SecurityModeComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING
                                                                                                    OPTIONAL,
     nonCriticalExtension
                                                    SEQUENCE {}
                                                                                                    OPTIONAL
-- ASN1STOP
```

SecurityModeFailure

The SecurityModeFailure message is used to indicate an unsuccessful completion of a security mode command.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

SecurityModeFailure message

```
-- ASN1START
SecurityModeFailure ::=
                                   SEQUENCE {
   urityModeFailure ::=
rrc-TransactionIdentifier
                                 RRC-TransactionIdentifier,
   criticalExtensions
                                      CHOICE {
       securityModeFailure-r8
       criticalExtensionsFuture
                                          SecurityModeFailure-r8-IEs,
                                          SEQUENCE {}
}
SecurityModeFailure-r8-IEs ::= SEQUENCE {
   nonCriticalExtension
                                      SecurityModeFailure-v8a0-IEs
   OPTIONAL
SecurityModeFailure-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
                                                                          OPTIONAL,
   nonCriticalExtension
                                      SEQUENCE {}
                                                                          OPTIONAL
-- ASN1STOP
```

SidelinkUEInformation

The SidelinkUEInformation message is used for the indication of sidelink information to the eNB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

SidelinkUEInformation message

```
-- ASN1START
                                  SEQUENCE {
SidelinkUEInformation-r12 ::=
   criticalExtensions
                                  CHOICE {
       c1
                                    CHOICE {
           sidelinkUEInformation-r12
                                       SidelinkUEInformation-r12-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                          SEQUENCE {}
}
{\tt SidelinkUEInformation-r12-IEs} \; ::= \; \; {\tt SEQUENCE} \; \{
   OPTIONAL,
                                                              OPTIONAL,
                                                             OPTIONAL,
                                                              OPTIONAL,
                                                              OPTIONAL
   nonCriticalExtension
                                 SidelinkUEInformation-v1310-IEs OPTIONAL
SidelinkUEInformation-v1310-IEs ::= SEQUENCE {
   commTxResourceReqUC-r13 SL-CommTxResourceReq-r12 OPTIONAL,
   commTxResourceInfoReqRelay-r13 SEQUENCE {
    commTxResourceReqRelay-r13 SL-CommTxR
                                      SL-CommTxResourceReg-r12
                                                                      OPTIONAL,
       commTxResourceReqRelayUC-r13 SL-CommTxResourceReq-r12
                                                                     OPTIONAL,
```

```
ENUMERATED {relayUE, remoteUE}
        ue-Type-r13
                                                                   OPTIONAL,
   discTxResourceReq-v1310 SEQUENCE {
    carrierFreqDiscTx-r13 INTEGE
        carrierFreqDiscTx-r13 INTEGER (1..maxFreq) OPTIONAL,
discTxResourceReqAddFreq-r13 SL-DiscTxResourceReqPerFreqList-r13 OPTIONAL
                                                                  OPTIONAL,
    discTxResourceReqPS-r13 SL-DiscTxResourceReq-r13 OPTIONAL,
                                    SL-GapRequest-r13 OPTIONAL, SL-GapRequest-r13 OPTIONAL,
   discRxGapReg-r13
    discTxGapReq-r13
    discSysInfoReportFreqList-r13
                                         SL-DiscSysInfoReportFreqList-r13 OPTIONAL,
   nonCriticalExtension
                                    SidelinkUEInformation-v1430-IEs
                                                                                       OPTIONAL
SidelinkUEInformation-v1430-IEs ::= SEQUENCE {
   v2x-CommRxInterestedFreqList-r14 SL-V2X-CommFreqList-r14 p2x-CommTxType-r14 ENUMERATED {true}
   v2x-CommRxInterescented
p2x-CommTxType-r14 ENUMERATED {true}
v2x-CommTxResourceReq-r14 SL-V2X-CommTxFreqList-r14
SEQUENCE {}
                                                                              OPTIONAL,
                                                                              OPTIONAL,
                                                                               OPTIONAL
}
                                    SEQUENCE {
SL-CommTxResourceReq-r12 ::=
                                    ARFCN-ValueEUTRA-r9
    carrierFreq-r12
                                                                 OPTIONAL,
    destinationInfoList-r12
                                     SL-DestinationInfoList-r12
SL-DiscTxResourceReqPerFreqList-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-DiscTxResourceReq-r13
SL-DiscTxResourceReq-r13 ::=
                                 SEQUENCE {
                                    INTEGER (1..maxFreq)
   carrierFreqDiscTx-r13
                                                                     OPTIONAL,
    discTxResourceReq-r13
                                    INTEGER (1..63)
SL-DestinationInfoList-r12 ::= SEQUENCE (SIZE (1..maxSL-Dest-r12)) OF SL-DestinationIdentity-r12
SL-DestinationIdentity-r12 ::= BIT STRING (SIZE (24))
SL-DiscSysInfoReportFreqList-r13 ::= SEQUENCE (SIZE (1.. maxSL-DiscSysInfoReportFreq-r13)) OF SL-
DiscSysInfoReport-r13
SL-V2X-CommFreqList-r14 ::= SEQUENCE (SIZE (1..maxFreqV2X-r14)) OF INTEGER (0..maxFreqV2X-1-r14)
SL-V2X-CommTxFreqList-r14 ::= SEQUENCE (SIZE (1..maxFreqV2X-r14)) OF SL-V2X-CommTxResourceReq-r14
SL-V2X-CommTxResourceReq-r14 ::=
                                         SEQUENCE {
   carrierFreqCommTx-r14 INTEGER (0.. maxFreqV2X-1-r14)
                                                                               OPTIONAL,
    v2x-TypeTxSync-r14
                                     SL-TypeTxSync-r14
                                                                      OPTIONAL,
    v2x-DestinationInfoList-r14 SL-DestinationInfoList-r12
                                                                      OPTIONAL
}
-- ASN1STOP
```

SidelinkUEInformation field descriptions

carrierFreaCommTx

Indicates the index of the frequency on which the UE is interested to transmit V2X sidelink communication. The value 1 corresponds to the frequency of first entry in *v2x-InterFreqInfoList* broadcast in SIB21, the value 2 corresponds to the frequency of second entry in *v2x-InterFreqInfoList* broadcast in SIB21 and so on. The value 0 corresponds the PCell's frequency.

carrierFreqDiscTx

Indicates the frequency by the index of the entry in field discInterFreqList within SystemInformationBlockType19. Value 1 corresponds to the first entry in discInterFreqList within SystemInformationBlockType19, value 2 corresponds to the second entry in this list and so on.

commRxInterestedFreq

Indicates the frequency on which the UE is interested to receive sidelink communication.

commTxResourceReq

Indicates the frequency on which the UE is interested to transmit non-relay related sidelink communication as well as the one-to-many sidelink communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources. NOTE 1.

commTxResourceReqRelay

Indicates the relay related one-to-many sidelink communication transmission destination(s) for which the sidelink relay UE requests E-UTRAN to assign dedicated resources.

commTxResourceReqRelayUC

Indicates the relay related one-to-one sidelink communication transmission destination(s) for which the sidelink relay UE or sidelink remote UE requests E-UTRAN to assign dedicated resources i.e. either contains the unicast destination identity of the sidelink relay UE or of the sidelink remote UE.

commTxResourceRegUC

Indicates the frequency on which the UE is interested to transmit non-relay related one-to-one sidelink communication as well as the sidelink communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources. NOTE 1.

destinationInfoList

Indicates the destination(s) for relay or non-relay related one-to-one or one-to-many sidelink communication. For one-to-one sidelink communication the destination is identified by the ProSe UE ID for unicast communication, while for one-to-many the destination it is identified by the ProSe Layer-2 Group ID as specified in TS 23.303 [68].

discRxInterest

Indicates that the UE is interested to monitor sidelink discovery announcements.

discSysInfoReportFreqList

Indicates, for one or more frequencies, a list of sidelink discovery related parameters acquired from system Information of cells on configured inter-frequency carriers.

discTxResourceReq

Indicates the number of separate discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting sidelink discovery announcement(s).

discTxResourceReqAddFreq

Indicates, for any frequencies in addition to the one covered by <code>discTxResourceReq</code>, the number of separate discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting sidelink discovery announcement(s).

discTxResourceReqPS

Indicates the number of separate PS related discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting PS related sidelink discovery announcement(s).

p2x-CommTxType

Indicates that the requested transmission resource pool is for P2X related V2X sidelink communication.

v2x-CommRxInterestedFreqList

Indicates the index(es) of the frequency(ies) on which the UE is interested to receive V2X sidelink communication. The value 1 corresponds to the frequency of first entry in *v2x-InterFreqInfoList* broadcast in SIB21, the value 2 corresponds to the frequency of second entry in *v2x-InterFreqInfoList* broadcast in SIB21 and so on. The value 0 corresponds the PCell's frequency.

v2x-DestinationInfoList

Indicates the destination(s) for V2X sidelink communication.

v2x-TypeTxSync

Indicates the synchronization reference used by the UE.

NOTE 1: When configuring commTxResourceReq, commTxResourceReqUC, commTxResourceReqRelay and commTxResourceReqRelayUC, E-UTRAN configures at most maxSL-Dest-r12 destinations in total (i.e. as included in the four fields together).

SystemInformation

The *SystemInformation* message is used to convey one or more System Information Blocks. All the SIBs included are transmitted with the same periodicity. *SystemInformation-BR* and *SystemInformation-MBMS* use the same structure as *SystemInformation*.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH and BR-BCCH

Direction: E-UTRAN to UE

SystemInformation message

```
-- ASN1START
SystemInformation-BR-r13 ::=
                               SystemInformation
SystemInformation-MBMS-r14 ::= SystemInformation
SystemInformation ::=
                                    SEQUENCE {
   criticalExtensions
                                       CHOICE {
       systemInformation-r8
                                            SystemInformation-r8-IEs,
       criticalExtensionsFuture
                                            SEQUENCE {}
SystemInformation-r8-IEs ::=
                                  SEQUENCE {
   sib-TypeAndInfo
                                        SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
       sib2
                                            SystemInformationBlockType2,
        sib3
                                            SystemInformationBlockType3,
        sib4
                                            SystemInformationBlockType4,
        sib5
                                            SystemInformationBlockType5,
        sib6
                                            SystemInformationBlockType6,
       sib7
                                            SystemInformationBlockType7,
        sib8
                                            SystemInformationBlockType8,
        sib9
                                            SystemInformationBlockType9,
       sib10
                                            SystemInformationBlockType10,
       sib11
                                            SystemInformationBlockType11,
        sib12-v920
                                            SystemInformationBlockType12-r9,
        sib13-v920
                                            SystemInformationBlockType13-r9,
       sib14-v1130
                                            SystemInformationBlockType14-r11,
        sib15-v1130
                                            SystemInformationBlockType15-r11,
        sib16-v1130
                                            SystemInformationBlockType16-r11,
        sib17-v1250
                                            SystemInformationBlockType17-r12,
        sib18-v1250
                                            SystemInformationBlockType18-r12,
       sib19-v1250
                                            SystemInformationBlockType19-r12,
        sib20-v1310
                                            SystemInformationBlockType20-r13,
        sib21-v1430
                                            SystemInformationBlockType21-r14
   nonCriticalExtension
                                        SystemInformation-v8a0-IEs
                                                                            OPTIONAL
SystemInformation-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                        OCTET STRING
                                                                            OPTIONAL,
   nonCriticalExtension
                                        SEQUENCE {}
                                                                            OPTIONAL
-- ASN1STOP
```

SystemInformationBlockType1

SystemInformationBlockType1 contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information. SystemInformationBlockType1-BR uses the same structure as SystemInformationBlockType1.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH and BR-BCCH

Direction: E-UTRAN to UE

SystemInformationBlockType1 message

```
-- ASN1START
SystemInformationBlockType1-BR-r13 ::= SystemInformationBlockType1
SystemInformationBlockType1 ::= SEQUENCE {
    cellAccessRelatedInfo
plmn-IdentityList
trackingAreaCode
                                            SEQUENCE {
                                                 PLMN-IdentityList,
                                                 TrackingAreaCode,
                                                 CellIdentity,
        cellIdentity
                                                 ENUMERATED {barred, notBarred},
         cellBarred
        intraFreqReselection
csg-Indication
                                                 ENUMERATED {allowed, notAllowed},
                                                 BOOLEAN,
        csg-Identity
                                                 CSG-Identity
                                                                            OPTIONAL
                                                                                          -- Need OR
    cellSelectionInfo SEQUENCE {
                                            Q-RxLevMin,
        q-RxLevMin
        q-RxLevMinOffset
                                                 INTEGER (1..8)
                                                                          OPTIONAL
                                                                                          -- Need OP
    p-Max
                                            P-Max
    p-Max
freqBandIndicator
schedulingInfoList
tdd-Config
                                                                            OPTIONAL,
                                                                                                  -- Need OP
                                            FreqBandIndicator,
                                    SchedulingInfoList,
TDD-Config
ENUMERATED {
                                                                            OPTIONAL,
                                                                                          -- Cond TDD
    si-WindowLength
                                                ms1, ms2, ms5, ms10, ms15, ms20,
    systemInfoValueTag iNTEGER (0..31), nonCriticalExtension SystemInfoValueTag
                                            SystemInformationBlockType1-v890-IES OPTIONAL
SystemInformationBlockType1-v890-IEs::= SEQUENCE {
 lateNonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType1-v8h0-
                 OPTIONAL,
TES)
    nonCriticalExtension
                                            SystemInformationBlockType1-v920-IEs OPTIONAL
-- Late non critical extensions
SystemInformationBlockType1-v8h0-IEs ::= SEQUENCE {
                                            MultiBandInfoList
    nonCriticalExtension
                                                                       OPTIONAL, -- Need OR
                                            SystemInformationBlockType1-v9e0-IEs OPTIONAL
{\tt SystemInformationBlockType1-v9e0-IEs} \ ::= \ {\tt SEQUENCE} \ \big\{
    freqBandIndicator-v9e0 FreqBandIndicator-v9e0 OPTIONAL, -- Cond FBI-max multiBandInfoList-v9e0 MultiBandInfoList-v9e0 OPTIONAL, -- Cond mFBI-max nonCriticalExtension SystemInformationPlockType1 v10i0 IEC OPTIONAL
    nonCriticalExtension
                                            SystemInformationBlockType1-v10j0-IEs OPTIONAL
SystemInformationBlockType1-v10j0-IEs ::= SEQUENCE {
    freqBandInfo-r10 NS-PmaxList-r10 OPTIONAL, -- Need OR multiBandInfoList-v10j0 MultiBandInfoList-v10j0 OPTIONAL, -- Need OR nonCriticalExtension SystemInformationBlockType1-v1010-IEs
}
    SystemInformationBlockType1-v1010-IEs ::= SEQUENCE {
                                                                                          -- Need OR
                                            SEQUENCE {}
-- Regular non critical extensions
SystemInformationBlockType1-v920-IEs ::= SEQUENCE {
    ims-EmergencySupport-r9
cellSelectionInfo-v920
nonCriticalExtension

SEQUENCE {
ENUMERATED {true}
CellSelectionInfo-v920
SystemInformationBlockTv
                                            ENUMERATED {true} OPTIONAL, -- Need OR CellSelectionInfo-v920 OPTIONAL, -- Cond RSF
                                                                                          -- Cond RSRQ
                                           SystemInformationBlockType1-v1130-IEs OPTIONAL
```

```
SystemInformationBlockType1-v1130-IEs ::= SEQUENCE {
                                   TDD-Config-v1130
    tdd-Config-v1130
                                                                OPTIONAL,
                                                                            -- Cond TDD-OR
   tdd-Config-v1130 TDD-Config-v1130 OPTIONAL, cellSelectionInfo-v1130 CellSelectionInfo-v1130 OPTIONAL,
                                                                            -- Cond WB-RSRQ
                                   SystemInformationBlockType1-v1250-IEs OPTIONAL
    nonCriticalExtension
SystemInformationBlockType1-v1250-IEs ::= SEQUENCE {
    cellAccessRelatedInfo-v1250
                                                SEQUENCE {
       categoryOAllowed-r12
                                                    ENUMERATED {true}
                                                                           OPTIONAL
                                                                                         -- Need OP
                                            CellSelectionInfo-v1250 OPTIONAL, -- Cond RSRQ2
ENUMERATED {true} OPTIONAL, -- Cond mFBI
    cellSelectionInfo-v1250
                                            ENUMERATED {true}
    freqBandIndicatorPriority-r12
                                    SystemInformationBlockType1-v1310-IEs OPTIONAL
    nonCriticalExtension
}
SystemInformationBlockType1-v1310-IEs ::= SEQUENCE {
                                                BIT STRING (SIZE (10)) OPTIONAL, -- Need OR ENUMERATED {true} OPTIONAL, -- Need OR
   hyperSFN-r13
                                                ENUMERATED {true}
    eDRX-Allowed-r13
    cellSelectionInfoCE-r13
                                            CellSelectionInfoCE-r13 OPTIONAL, -- Need OP
    bandwidthReducedAccessRelatedInfo-r13
                                           SEQUENCE {
       si-WindowLength-BR-r13
                                                ENUMERATED {
                                                    ms20, ms40, ms60, ms80, ms120,
                                                    ms160, ms200, spare},
       si-RepetitionPattern-r13
                                                ENUMERATED {everyRF, every2ndRF, every4thRF,
                                                            every8thRF},
        schedulingInfoList-BR-r13
                                                SchedulingInfoList-BR-r13 OPTIONAL, -- Cond SI-
BR
        fdd-DownlinkOrTddSubframeBitmapBR-r13 CHOICE {
                                                   BIT STRING (SIZE (10)),
            subframePattern10-r13
                                                    BIT STRING (SIZE (40))
            subframePattern40-r13
                                                                            OPTIONAL,
                                                                                         -- Need OP
        fdd-UplinkSubframeBitmapBR-r13
                                                BIT STRING (SIZE (10))
                                                                           OPTIONAL,
                                                                                        -- Need OP
                                                INTEGER (1..4),
        startSymbolBR-r13
        startSymbolBR-r13
si-HoppingConfigCommon-r13
                                                ENUMERATED {on,off},
                                                ENUMERATED {true} OPTIONAL,
        si-ValidityTime-r13
                                                                                         -- Need OP
        systemInfoValueTagList-r13
                                                SystemInfoValueTagList-r13 OPTIONAL
                                                                                        -- Need OR
                                                                    OPTIONAL, -- Cond BW-reduced
    nonCriticalExtension
                                                SystemInformationBlockType1-v1320-IEs
}
SystemInformationBlockType1-v1320-IEs ::=
                                            SEOUENCE {
                                           SEQUENCE {
    freqHoppingParametersDL-r13
        mpdcch-pdsch-HoppingNB-r13
                                                ENUMERATED {nb2, nb4} OPTIONAL,
                                                                                        -- Need OR
        interval-DLHoppingConfigCommonModeA-r13 CHOICE {
                                                ENUMERATED {int1, int2, int4, int8},
           interval-FDD-r13
            interval-TDD-r13
                                                ENUMERATED {int1, int5, int10, int20}
                                                                            OPTIONAL.
                                                                                         -- Need OR
        interval-DLHoppingConfigCommonModeB-r13 CHOICE {
                                                ENUMERATED {int2, int4, int8, int16},
            interval-FDD-r13
            interval-TDD-r13
                                                ENUMERATED { int5, int10, int20, int40}
                                                                            OPTIONAL,
                                                                                         -- Need OR
        mpdcch-pdsch-HoppingOffset-r13
                                                INTEGER (1..maxAvailNarrowBands-r13)
                                                                                        OPTIONAL --
Need OR
                                                                    OPTIONAL,
                                                                                -- Cond Hopping
    nonCriticalExtension
                                                SystemInformationBlockType1-v1350-IEs
    OPTIONAL
}
SystemInformationBlockType1-v1350-IEs ::= SEQUENCE {
    cellSelectionInfoCE1-r13
                                            CellSelectionInfoCE1-r13 OPTIONAL,
                                                                                     -- Need OP
    nonCriticalExtension
                                            SystemInformationBlockType1-v1360-IEs
    OPTIONAL
}
SystemInformationBlockType1-v1360-IEs ::= SEQUENCE {
                                            CellSelectionInfoCE1-v1360 OPTIONAL, -- Cond
    cellSelectionInfoCE1-v1360
OrxlevminCE1
   nonCriticalExtension
                                                SystemInformationBlockType1-v1430-IEs
                                                                                             OPTIONAL
SystemInformationBlockType1-v1430-IEs ::= SEQUENCE {
                                            ENUMERATED {true}
    eCallOverIMS-Support-r14
                                                                        OPTIONAL,
                                                                                     -- Need OR
    tdd-Config-v1430
                                            TDD-Config-v1430
                                                                        OPTIONAL,
                                                                                     -- Cond TDD-OR
    cellAccessRelatedInfoList-r14
                                            SEQUENCE (SIZE (1..maxPLMN-1-r14)) OF
                                            CellAccessRelatedInfo-r14 OPTIONAL,
                                                                                     -- Need OR
   nonCriticalExtension
                                            SEQUENCE {}
                                                                        OPTIONAL
}
```

```
SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo
PLMN-IdentityList ::=
PLMN-IdentityInfo ::=
                                        SEQUENCE {
                                           PLMN-Identity,
   plmn-Identity
    cellReservedForOperatorUse
                                            ENUMERATED {reserved, notReserved}
SchedulingInfoList ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo
SchedulingInfo ::= SEQUENCE {
   si-Periodicity
                                       ENUMERATED {
                                            rf8, rf16, rf32, rf64, rf128, rf256, rf512},
                                        SIB-MappingInfo
    sib-MappingInfo
SchedulingInfoList-BR-r13 ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo-BR-r13
SchedulingInfo-BR-r13 ::= SEQUENCE {
    si-Narrowband-r13
                                    INTEGER (1..maxAvailNarrowBands-r13),
    si-TBS-r13
                                    ENUMERATED {b152, b208, b256, b328, b408, b504, b600, b712,
                                                b808, b936}
SIB-MappingInfo ::= SEQUENCE (SIZE (0..maxSIB-1)) OF SIB-Type
SIB-Type ::=
                                    ENUMERATED {
                                        sibType3, sibType4, sibType5, sibType6,
                                        sibType7, sibType8, sibType9, sibType10
                                        sibType11, sibType12-v920, sibType13-v920,
                                        sibType14-v1130, sibType15-v1130, sibType16-v1130, sibType16-v1130, sibType17-v1250, sibType18-v1250,
                                        ..., sibType19-v1250, sibType20-v1310, sibType21-v1430}
SystemInfoValueTagList-r13 ::=
                                    SEQUENCE (SIZE (1..maxSI-Message)) OF SystemInfoValueTagSI-r13
SystemInfoValueTagSI-r13 ::=
                                   INTEGER (0..3)
CellSelectionInfo-v920 ::=
                                    SEQUENCE {
    q-QualMin-r9
                                        Q-QualMin-r9,
    q-QualMinOffset-r9
                                        INTEGER (1..8)
                                                                           OPTIONAL -- Need OP
CellSelectionInfo-v1130 ::=
                                  SEQUENCE {
                                        Q-QualMin-r9
   q-QualMinWB-r11
CellSelectionInfo-v1250 ::=
                                    SEQUENCE {
   q-QualMinRSRQ-OnAllSymbols-r12
                                                        O-OualMin-r9
CellAccessRelatedInfo-r14 ::= SEQUENCE {
   plmn-IdentityList-r14 PLMN-IdentityList,
    trackingAreaCode-r14
                                       TrackingAreaCode,
   cellIdentity-r14
                                       CellIdentity
}
-- ASN1STOP
```

SystemInformationBlockType1 field descriptions

bandwithReducedAccessRelatedInfo

Access related information for BL UEs and UEs in CE. NOTE 3.

category0Allowed

The presence of this field indicates category 0 UEs are allowed to access the cell.

cellAccessRelatedInfoList

This field contains a list allowing signalling of access related information per PLMN. One PLMN can be included in only one entry of this list. NOTE 4.

cellBarred

barred means the cell is barred, as defined in TS 36.304 [4].

cellidentity

Indicates the cell identity. NOTE 2.

cellReservedForOperatorUse

As defined in TS 36.304 [4].

cellSelectionInfoCE

Cell selection information for BL UEs and UEs in CE. NOTE 3.

cellSelectionInfoCE1

Cell selection information for BL UEs and UEs in CE supporting CE Mode B. E-UTRAN includes this IE only if cellSelectionInfoCE is present in SystemInformationBlockType1-BR. NOTE 3.

csg-Identity

Identity of the Closed Subscriber Group the cell belongs to.

csg-Indication

If set to TRUE the UE is only allowed to access the cell if it is a CSG member cell, if selected during manual CSG selection or to obtain limited service, see TS 36.304 [4].

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services for UEs as defined in TS 23.401 [41]. If absent, eCall over IMS is not supported by the network in the cell. NOTE 2.

eDRX-Allowed

The presence of this field indicates if idle mode extended DRX is allowed in the cell. The UE shall stop using extended DRX in idle mode if *eDRX-Allowed* is not present.

fdd-DownlinkOrTddSubframeBitmapBR

The set of valid subframes for FDD downlink or TDD transmissions, see TS 36.213 [23].

If this field is not present, the set of valid subframes is the set of non-MBSFN subframes as indicated by *mbsfn-SubframeConfigList*. If neither this field nor *mbsfn-SubframeConfigList* is present, all subframes are considered as valid subframes for FDD downlink transmission, all DL subframes according to the uplink-downlink configuration (see TS 36.211 [21]) are considered as valid subframes for TDD DL transmission, and all UL subframes according to the uplink-downlink configuration (see TS 36.211 [21]) are considered as valid subframes for TDD UL transmission. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. Value 0 in the bitmap indicates that the corresponding subframe is invalid for transmission.

fdd-UplinkSubframeBitmapBR

The set of valid subframes for FDD uplink transmissions for BL UEs, see TS 36.213 [23].

If the field is not present, then UE considers all uplink subframes as valid subframes for FDD uplink transmissions. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. Value 0 in the bitmap indicates that the corresponding subframe is invalid for transmission. Value 1 in the bitmap indicates that the corresponding subframe is valid for transmission.

freqBandIndicatorPriority

If the field is present and supported by the UE, the UE shall prioritize the frequency bands in the *multiBandInfoList* field in decreasing priority order. Only if the UE does not support any of the frequency band in *multiBandInfoList*, the UE shall use the value in *freqBandIndicator* field. Otherwise, the UE applies frequency band according to the rules defined in *multiBandInfoList*. NOTE 2.

fregBandInfo

A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for the frequency band in freqBandIndicator. If E-UTRAN includes freqBandInfo-v10l0 it includes the same number of entries, and listed in the same order, as in freqBandInfo-r10.

freqHoppingParametersDL

Downlink frequency hopping parameters for BR versions of SI messages, MPDCCH/PDSCH of paging, MPDCCH/PDSCH of RAR/Msg4 and unicast MPDCCH/PDSCH. If not present, the UE is not configured downlink frequency hopping.

hyperSFN

Indicates hyper SFN which increments by one when the SFN wraps around.

ims-EmergencySupport

Indicates whether the cell supports IMS emergency bearer services for UEs in limited service mode. If absent, IMS emergency call is not supported by the network in the cell for UEs in limited service mode. NOTE 2.

SystemInformationBlockType1 field descriptions

intraFreqReselection

Used to control cell reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 36.304 [4]. NOTE 2.

multiBandInfoList

A list of additional frequency band indicators, as defined in TS 36.101 [42, table 5.5-1] that the cell belongs to. If the UE supports the frequency band in the *freqBandIndicator* field it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the *multiBandInfoList* field. If E-UTRAN includes *multiBandInfoListv9e0* it includes the same number of entries, and listed in the same order, as in *multiBandInfoList* (i.e. without suffix). See Annex D for more descriptions. The UE shall ignore the rule defined in this field description if *freqBandIndicatorPriority* is present and supported by the UE.

multiBandInfoList-v10j0

A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for the frequency bands in multiBandInfoList (i.e. without suffix) and multiBandInfoList-v9e0. If E-UTRAN includes multiBandInfoList-v10j0, it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix). If E-UTRAN includes multiBandInfoList-v10j0 it includes the same number of entries, and listed in the same order, as in multiBandInfoList-v10j0.

plmn-IdentityList

List of PLMN identities. The first listed PLMN-Identity is the primary PLMN. NOTE 2.

p-Max

Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability. NOTE 2.

q-QualMin

Parameter "Q_{qualmin}" in TS 36.304 [4]. If *cellSelectionInfo-v920* is not present, the UE applies the (default) value of negative infinity for Q_{qualmin}. NOTE 1.

q-QualMinRSRQ-OnAllSymbols

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.

a-QualMinOffset

Parameter " $Q_{qualminoffset}$ " in TS 36.304 [4]. Actual value $Q_{qualminoffset}$ = field value [dB]. If *cellSelectionInfo-v920* is not present or the field is not present, the UE applies the (default) value of 0 dB for $Q_{qualminoffset}$. Affects the minimum required quality level in the cell.

q-QualMinWB

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.

q-RxLevMinOffset

Parameter Q_{rxlevminoffset} in TS 36.304 [4]. Actual value Q_{rxlevminoffset} = field value * 2 [dB]. If absent, the UE applies the (default) value of 0 dB for Q_{rxlevminoffset}. Affects the minimum required Rx level in the cell.

sib-MappingInfo

List of the SIBs mapped to this *SystemInformation* message. There is no mapping information of SIB2; it is always present in the first *SystemInformation* message listed in the *schedulingInfoList* list.

si-HoppingConfigCommon

Frequency hopping activation/deactivation for BR versions of SI messages and MPDCCH/PDSCH of paging.

si-Narrowband

This field indicates the index of a narrowband used to broadcast the SI message towards BL UEs and UEs in CE, see TS 36.211 [21, 6.4.1] and TS 36.213 [23, 7.1.6]. Field values (1...maxAvailNarrowBands-r13) correspond to narrowband indices (0..[maxAvailNarrowBands-r13-1]) as specified in TS 36.211 [21].

si-RepetitionPattern

Indicates the radio frames within the SI window used for SI message transmission. Value everyRF corresponds to every radio frame, value every2ndRF corresponds to every 2 radio frames, and so on. The first transmission of the SI message is transmitted from the first radio frame of the SI window.

si-Periodicity

Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and so on.

si-TBS

This field indicates the transport block size information used to broadcast the SI message towards BL UEs and UEs in CE, see TS 36.213 [23, Table 7.1.7.2.1-1] for a 6 PRB bandwidth and a QPSK modulation.

schedulingInfoList-BR

Indicates additional scheduling information of SI messages for BL UEs and UEs in CE. It includes the same number of entries, and listed in the same order, as in *schedulingInfoList* (without suffix).

si-ValidityTime

Indicates system information validity timer. If set to TRUE, the timer is set to 3h, otherwise the timer is set to 24h.

si-WindowLength, si-WindowLength-BR

Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on. In case si-WindowLength-BR-r13 is present and the UE is a BL UE or a UE in CE, the UE shall use si-WindowLength-BR-r13 and ignore the original field si-WindowLength (without suffix). UEs other than BL UEs or UEs in CE shall ignore the extension field si-WindowLength-BR-r13.

SystemInformationBlockType1 field descriptions

startSymbolBR

For BL UEs and UEs in CE, indicates the OFDM starting symbol for any MPDCCH, PDSCH scheduled on the same cell except the PDSCH carrying *SystemInformationBlockType1-BR*, see TS 36.213 [23]. Values 1, 2, and 3 are applicable for *dl-Bandwidth* greater than 10 resource blocks. Values 2, 3, and 4 are applicable otherwise.

systemInfoValueTagList

Indicates SI message specific value tags for BL UEs and UEs in CE. It includes the same number of entries, and listed in the same order, as in *schedulingInfoList* (without suffix).

svstemInfoValueTaqSI

SI message specific value tag as specified in subclause 5.2.1.3. Common for all SIBs within the SI message other than MIB, SIB1, SIB10, SIB11, SIB12 and SIB14.

systemInfoValueTag

Common for all SIBs other than MIB, MIB-MBMS, SIB1, SIB1-MBMS, SIB10, SIB11, SIB12 and SIB14. Change of MIB, MIB-MBMS, SIB1 and SIB1-MBMS is detected by acquisition of the corresponding message.

tdd-Config

Specifies the TDD specific physical channel configurations. NOTE 2.

trackingAreaCode

A trackingAreaCode that is common for all the PLMNs listed. NOTE2. NOTE 5.

NOTE 1: The value the UE applies for parameter "Q_{qualmin}" in TS 36.304 [4] depends on the *q-QualMin* fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

q-QualMinRSRQ-OnAllSymbols	q-QualMinWB	Value of parameter "Q _{qualmin} " in TS 36.304 [4]
Included	Included	q-QualMinRSRQ-OnAllSymbols – (q-QualMin – q-
		QualMinWB)
Included	Not included	q-QualMinRSRQ-OnAllSymbols
Not included	Included	q-QualMinWB
Not included	Not included	g-QualMin

- NOTE 2: E-UTRAN sets this field to the same value for all instances of SIB1 message that are broadcasted within the same cell.
- NOTE 3: E-UTRAN configures this field only in the BR version of SIB1 message.
- NOTE 4: E-UTRAN configures at most 6 PLMNs in total (i.e. across all the PLMN lists in SIB1).
- NOTE 5: E-UTRAN configures only one value for this parameter per PLMN.

Conditional presence	Explanation
BW-reduced	The field is optional present, Need OR, if <i>schedulingInfoSIB1-BR</i> in MIB is set to a value greater than 0. Otherwise the field is not present.
FBI-max	The field is mandatory present if <i>freqBandIndicator</i> (i.e. without suffix) is set to <i>maxFBI</i> . Otherwise the field is not present.
mFBI	The field is optional present, Need OR, if <i>multiBandInfoList</i> is present. Otherwise the field is not present.
mFBI-max	The field is mandatory present if one or more entries in <i>multiBandInfoList</i> (i.e. without suffix, introduced in -v8h0) is set to <i>maxFBI</i> . Otherwise the field is not present.
RSRQ	The field is mandatory present if SIB3 is being broadcast and <i>threshServingLowQ</i> is present in SIB3; otherwise optionally present, Need OP.
RSRQ2	The field is mandatory present if <i>q-QualMinRSRQ-OnAllSymbols</i> is present in SIB3; otherwise it is not present and the UE shall delete any existing value for this field.
Hopping	The field is mandatory present if <i>si-HoppingConfigCommon</i> field is broadcasted and set to <i>on</i> . Otherwise the field is optionally present, need OP.
QrxlevminCE1	The field is optionally present, Need OR, if <i>q-RxLevMinCE1-r13</i> is set below -140 dBm. Otherwise the field is not present.
TDD	This field is mandatory present for TDD; it is not present for FDD and the UE shall delete any existing value for this field.
TDD-OR	The field is optional present for TDD, need OR; it is not present for FDD.
WB-RSRQ	The field is optionally present, need OP if the measurement bandwidth indicated by allowedMeasBandwidth in systemInformationBlockType3 is 50 resource blocks or larger; otherwise it is not present.
SI-BR	The field is mandatory present if <i>schedulingInfoSIB1-BR</i> is included in MIB with a value greater than 0. Otherwise the field is not present.

SystemInformationBlockType1-MBMS

SystemInformationBlockType1-MBMS contains information relevant for receiving service from MBMS-dedicated cell and defines the scheduling of other system information.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: E-UTRAN to UE

SystemInformationBlockType1-MBMS message

```
-- ASN1START
SystemInformationBlockType1-MBMS-r14 ::= SEQUENCE
    cellAccessRelatedInfo-r14
                                                SEQUENCE
                                               PLMN-IdentityList-MBMS-r14,
        plmn-IdentityList-r14
        trackingAreaCode-r14
                                                        TrackingAreaCode,
        cellIdentity-r14
                                                         CellIdentity
    freqBandIndicator-r14
                                               FreqBandIndicator-r11,
    multiBandInfoList-r14
                                               MultiBandInfoList-r11
                                                                                      OPTIONAL, -- Need OR
    schedulingInfoList-MBMS-r14 SchedulingInfoList-MBMS-r14,
si-WindowLength-r14 ENUMERATED {
                                          ENUMERATED {
    si-WindowLength-r14
                                                    ms1, ms2, ms5, ms10, ms15, ms20, ms40, ms80},
    systemInfoValueTag-r14
nonMBSFN-SubframeConfig-r14
                                               INTEGER (0..31),
                                              NonMBSFN-SubframeConfig-r14 OPTIONAL, --Need OR
    pdsch-ConfigCommon-r14
                                               PDSCH-ConfigCommon,
    systemInformationBlockType13-r14 SystemInformationBlockType13-r9 OF cellAccessRelatedInfoList-r14 SEQUENCE (SIZE (1..maxPLMN-1-r14)) OF CellAccessRelatedInfoList-r14 OPTION
                                               SystemInformationBlockType13-r9 OPTIONAL, --Need OR
                                                CellAccessRelatedInfo-r14 OPTIONAL, -- Need OR
                                                SEQUENCE {}
    nonCriticalExtension
                                                                                       OPTIONAL
PLMN-IdentityList-MBMS-r14 ::=
                                                SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-Identity
SchedulingInfoList-MBMS-r14 ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo-MBMS-r14
SchedulingInfo-MBMS-r14 ::= SEQUENCE {
                                                ENUMERATED {
   si-Periodicity-r14
```

```
rf16, rf32, rf64, rf128, rf256, rf512},
                                            SIB-MappingInfo-MBMS-r14
    sib-MappingInfo-r14
SIB-MappingInfo-MBMS-r14 ::= SEQUENCE (SIZE (0..maxSIB-1)) OF SIB-Type-MBMS-r14
SIB-Type-MBMS-r14 ::=
                                        ENUMERATED {
                                           sibType10, sibType11, sibType12-v920, sibType13-v920,
                                            sibType15-v1130, sibType16-v1130, ...}
                                       SEQUENCE {
NonMBSFN-SubframeConfig-r14 ::=
   radioFrameAllocationPeriod-r14
                                       ENUMERATED {rf4, rf8, rf16, rf32, rf64, rf128, rf512},
                                      INTEGER (0..7),
    radioFrameAllocationOffset-r14
    subframeAllocation-r14
                                       BIT STRING (SIZE(9))
}
-- ASN1STOP
```

SystemInformationBlockType1-MBMS field descriptions

cellAccessRelatedInfoList

This field contains a list allowing signalling of access related information per PLMN. One PLMN can be included in only one entry of this list. NOTE 2.

cellidentity

Indicates the cell identity. NOTE 1.

freqBandIndicator

A list of as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band in freqBandIndicator.

multiBandInfoList

A list of additional frequency band indicators, as defined in TS 36.101 [42, table 5.5-1] that the cell belongs to. If the UE supports the frequency band in the *freqBandIndicator* field it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the *multiBandInfoList* field.

nonMBSFN-SubframeConfig

Defines the non-MBSFN subframes within the radio frame allocation period defined by the radioFrameAllocationPeriod and the radioFrameAllocationOffset.

plmn-IdentityList

List of PLMN identities. The first listed *PLMN-Identity* is the primary PLMN. NOTE 1.

radioFrameAllocationPeriod, radioFrameAllocationOffset

Radio-frames that contain non-MBSFN subframes occur when equation *SFN* mod *radioFrameAllocationPeriod* = *radioFrameAllocationOffset* is satisfied. Value rf4 for *radioframeAllocationPeriod* denotes 4 radio frames, rf8 detones 8 radion frames, and so on.

schedulingInfoList-MBMS

Indicates additional scheduling information of SI messages on MBMS-dedicated cell.

sib-MappingInfo

List of the SIBs mapped to this SystemInformation message.

si-Periodicity

Periodicity of the SI-message in radio frames, such that rf16 denotes 16 radio frames, rf32 denotes 32 radio frames, and so on.

si-WindowLength

Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on.

subframeAllocation

Defines the subframes that are allocated for non-MBSFN within the radio frame allocation period defined by the radioFrameAllocationPeriod and the radioFrameAllocationOffset. "0" denotes that the corresponding subframe is a MBSFN subframe. "1" denotes that the corresponding subframe is a non-MBSFN subframe. If E-UTRAN configures a value other than "0" for additionalNonMBSFNSubframes within MasterInformationBlock-MBMS, subframeAllocation configuration should also indicate subframes pointed out by additionalNonMBSFNSubframes as non-MBSFN subframes.

systemInformationBlockType13

E-UTRAN does not configure this field if *schedulingInfoList–MBMS* indicates that *SystemInformationBlockType13* is present.

systemInfoValueTag

Common for all SIBs other than MIB, SIB1, SIB10, SIB11, SIB12 and SIB14. Change of MIB and SIB1 is detected by acquisition of the corresponding message.

trackingAreaCode

A trackingAreaCode that is common for all the PLMNs listed. NOTE1.

NOTE 1: E-UTRAN sets this field to the same value for all instances of SIB1-MBMS message that are broadcasted within the same cell.

UEAssistanceInformation

The UEAssistanceInformation message is used for the indication of UE assistance information to the eNB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

UEAssistanceInformation message

```
-- ASN1START
UEAssistanceInformation-r11 ::=
                                            SEQUENCE {
    criticalExtensions
                                        CHOICE {
        c1
                                            CHOICE {
            ueAssistanceInformation-r11
                                                UEAssistanceInformation-rll-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
                                            SEQUENCE { }
        criticalExtensionsFuture
}
                                     SEQUENCE {
UEAssistanceInformation-r11-IEs ::=
   powerPrefIndication-rll ENUMERATED lateNonCriticalExtension OCTET STRING
                                                    {normal, lowPowerConsumption} OPTIONAL,
                                                                                         OPTIONAL,
   nonCriticalExtension
                                        UEAssistanceInformation-v1430-IEs
                                                                                     OPTIONAL
UEAssistanceInformation-v1430-IEs ::=
                                            SEQUENCE
   bw-Preference-r14
                                       BW-Preference-r14
    OPTIONAL,
    sps-AssistanceInformation-r14
                                       SEQUENCE {
        trafficPatternInfoListSL-r14
                                        TrafficPatternInfoList-r14 OPTIONAL,
        trafficPatternInfoListUL-r14
                                            TrafficPatternInfoList-r14
               OPTIONAL,
                                        SEQUENCE {
    rlm-Report-r14
                                        ENUMERATED {earlyOutOfSync, earlyInSync},
       rlm-Event-r14
       excessRep-MPDCCH-r14
                                            ENUMERATED {excessRep1, excessRep2}
                                                                                    OPTIONAL
                                                                                     OPTIONAL,
    delayBudgetReport-r14
                                     DelayBudgetReport-r14
                                                                                     OPTIONAL,
    nonCriticalExtension
                                        SEQUENCE {}
                                                                                     OPTIONAL
}
BW-Preference-r14 ::= SEQUENCE {
   dl-Preference-r14 ENUMERATED {mhz1dot4, mhz5, mhz20 } ul-Preference-r14 ENUMERATED {mhz1dot4, mhz5}
                                                                                         OPTIONAL,
                                                                                 OPTIONAL
TrafficPatternInfoList-r14 ::= SEQUENCE (SIZE (1..maxTrafficPattern-r14)) OF TrafficPatternInfo-r14
TrafficPatternInfo-r14 ::= SEQUENCE {
   trafficPeriodicity-r14
                                    ENUMERATED {
                                            sf20, sf50, sf100, sf200, sf300, sf400, sf500,
                                            sf600, sf700, sf800, sf900, sf1000},
    timingOffset-r14
                                        INTEGER (0..10239),
                                       SL-Priority-r13
   priorityInfoSL-r14
                                                                                     OPTIONAL.
    logicalChannelIdentityUL-r14
                                        INTEGER (3..10)
                                                                                     OPTIONAL,
                                    BIT STRING (SIZE (6))
   messageSize-r14
                          CHOICE {
DelayBudgetReport-r14::=
                                    ENUMERATED {
   type1
                                        msMinus1280, msMinus640, msMinus320, msMinus160,
                                        msMinus80, msMinus60, msMinus40, msMinus20, ms0, ms20,
                                        ms40, ms60, ms80, ms160, ms320, ms640, ms1280},
                                    ENUMERATED {
    type2
                                        msMinus192, msMinus168, msMinus144, msMinus120,
                                        msMinus96, msMinus72, msMinus48, msMinus24, ms0, ms24,
                                        ms48, ms72, ms96, ms120, ms144, ms168, ms192}
```

-- ASN1STOP

UEAssistanceInformation field descriptions

delayBudgetReport

Indicates the UE-preferred adjustment to connected mode DRX or coverage enhancement configuration.

dl-Preference

Indicates UE's preference on configuration of maximum PDSCH bandwidth. The value mhz1dot4 corresponds to CE mode usage in 1.4MHz bandwidth, mhz5 corresponds to CE mode usage in 5MHz bandwidth, and mhz20 corresponds to CE mode usage in 20MHz bandwidth or normal coverage.

excessRep-MPDCCH

Indicates the excess number of repetitions on MPDCCH. Value excessRep1 and excessRep2 indicate the excess number of repetitions defined in TS 36.133 [16].

logicalChannelldentityUL

Indicates the logical channel identity associated with the reported traffic pattern in the uplink logical channel.

messageSize

Indicates the maximum TB size based on the observed traffic pattern. The value refers to the index of TS 36.321 [6, table 6.1.3.1-1].

powerPrefIndication

Value *lowPowerConsumption* indicates the UE prefers a configuration that is primarily optimised for power saving. Otherwise the value is set to *normal*.

priorityInfoSL

Indicates the traffic priority (i.e., PPPP) associated with the reported traffic pattern for V2X sidelink communication.

rlm-Event

This field provides the RLM event ("early-out-of-sync" or "early-in-sync").

rlm-Report

This field provides the RLM report for BL UEs and UEs in CE.

sps-AssistanceInformation

Indicates the UE assistance information to assist E-UTRAN to configure SPS.

timinaOffset

This field indicates the estimated timing for a packet arrival in a SL/UL logical channel. Specifically, the value indicates the timing offset with respect to subframe#0 of SFN#0 in milliseconds.

trafficPatternInfoListSL

This field provides the traffic characteristics of sidelink logical channel(s) that are setup for V2X sidelink communication.

trafficPatternInfoListUL

This field provides the traffic characteristics of uplink logical channel(s).

trafficPeriodicity

This field indicates the estimated data arrival periodicity in a SL/UL logical channel. Value sf20 corresponds to 20 ms, sf50 corresponds to 50 ms and so on.

type1

Indicates the preferred amount of increment/decrement to the connected mode DRX cycle length with respect to the current configuration. Value in number of milliseconds. Value ms40 corresponds to 40 milliseconds, msMinus40 corresponds to -40 milliseconds and so on.

type2

Indicates the preferred amount of increment/decrement to the coverage enhancement configuration with respect to the current configuration so that the Uu air interface delay changes by the indicated amount. Value in number of milliseconds. Value ms24 corresponds to 24 milliseconds, msMinus24 corresponds to -24 milliseconds and so on.

ul-Preference

Indicates UE's preference on configuration of maximum PUSCH bandwidth. The value mhz1dot4 corresponds to CE mode usage in 1.4MHz bandwidth, and mhz5 corresponds to CE mode usage in 5MHz bandwidth.

UECapabilityEnquiry

The *UECapabilityEnquiry* message is used to request the transfer of UE radio access capabilities for E-UTRA as well as for other RATs.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

UECapabilityEnquiry message

```
-- ASN1START
UECapabilityEnquiry ::=
                                     SEQUENCE {
                                   RRC-TransactionIdentifier,
CHOICE {
    rrc-TransactionIdentifier
    criticalExtensions
            ueCapabilityEnquiry-r8
                                            CHOICE {
        c1
                                                 UECapabilityEnquiry-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                             SEQUENCE {}
}
UECapabilityEnquiry-r8-IEs ::= SEQUENCE {
    ue-CapabilityRequest
nonCriticalExtension
                                        UE-CapabilityRequest,
                                        UECapabilityEnquiry-v8a0-IEs
                                                                            OPTIONAL
UECapabilityEnquiry-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING
    nonCriticalExtension UECapabilityE
                                                                              OPTIONAL,
                                        UECapabilityEnquiry-v1180-IEs
    OPTIONAL
}
UECapabilityEnquiry-v1180-IEs ::= SEQUENCE {
   requestedFrequencyBands-r11 SEQUENCE (SIZE (1..16)) OF FreqBandIndicator-r11 OPTIONAL,
                OPTIONAL,
    nonCriticalExtension
                                        UECapabilityEnquiry-v1310-IEs
    OPTIONAL
OPTIONAL, -- Need ON OPTIONAL, -- Need ON OPTIONAL, -- Need ON OPTIONAL, -- Need ON
                                     ENUMERATED {true}
                                                                                          -- Need ON
   requestedMaxCCsDL-r13 INTEGER (2..32) requestedMaxCCsUL-r13 INTEGER (2..32)
                                                                           OPTIONAL, -- Need ON
    requestReducedIntNonContComb-r13 ENUMERATED {true}
    nonCriticalExtension
                                        UECapabilityEnquiry-v1430-IEs
                                                                              OPTIONAL
}
UECapabilityEnquiry-v1430-IEs ::= SEQUENCE {
    requestDiffFallbackCombList-r14 BandCombinationList-r14 OPTIONAL,
                                                                                     -- Need ON
    nonCriticalExtension
                                         SEQUENCE {}
                                                                          OPTIONAL
}
UE-CapabilityRequest ::=
                            SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF RAT-Type
-- ASN1STOP
```

UECapabilityEnquiry field descriptions

requestDiffFallbackCombList

List of CA band combinations for which the UE is requested to provide different capabilities for their fallback band combinations in conjunction with the capabilities supported for the CA band combinations in this list. The UE shall exclude fallback band combinations for which their supported UE capabilities are the same as the CA band combination indicated in this list.

requestReducedFormat

Indicates that the UE if supported is requested to provide supported CA band combinations in the supportedBandCombinationReduced-r13 instead of the supportedBandCombination-r10. The E-UTRAN includes this field if requestSkipFallbackComb or requestDiffFallbackCombList is included in the message.

requestSkipFallbackComb

Indicates that the UE shall explicitly exclude fallback CA band combinations in capability signalling.

ue-CapabilityRequest

List of the RATs for which the UE is requested to transfer the UE radio access capabilities i.e. E-UTRA, UTRA, GERAN-CS, GERAN-PS, CDMA2000.

requestedFrequencyBands

List of frequency bands for which the UE is requested to provide supported CA band combinations and non CA bands.

requestedMaxCCsDL, requestedMaxCCsUL

Indicates the maximum number of CCs for which the UE is requested to provide supported CA band combinations and non-CA bands.

requestReducedIntNonContComb

Indicates that the UE shall explicitly exclude supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].

UECapabilityInformation

The UECapabilityInformation message is used to transfer of UE radio access capabilities requested by the E-UTRAN.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

UECapabilityInformation message

```
-- ASN1START
UECapabilityInformation ::=
                                   SEQUENCE {
                                   RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
                                      CHOICE {
   criticalExtensions
       c1
                                          CHOICE {
           ueCapabilityInformation-r8
                                              UECapabilityInformation-r8-IEs,
           spare7 NULL,
           spare6 NULL, spare5 NULL, spare4 NULL,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                          SEQUENCE { }
}
UECapabilityInformation-r8-IEs ::= SEQUENCE {
   \verb"ue-CapabilityRAT-ContainerList" UE-CapabilityRAT-ContainerList",
   nonCriticalExtension
                                      UECapabilityInformation-v8a0-IEs
                                                                          OPTIONAL
UECapabilityInformation-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
                                                                          OPTIONAL.
   nonCriticalExtension
                                      UECapabilityInformation-v1250-IES OPTIONAL
UECapabilityInformation-v1250-IEs ::= SEQUENCE {
   ue-RadioPagingInfo-r12
                                      UE-RadioPagingInfo-r12
                                                                          OPTIONAL,
   nonCriticalExtension
                                       SEQUENCE {}
                                                                          OPTIONAL
-- ASN1STOP
```

UECapabilityInformation field descriptions

ue-RadioPagingInfo

This field contains UE capability information used for paging.

UEInformationRequest

The UEInformationRequest is the command used by E-UTRAN to retrieve information from the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

UEInformationRequest message

```
-- ASN1START
   UEInformationRequest-r9
           ueInformationRequest-r9
spare3 NULL
                                               UEInformationRequest-r9-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                           SEQUENCE { }
   }
}
UEInformationRequest-r9-IEs ::= SEQUENCE {
   rach-ReportReq-r9 BOOLEAN, rlf-ReportReq-r9 BOOLEAN,
                                      UEInformationRequest-v930-IEs
   nonCriticalExtension
                                                                          OPTIONAL
UEInformationRequest-v930-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
                                                                           OPTIONAL.
                                      UEInformationRequest-v1020-IEs
   nonCriticalExtension
                                                                          OPTIONAL
UEInformationRequest-v1020-IEs ::= SEQUENCE {
                                       ENUMERATED {true}
                                                                           OPTIONAL,
   logMeasReportReq-r10
                                                                                        -- Need ON
                                       UEInformationRequest-v1130-IES OPTIONAL,
   nonCriticalExtension
UEInformationRequest-v1130-IEs ::= SEQUENCE {
   connEstFailReportReq-rl1 ENUMERATED {true} OPTIONAL, nonCriticalExtension UEInformationRequest-v1250-IES OPTIONAL
                                                                           OPTIONAL,
                                                                                        -- Need ON
{\tt UEInformationRequest-v1250-IEs} \; ::= \; {\tt SEQUENCE} \; \{
   mobilityHistoryReportReq-r12 ENUMERATED {true} nonCriticalExtension SEQUENCE {}
                                                                           OPTIONAL,
                                                                                        -- Need ON
                                                                           OPTIONAL
-- ASN1STOP
```

UEInformationRequest field descriptions

rach-ReportReq

This field is used to indicate whether the UE shall report information about the random access procedure.

UEInformationResponse

The UEInformationResponse message is used by the UE to transfer the information requested by the E-UTRAN.

Signalling radio bearer: SRB1 or SRB2 (when logged measurement information is included)

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

UEInformationResponse message

```
-- ASN1START
UEInformationResponse-r9 ::=
                                     SEQUENCE {
   rrc-TransactionIdentifier
                                    RRC-TransactionIdentifier,
   criticalExtensions
                                      CHOICE {
       c1
                                     CHOICE {
           ueInformationResponse-r9
                                                 UEInformationResponse-r9-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                             SEQUENCE {}
   }
}
UEInformationResponse-r9-IEs ::=
                                    SEQUENCE {
                                      SEQUENCE {
   rach-Report-r9
                                             NumberOfPreamblesSent-r11,
       numberOfPreamblesSent-r9
       contentionDetected-r9
                                             BOOLEAN
                                                                OPTIONAL,
                                         RLF-Report-r9
   rlf-Report-r9
                                                                OPTIONAL,
   nonCriticalExtension
                                         UEInformationResponse-v930-IEs
                                                                                    OPTIONAL
 - Late non critical extensions
UEInformationResponse-v9e0-IEs ::= SEQUENCE {
   rlf-Report-v9e0
                                     RLF-Report-v9e0
                                                                   OPTIONAL,
   nonCriticalExtension
                                      SEQUENCE {}
                                                                    OPTIONAL
}
-- Regular non critical extensions
UEInformationResponse-v930-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING (CONTAINING UEInformationResponse-v9e0-IEs)
   OPTIONAL,
   nonCriticalExtension
                                     UEInformationResponse-v1020-IEs
                                                                       OPTIONAL
}
UEInformationResponse-v1020-IEs ::= SEQUENCE {
                                     LogMeasReport-r10
   logMeasReport-r10
                                                                   OPTIONAL,
   nonCriticalExtension
                                     UEInformationResponse-v1130-IEs
                                                                       OPTIONAL
UEInformationResponse-v1130-IEs ::= SEQUENCE {
                                     ConnEstFailReport-r11
   connEstFailReport-r11
                                                                    OPTIONAL.
   nonCriticalExtension
                                     UEInformationResponse-v1250-IEs OPTIONAL
UEInformationResponse-v1250-IEs ::= SEQUENCE {
   mobilityHistoryReport-r12
                                     MobilityHistoryReport-r12 OPTIONAL,
                                     SEQUENCE {}
   nonCriticalExtension
                                                                    OPTIONAL
                                SEQUENCE {
RLF-Report-r9 ::=
   measResultLastServCell-r9
                                          SEQUENCE {
                                             RSRP-Range,
      rsrpResult-r9
       rsrqResult-r9
                                             RSRQ-Range
                                                                OPTIONAL
   measResultNeighCells-r9
                                    SEQUENCE {
                                         MeasResultList2EUTRA-r9
MeasResultList2UTRA-r9
       measResultListEUTRA-r9
                                                                       OPTIONAL,
                                                                      OPTIONAL,
       measResultListUTRA-r9
       measResultListGERAN-r9
                                         MeasResultListGERAN
                                                                        OPTIONAL,
                                         MeasResultList2CDMA2000-r9
       measResultsCDMA2000-r9
                                                                       OPTIONAL
       OPTIONAL,
    [[ locationInfo-r10
                             LocationInfo-r10 OPTIONAL,
       failedPCellId-r10
                                             CHOICE {
           cellGlobalId-r10
                                                 CellGlobalIdEUTRA,
           pci-arfcn-r10
                                                 SEQUENCE {
                                                     PhysCellId,
               physCellId-r10
                                                     ARFCN-ValueEUTRA
               carrierFreq-r10
```

```
OPTIONAL,
       reestablishmentCellId-r10 CellGlobalIdEUTRA
timeConnFailure-r10 INTEGER (0..1023)
connectionFailureType-r10 ENUMERATED {rlf, hof}
previousPCellId-r10 CellGlobalIdEUTRA
                                                                          OPTIONAL,
                                                                          OPTIONAL,
                                                                         OPTIONAL,
                                                                          OPTIONAL
    ]],
           LedPCellId-v1090 SEQUENCE { carrierFreq-v1090 ARFCN-
    [[ failedPCellId-v1090
                                        ARFCN-ValueEUTRA-v9e0
        }
                                                                          OPTIONAL
    [[ basicFields-r11
                                       SEQUENCE {
           c-RNTI-r11
                                             C-RNTI.
            rlf-Cause-rll
                                             ENUMERATED {
                                                 t310-Expiry, randomAccessProblem,
                                                 rlc-MaxNumRetx, t312-Expiry-r12},
                                         TimeSinceFailure-r11
            timeSinceFailure-r11
                                                                          OPTIONAL.
                                        ARFCN-ValueUTRA,
CHOICE {
       previousUTRA-CellId-r11 SEQUENCE {
    carrierFreq-r11 ARFCN-V
    physCellId-r11 CHOICE
    fdd-r11 Phy
                                              PhysCellIdUTRA-FDD,
                tdd-r11
                                                PhysCellIdUTRA-TDD
            cellGlobalId-r11
                                           CellGlobalIdUTRA
                                                                         OPTIONAL
                                                                          OPTIONAL,
        selectedUTRA-CellId-r11
carrierFreq-r11
physCellId-r11
                                       SEQUENCE {
                                        ARFCN-ValueUTRA,
                                             CHOICE {
               fdd-r11
                                              PhysCellIdUTRA-FDD,
                                                 PhysCellIdUTRA-TDD
                tdd-r11
        }
                                                                         OPTIONAL
    OPTIONAL,
        measResultLastServCell-v1250 RSRQ-Range-v1250
                                                                          OPTIONAL,
        lastServCellRSRQ-Type-r12 RSRQ-Type-r12 OPTIONAL measResultListEUTRA-v1250 MeasResultList2EUTRA-v1250 OPTIONAL
                                                                          OPTIONAL,
    ]],
    [[ drb-EstablishedWithQCI-1-r13
                                                ENUMERATED {qci1}
                                                                                  OPTIONAL
    11,
       measResultLastServCell-v1360
                                                RSRP-Range-v1360
                                                                                  OPTIONAL
    11
    ]]
}
RLF-Report-v9e0 ::=
                                   SEOUENCE {
   measResultListEUTRA-v9e0
                                    MeasResultList2EUTRA-v9e0
MeasResultList2EUTRA-r9 ::=
                                        SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r9
MeasResultList2EUTRA-v9e0 ::=
                                       SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v9e0
MeasResultList2EUTRA-v1250 ::=
                                        SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v1250
MeasResult2EUTRA-r9 ::=
                                   SEQUENCE {
  carrierFreq-r9
                                       ARFCN-ValueEUTRA,
   measResultList-r9
                                         MeasResultListEUTRA
}
MeasResult2EUTRA-v9e0 ::=
                                         SEQUENCE {
                                           ARFCN-ValueEUTRA-v9e0
  carrierFreq-v9e0
MeasResult2EUTRA-v1250 ::=
                                        SEQUENCE {
                                             RSRQ-Type-r12 OPTIONAL
   rsrq-Type-r12
                                    SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2UTRA-r9
MeasResultList2UTRA-r9 ::=
MeasResult2UTRA-r9 ::=
                                     SEQUENCE {
                                       ARFCN-ValueUTRA,
   carrierFreg-r9
   measResultList-r9
                                         MeasResultListUTRA
MeasResultList2CDMA2000-r9 ::=
                                    SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2CDMA2000-r9
```

```
MeasResult2CDMA2000-r9 ::= SEQUENCE {
                                       CarrierFreqCDMA2000,
   carrierFreq-r9
   measResultList-r9
                                       MeasResultsCDMA2000
}
LogMeasReport-r10 ::=
                                 SEQUENCE {
                          AbsoluteTimeInfo-r10,
   absoluteTimeStamp-r10
   traceReference-r10
                                      TraceReference-r10,
   traceRecordingSessionRef-r10
                                      OCTET STRING (SIZE (2)),
   tce-Id-r10
                                       OCTET STRING (SIZE (1)),
   logMeasInfoList-r10
                                      LogMeasInfoList-r10,
   logMeasAvailable-r10
                                      ENUMERATED {true}
                                                                      OPTIONAL.
}
LogMeasInfoList-r10 ::=
                              SEQUENCE (SIZE (1..maxLogMeasReport-r10)) OF LogMeasInfo-r10
                      SEQUENCE {
LogMeasInfo-r10 ::=
   locationInfo-r10
                                       LocationInfo-r10
                                                              OPTIONAL,
   relativeTimeStamp-r10
                                       INTEGER (0..7200),
   servCellIdentity-r10
                                       CellGlobalIdEUTRA,
   measResultServCell-r10
                                       SEQUENCE {
       rsrpResult-r10
                                           RSRP-Range,
       rsrqResult-r10
                                          RSRQ-Range
                                     SEQUENCE {
   measResultNeighCells-r10
                                      MeasResultList2EUTRA-r9 OPTIONAL,
MeasResultList2UTRA-r9 OPTIONAL,
MeasResultList2GERAN-r10 OPTIONAL,
       measResultListEUTRA-r10
       measResultListUTRA-r10
measResultListGERAN-r10
       measResultListCDMA2000-r10
                                         MeasResultList2CDMA2000-r9 OPTIONAL
   }
       OPTIONAL,
   [[ measResultListEUTRA-v1090
                                        MeasResultList2EUTRA-v9e0 OPTIONAL
    [[ measResultListMBSFN-r12
                                          MeasResultListMBSFN-r12 OPTIONAL,
                                          RSRQ-Range-v1250
                                                                      OPTIONAL,
       measResultServCell-v1250
       servCellRSRQ-Type-r12
                                          RSRQ-Type-r12
       measResultListEUTRA-v1250
                                          MeasResultList2EUTRA-v1250 OPTIONAL
   1],
   [[ inDeviceCoexDetected-r13
                                          ENUMERATED {true}
                                                                      OPTIONAL
    ]],
   [[ measResultServCell-v1360
                                          RSRP-Range-v1360
                                                                      OPTIONAL
   11
MeasResultListMBSFN-r12 ::=
                                     SEQUENCE (SIZE (1..maxMBSFN-Area)) OF MeasResultMBSFN-r12
                                 SEQUENCE {
MeasResultMBSFN-r12 ::=
   mbsfn-Area-r12
                                           SEQUENCE {
      mbsfn-AreaId-r12
                                              MBSFN-Areald-r12,
                                              ARFCN-ValueEUTRA-r9
       carrierFreq-r12
   rsrpResultMBSFN-r12
                                          RSRP-Range,
   rsrqResultMBSFN-r12
                                          MBSFN-RSRQ-Range-r12,
   signallingBLER-Result-r12
   dataBLER-MCH-ResultList-r12
                                          BLER-Result-r12
                                                                      OPTIONAL,
                                          DataBLER-MCH-ResultList-r12 OPTIONAL,
}
DataBLER-MCH-ResultList-r12 ::= SEQUENCE (SIZE (1.. maxPMCH-PerMBSFN)) OF DataBLER-MCH-
Result-r12
DataBLER-MCH-Result-r12 ::=
                                      SEQUENCE {
   mch-Index-r12
                                           INTEGER (1..maxPMCH-PerMBSFN),
   dataBLER-Result-r12
                                           BLER-Result-r12
}
BLER-Result-r12 ::=
                                  SEQUENCE {
                                              BLER-Range-r12,
   bler-r12
   blocksReceived-r12
                                           SEOUENCE {
       n-r12
                                              BIT STRING (SIZE (3)),
                                               BIT STRING (SIZE (8))
       m-r12
   }
}
BLER-Range-r12 ::=
                                      INTEGER (0..31)
MeasResultList2GERAN-r10 ::= SEQUENCE (SIZE (1..maxCellListGERAN)) OF MeasResultListGERAN
```

```
ConnEstFailReport-rl1 ::=
failedCellId-rl1
                                                        SEQUENCE {
                                                       CellGlobalIdEUTRA,
                                                       LocationInfo-r10
     locationInfo-r11
                                                                                                   OPTIONAL,
     measResultFailedCell-r11
                                                         SEQUENCE {
         rsrpResult-r11
                                                                  RSRP-Range,
                                                                                       OPTIONAL
           rsrqResult-r11
                                                                   RSRQ-Range
     measResultNeighCells-r11
          RRESULTNEIGHCELLS-T11 SEQUENCE {
measResultListEUTRA-r11 MeasResultList2EUTRA-r9 OPTIONAL,
measResultListUTRA-r11 MeasResultList2UTRA-r9 OPTIONAL,
measResultListGERAN-r11 MeasResultListGERAN OPTIONAL,
measResultLCDMA2000-r11 MeasResultList2CDMA2000-r9 OPTIONAL
                                                           SEQUENCE {
         OPTIONAL,
     } OPTIONAL,
numberOfPreamblesSent-r11 NumberOfPreamblesSent-r11,
contentionDetected-r11 BOOLEAN,
maxTxPowerReached-r11 BOOLEAN,
timeSinceFailure-r11 TimeSinceFailure-r11,
     measResultListEUTRA-v1130
                                                     MeasResultList2EUTRA-v9e0
                                                                                                  OPTIONAL,
     [[ measResultFailedCell-v1250 RSRQ-Range-v1250 OPTIONAL, failedCellRSRQ-Type-r12 RSRQ-Type-r12 OPTIONAL, measResultListEUTRA-v1250 MeasResultList2EUTRA-v1250 OPTIONAL
          measResultFailedCell-v1360
                                                     RSRP-Range-v1360
                                                                                             OPTIONAL
     1.1
     ]]
NumberOfPreamblesSent-r11::=
                                                      INTEGER (1..200)
TimeSinceFailure-r11 ::=
                                                       INTEGER (0..172800)
MobilityHistoryReport-r12 ::= VisitedCellInfoList-r12
-- ASN1STOP
```

UEInformationResponse field descriptions

absoluteTimeStamp

Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within absoluteTimeInfo.

bler

Indicates the measured BLER value. The coding of BLER value is defined in TS 36.133 [16].

blocksReceived

Indicates total number of MCH blocks, which were received by the UE and used for the corresponding BLER calculation, within the measurement period as defined in TS 36.133 [16].

carrierFred

In case the UE includes *carrierFreq-v9e0* and/ or *carrierFreq-v1090*, the UE shall set the corresponding entry of *carrierFreq-r9* and/ or *carrierFreq-r10* respectively to *maxEARFCN*. For E-UTRA and UTRA frequencies, the UE sets the ARFCN according to the band used when obtaining the concerned measurement results.

connectionFailureType

This field is used to indicate whether the connection failure is due to radio link failure or handover failure.

contentionDetected

This field is used to indicate that contention was detected for at least one of the transmitted preambles, see TS 36.321 [6].

c-RNTI

This field indicates the C-RNTI used in the PCell upon detecting radio link failure or the C-RNTI used in the source PCell upon handover failure.

dataBLER-MCH-ResultList

Includes a BLER result per MCH on subframes using *dataMCS*, with the applicable MCH(s) listed in the same order as in *pmch-InfoList* within *MBSFNAreaConfiguration*.

drb-EstablishedWithQCI-1

This field is used to indicate the radio link failure occurred while a bearer with QCI value equal to 1 was configured, see TS 24.301 [35].

failedCellId

This field is used to indicate the cell in which connection establishment failed.

failedPCellId

This field is used to indicate the PCell in which RLF is detected or the target PCell of the failed handover. The UE sets the EARFCN according to the band used for transmission/ reception when the failure occurred.

inDeviceCoexDetected

Indicates that measurement logging is suspended due to IDC problem detection.

maxTxPowerReached

This field is used to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6].

mch-Index

Indicates the MCH by referring to the entry as listed in pmch-InfoList within MBSFNAreaConfiguration.

measResultFailedCell

This field refers to the last measurement results taken in the cell, where connection establishment failure happened. For BL UEs or UEs in CE, when operating in CE Mode B, *measResultFailedCell-v1360* is reported if the measured RSRP is less than -140 dBm.

measResultLastServCell

This field refers to the last measurement results taken in the PCell, where radio link failure or handover failure happened. For BL UEs or UEs in CE, when operating in CE Mode B, *measResultLastServCell-v1360* is reported if the measured RSRP is less than -140 dBm.

measResultListEUTRA

If measResultListEUTRA-v9e0, measResultListEUTRA-v1090 or measResultListEUTRA-v1130 is included, the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-r9, measResultListEUTRA-r10 and/ or measResultListEUTRA-r11 respectively.

measResultListEUTRA-v1250

If included in *RLF-Report-r9* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r9*;

If included in *LogMeasInfo-r10* the UE shall include the same number of entries, and listed in the same order, as in *measResultListEUTRA-r10*:

If included in ConnEstFailReport-r11 the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-r11;

measResultServCell

This field refers to the log measurement results taken in the Serving cell. For BL UEs or UEs in CE, when operating in CE Mode B, *measResultServCell-v1360* is reported if the measured RSRP is less than -140 dBm.

mobility History Report

This field is used to indicate the time of stay in 16 most recently visited E-UTRA cells or of stay out of E-UTRA.

numberOfPreamblesSent

This field is used to indicate the number of RACH preambles that were transmitted. Corresponds to parameter PREAMBLE_TRANSMISSION_COUNTER in TS 36.321 [6].

UEInformationResponse field descriptions

previousPCellId

This field is used to indicate the source PCell of the last handover (source PCell when the last RRC-Connection-Reconfiguration message including mobilityControlInfowas received).

previousUTRA-CellId

This field is used to indicate the source UTRA cell of the last successful handover to E-UTRAN, when RLF occurred at the target PCell. The UE sets the ARFCN according to the band used for transmission/ reception on the concerned cell

reestablishmentCellId

This field is used to indicate the cell in which the re-establishment attempt was made after connection failure.

relativeTimeStamp

Indicates the time of logging measurement results, measured relative to the absoluteTimeStamp. Value in seconds.

rlf-Cause

This field is used to indicate the cause of the last radio link failure that was detected. In case of handover failure information reporting (i.e., the *connectionFailureType* is set to 'hof'), the UE is allowed to set this field to any value.

selectedUTRA-CellId

This field is used to indicate the UTRA cell that the UE selects after RLF is detected, while T311 is running. The UE sets the ARFCN according to the band selected for transmission/ reception on the concerned cell.

signallingBLER-Result

Includes a BLER result of MBSFN subframes using signallingMCS.

tac-FailedPCell

This field is used to indicate the Tracking Area Code of the PCell in which RLF is detected.

tce-ld

Parameter Trace Collection Entity Id: See TS 32.422 [58].

timeConnFailure

This field is used to indicate the time elapsed since the last HO initialization until connection failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.

timeSinceFailure

This field is used to indicate the time that elapsed since the connection (establishment) failure. Value in seconds. The maximum value 172800 means 172800s or longer.

traceRecordingSessionRef

Parameter Trace Recording Session Reference: See TS 32.422 [58].

ULHandoverPreparationTransfer (CDMA2000)

The *ULHandoverPreparationTransfer* message is used for the uplink transfer of handover related CDMA2000 information when requested by the higher layers.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

ULHandoverPreparationTransfer message

```
-- ASN1START
ULHandoverPreparationTransfer ::=
                                  SEOUENCE {
                                 CHOICE {
   criticalExtensions
                                         CHOICE {
       c1
           ulHandoverPreparationTransfer-r8
                                                  ULHandoverPreparationTransfer-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
                                              SEQUENCE {}
       \verb|criticalExtensionsFuture| \\
   }
ULHandoverPreparationTransfer-r8-IEs ::= SEQUENCE {
   cdma2000-Type
                                      CDMA2000-Type,
   meid
                                      BIT STRING (SIZE (56)) OPTIONAL,
   dedicatedInfo
                                      DedicatedInfoCDMA2000,
   nonCriticalExtension
                                      ULHandoverPreparationTransfer-v8a0-IEs OPTIONAL
ULHandoverPreparationTransfer-v8a0-IEs ::= SEQUENCE {
```

ULHandoverPreparationTransfer field descriptions

meid

The 56 bit mobile identification number provided by the CDMA2000 Upper layers.

ULInformationTransfer

The ULInformationTransfer message is used for the uplink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1(only if SRB2 not established yet). If SRB2 is suspended, the UE does not send this message until SRB2 is resumed

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

ULInformationTransfer message

```
-- ASN1START
ULInformationTransfer ::=
                                  SEQUENCE {
   criticalExtensions
                                     CHOICE {
       c1
                                          CHOICE {
           ulInformationTransfer-r8
                                              ULInformationTransfer-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
       },
       criticalExtensionsFuture
                                          SEQUENCE { }
ULInformationTransfer-r8-IEs ::= SEQUENCE {
   dedicatedInfoType
                      CHOICE {
       dedicatedInfoNAS
                                          DedicatedInfoNAS,
       dedicatedInfoCDMA2000-1XRTT
                                          DedicatedInfoCDMA2000,
       dedicatedInfoCDMA2000-HRPD
                                          DedicatedInfoCDMA2000
   nonCriticalExtension
                                      ULInformationTransfer-v8a0-IEs
   OPTIONAL
}
ULInformationTransfer-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                      OCTET STRING
                                                                         OPTIONAL.
   nonCriticalExtension
                                      SEQUENCE {}
                                                                         OPTIONAL
-- ASN1STOP
```

WLANConnectionStatusReport

The *WLANConnectionStatusReport* message is used to inform the successful connection to WLAN or failure of the WLAN connection or connection attempt(s).

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

WLANConnectionStatusReport message

```
-- ASN1START
WLANConnectionStatusReport-r13 ::= SEQUENCE {
                      criticalExtensions
                                                                                                                                                                                                                              CHOICE {
                                                                                                                                                                                                                                                        CHOICE {
                                             c1
                                                                    wlanConnectionStatusReport-r13 WLANConnectionStatusReport-r13-IEs,
                                                                    spare3 NULL, spare2 NULL, spare1 NULL
                                             },
                                             criticalExtensionsFuture
                                                                                                                                                                                                                                                     SEOUENCE { }
}
WLANConnectionStatusReport-r13-IEs ::= SEQUENCE {

    wlan-Status-r13
    WLAN-Status-r13,

    lateNonCriticalExtension
    OCTET STRING

    nonCriticalExtension
    WLANConnectionStatusReport-v1430-IEs

                    wlan-Status-r13
                                                                                                                                                                                                                                                                                                                                                                                                                     OPTIONAL,
                                                                                                                                                                                                                                                                                                                                                                                                                                     OPTIONAL
WLANConnectionStatusReport-v1430-IEs ::=
                                                                                                                                                                                                                                            SEQUENCE {
                       \begin{array}{lll} & & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & \\ & & \\ & & \\ & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & \\ & & 
                                                                                                                                                                                                                                                                                                                                                                                                                       OPTIONAL
-- ASN1STOP
```

WLANConnectionStatusReport field descriptions

wlan-Status

Indicates the connection status to WLAN and the cause of failures. If the *wlan-Status-v1430* is included, E-UTRAN ignores the *wlan-Status-r13*.

6.3 RRC information elements

6.3.1 System information blocks

SystemInformationBlockType2

The IE SystemInformationBlockType2 contains radio resource configuration information that is common for all UEs.

NOTE: UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

SystemInformationBlockType2 information element

```
-- ASN1START
                                  SEQUENCE {
SystemInformationBlockType2 ::=
                               SEQUENCE {
   ac-BarringInfo
       ac-BarringForEmergency
                                          BOOLEAN,
       ac-BarringForMO-Signalling
                                                                        OPTIONAL,
                                          AC-BarringConfig
                                                                                    -- Need OP
                                                                         OPTIONAL
       ac-BarringForMO-Data
                                          AC-BarringConfig
                                                                                    -- Need OP
                                                                                    -- Need OP
                                                                         OPTIONAL,
   radioResourceConfigCommon
                                    RadioResourceConfigCommonSIB,
   ue-TimersAndConstants
                                      UE-TimersAndConstants,
                                      SEOUENCE {
   freqInfo
                                          ARFCN-ValueEUTRA
       ul-CarrierFreq
                                                                         OPTIONAL,
                                                                                     -- Need OP
       ul-Bandwidth
                                          ENUMERATED {n6, n15, n25, n50, n75, n100}
                                                                                    -- Need OP
                                                                        OPTIONAL,
```

```
additionalSpectrumEmission AdditionalSpectrumEmission
                                   MBSFN-SubframeConfigList
TimeAlignmentTimer,
                                                                          OPTIONAL, -- Need OR
    mbsfn-SubframeConfigList
    timeAlignmentTimerCommon
                                         TimeAlignmentTimer,
    lateNonCriticalExtension
                                    OCTET STRING (CONTAINING SystemInformationBlockType2-v8h0-IEs)
                         OPTIONAL,
    [[ ssac-BarringForMMTEL-Voice-r9
                                              AC-BarringConfig
                                                                                OPTIONAL,
                                                                                             -- Need OP
        ssac-BarringForMMTEL-Video-r9
                                              AC-BarringConfig
                                                                                OPTIONAL
                                                                                             -- Need OP
    [[ ac-BarringForCSFB-r10
                                              AC-BarringConfig
                                                                           OPTIONAL
                                                                                         -- Need OP
    ]],
    [[ ac-BarringSkipForMMTELVoice-r12 ENUMERATED {true} OPTIONAL,
ac-BarringSkipForMMTELVideo-r12 ENUMERATED {true} OPTIONAL,
ac-BarringSkipForMMC-r12 ENUMERATED {true} OPTIONAL,
                                                                                         -- Need OP
                                                                                         -- Need OP
                                               ENUMERATED {true}
        ac-BarringSkipForSMS-r12
                                                                            OPTIONAL,
                                                                                          -- Need OP
                                                                                         -- Need OP
        ac-BarringPerPLMN-List-r12
                                              AC-BarringPerPLMN-List-r12 OPTIONAL
    ]],
        OPTIONAL -- Need OP
    Π
    11,
    [[ acdc-BarringForCommon-r13
                                              ACDC-BarringForCommon-r13
                                                                                OPTIONAL,
                                                                                             -- Need OP
                                              ACDC-BarringPerPLMN-List-r13
        acdc-BarringPerPLMN-List-r13
                                                                                OPTIONAL
                                                                                             -- Need OP
    ]],
    [ [
        udt-RestrictingForCommon-r13 UDT-Restricting-r13 UDT-RestrictingPerPLMN-List-r13 UDT-RestrictingPerPLM CIOT-EPS-OptimisationInfo-r13 CIOT-EPS-OptimisationInfo-r13 useFullResumeID-r12
                                                                                OPTIONAL,
                                                                                             -- Need OR
                                              UDT-RestrictingPerPLMN-List-r13 OPTIONAL,
                                                                                             -- Need OR
                                                                                             -- Need OP
                                              CIOT-EPS-OptimisationInfo-r13 OPTIONAL,
        useFullResumeID-r13
                                             ENUMERATED {true}
                                                                                OPTIONAL
                                                                                             -- Need OP
    ]],
    [[ unicastFreqHoppingInd-r13
                                             ENUMERATED {true}
                                                                                OPTIONAL
                                                                                             -- Need OP
    ]],
        mbsfn-SubframeConfigList-v1430 MBSFN-SubframeConfigvideoServiceCauseIndication-r14 ENUMERATED {true}
                                              MBSFN-SubframeConfigList-v1430 OPTIONAL, -- Need OP
    [[ mbsfn-SubframeConfigList-v1430
                                                                               OPTIONAL
                                                                                             -- Need OP
    ]]
}
SystemInformationBlockType2-v8h0-IEs ::= SEQUENCE {
   multiBandInfoList SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission OPTIONAL, -- Need OR
    nonCriticalExtension
                                    SystemInformationBlockType2-v9e0-IEs OPTIONAL
{\tt SystemInformationBlockType2-v9e0-IEs} ::= {\tt SEQUENCE} \ \{
    ul-CarrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0 OPTIONAL, -- Cond ul-FreqMax nonCriticalExtension SystemInformationBlockType2-v9i0-IEs
    OPTIONAL
}
SystemInformationBlockType2-v9i0-IEs ::= SEQUENCE {
 -- Following field is only for late non-critical extensions for REL-9
                                       OCTET STRING
    lateNonCriticalExtension
                                                                                OPTIONAL,
-- Following field is only for late non-critical extensions from REL-10
   nonCriticalExtension
                                SystemInformationBlockType2-v1010-IEs
                                                                               OPTIONAL
{\tt SystemInformationBlockType2-v1010-IEs} \ ::= \ {\tt SEQUENCE} \ \big\{
    freqInfo-v1010
                                         SEQUENCE {
       additionalSpectrumEmission-v1010
                                                       AdditionalSpectrumEmission-v1010
                                         SEQUENCE (SIZE (1..maxMultiBands)) OF
    multiBandInfoList-v1010
AdditionalSpectrumEmission-v1010,
   nonCriticalExtension
                                         SEQUENCE {}
                                                                       OPTIONAL
AC-BarringConfig ::=
ac-BarringFactor
                                    SEQUENCE {
                                          ENUMERATED {
                                            p00, p05, p10, p15, p20, p25, p30, p40,
                                              p50, p60, p70, p75, p80, p85, p90, p95},
                                          ENUMERATED \{s4, s8, s16, s32, s64, s128, s256, s512\},
    ac-BarringTime
    ac-BarringForSpecialAC
                                          BIT STRING (SIZE(5))
}
MBSFN-SubframeConfigList ::=
                                     SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-
SubframeConfig
MBSFN-SubframeConfigList-v1430 ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-
SubframeConfig-v1430
```

```
AC-BarringPerPLMN-List-r12 ::= SEQUENCE (SIZE (1.. maxPLMN-r11)) OF AC-BarringPerPLMN-r12
AC-BarringPerPLMN-r12 ::=
                                    SEQUENCE {
    plmn-IdentityIndex-r12
                                             INTEGER (1..maxPLMN-r11),
    ac-BarringInfo-r12
                                              SEQUENCE {
        ac-BarringForEmergency-r12
                                             BOOLEAN,
                                             AC-BarringConfig OPTIONAL,
AC-BarringConfig OPTIONAL
                                                                               -- Need OP
        ac-BarringForMO-Signalling-r12
                                                                   OPTIONAL,
        ac-BarringForMO-Data-r12
                                                                               -- Need OP
                                                                   OPTIONAL,
                                                                               -- Need OP
   ac-BarringSkipForMMTELVoice-r12 ENUMERATED {true} ac-BarringSkipForMMTELVideo-r12 ENUMERATED {true}
                                        OPTIONAL,
OPTIONAL,
ENUMERATED {true} OPTIONAL,
AC-BarringConfig OPTIONAL,
AC-BarringConfig OPTIONAL,
AC-BarringConfic
                                                                   OPTIONAL,
                                                                               -- Need OP
                                                                  OPTIONAL,
    ac-BarringSkipForSMS-r12
                                                                               -- Need OP
                                                                               -- Need OP
    ac-BarringForCSFB-r12
    ssac-BarringForMMTEL-Voice-r12
ssac-BarringForMMTEL-Video-r12
                                                                  OPTIONAL,
                                                                               -- Need OP
                                                                               -- Need OP
}
                                         SEQUENCE {
ACDC-BarringForCommon-r13 ::=
    acdc-HPLMNonly-r13
                                          BOOLEAN,
    barringPerACDC-CategoryList-r13
                                                  BarringPerACDC-CategoryList-r13
}
ACDC-BarringPerPLMN-List-r13 ::=
                                     SEQUENCE (SIZE (1.. maxPLMN-r11)) OF ACDC-BarringPerPLMN-r13
ACDC-BarringPerPLMN-r13 ::=
                              SEQUENCE {
                               INTEGER (1..maxPLMN-r11),
    plmn-IdentityIndex-r13
    acdc-OnlyForHPLMN-r13
                                            BOOLEAN,
    barringPerACDC-CategoryList-r13
                                                  BarringPerACDC-CategoryList-r13
}
BarringPerACDC-CategoryList-r13 ::= SEQUENCE (SIZE (1..maxACDC-Cat-r13)) OF BarringPerACDC-Category-
BarringPerACDC-Category-r13 ::= SEQUENCE {
                                     INTEGER (1..maxACDC-Cat-r13),
    acdc-BarringConfig-r13
                                     SEQUENCE {
        ac-BarringFactor-r13
                                         ENUMERATED {
                                              p00, p05, p10, p15, p20, p25, p30, p40,
                                              p50, p60, p70, p75, p80, p85, p90, p95}
        ac-BarringTime-r13
                                          ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512}
                                              OPTIONAL
                                                          -- Need OP
}
UDT-Restricting-r13 ::= SEQUENCE {
    udt-Restricting-r13
                                          ENUMERATED {true}
                                                                      OPTIONAL, --Need OR
                                         ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512}
    udt-RestrictingTime-r13
OPTIONAL --Need OR
UDT-RestrictingPerPLMN-List-r13 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF UDT-RestrictingPerPLMN-
UDT-RestrictingPerPLMN-r13 ::= SEQUENCE {
    plmn-IdentityIndex-r13
                                              INTEGER (1..maxPLMN-r11),
    udt-Restricting-r13
                                              UDT-Restricting-r13 OPTIONAL
CIOT-EPS-OptimisationInfo-r13 ::= SEQUENCE (SIZE (1.. maxPLMN-r11)) OF CIOT-OptimisationPLMN-r13
CIOT-OptimisationPLMN-r13::= SEQUENCE {
        up-CIoT-EPS-Optimisation-r13
                                             ENUMERATED {true}
                                                                          OPTIONAL,
                                                                                        -- Need OP
                                                                           OPTIONAL,
        cp-CIoT-EPS-Optimisation-r13
                                              ENUMERATED {true}
                                                                                        -- Need OP
                                                                                        -- Need OP
        attachWithoutPDN-Connectivity-r13 ENUMERATED {true}
                                                                          OPTIONAL
-- ASN1STOP
```

SystemInformationBlockType2 field descriptions

ac-BarringFactor

If the random number drawn by the UE is lower than this value, access is allowed. Otherwise the access is barred. The values are interpreted in the range [0,1): p00 = 0, p05 = 0.05, p10 = 0.10,..., p95 = 0.95. Values other than p00 can only be set if all bits of the corresponding *ac-BarringForSpecialAC* are set to 0.

ac-BarringForCSFB

Access class barring for mobile originating CS fallback.

ac-BarringForEmergency

Access class barring for AC 10.

ac-BarringForMO-Data

Access class barring for mobile originating calls.

ac-BarringForMO-Signalling

Access class barring for mobile originating signalling.

ac-BarringForSpecialAC

Access class barring for AC 11-15. The first/ leftmost bit is for AC 11, the second bit is for AC 12, and so on.

ac-BarringTime

Mean access barring time value in seconds.

acdc-BarringConfig

Barring configuration for an ACDC category. If the field is absent, access to the cell is considered as not barred for the ACDC category in accordance with subclause 5.3.3.13.

acdc-Category

Indicates the ACDC category as defined in TS 24.105 [72].

acdc-OnlyForHPLMN

Indicates whether ACDC is applicable for UEs not in their HPLMN for the corresponding PLMN. *TRUE* indicates that ACDC is applicable only for UEs in their HPLMN for the corresponding PLMN. *FALSE* indicates that ACDC is applicable for both UEs in their HPLMN and UEs not in their HPLMN for the corresponding PLMN.

additionalSpectrumEmission

The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs. NOTE 1.

attachWithoutPDN-Connectivity

If present, the field indicates that attach without PDN connectivity as specified in TS 24.301 [35] is supported for this PLMN.

barringPerACDC-CategoryList

A list of barring information per ACDC category according to the order defined in TS 22.011 [10]. The first entry in the list corresponds to the highest ACDC category of which applications are the least restricted in access attempts at a cell, the second entry in the list corresponds to the ACDC category of which applications are restricted more than applications of the highest ACDC category in access attempts at a cell, and so on. The last entry in the list corresponds to the lowest ACDC category of which applications are the most restricted in access attempts at a cell.

cloT-EPS-OptimisationInfo

A list of CIoT EPS related parameters. Value 1 indicates parameters for the PLMN listed 1st in the 1st *plmn-IdentityList* included in SIB1. Value 2 indicates parameters for the the PLMN listed 2nd in the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList*, then the value indicates parameters for PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on. NOTE 1.

cp-CloT-EPS-Optimisation

This field indicates if the UE is allowed to establish the connection with Control plane CloT EPS Optimisation, see TS 24.301 [35].

mbsfn-SubframeConfigList

Defines the subframes that are reserved for MBSFN in downlink.

NOTE 1. If the cell is a FeMBMS/Unicast mixed cell, EUTRAN includes *mbsfn-SubframeConfigList-v1430*. If a FeMBMS/Unicast mixed cell does not use sub-frames #4 or #9 as MBSFN sub-frames, *mbsfn-SubframeConfigList-v1430* is still included and indicates all sub-frames as non-MBSFN sub-frames.

multiBandInfoList

A list of *AdditionalSpectrumEmission* i.e. one for each additional frequency band included in *multiBandInfoList* in *SystemInformationBlockType1*, listed in the same order. If E-UTRAN includes *multiBandInfoList-v10I0* it includes the same number of entries, and listed in the same order, as in *multiBandInfoList*.

plmn-IdentityIndex

Index of the PLMN across the *plmn-IdentityList* fields included in SIB1. Value 1 indicates the PLMN listed 1st in the 1st *plmn-IdentityList* included in SIB1. Value 2 indicates the PLMN listed 2nd in the same *plmn-IdentityList*, or when no more PLMN are present within the same *plmn-IdentityList*, then the PLMN listed 1st in the subsequent *plmn-IdentityList* within the same SIB1 and so on. NOTE 1.

ssac-BarringForMMTEL-Video

Service specific access class barring for MMTEL video originating calls.

ssac-BarringForMMTEL-Voice

Service specific access class barring for MMTEL voice originating calls.

SystemInformationBlockType2 field descriptions

udt-Restricting

Value TRUE indicates that the UE should indicate to the higher layers to restrict unattended data traffic TS 22.101 [77] irrespective of the UE being in RRC_IDLE or RRC_CONNECTED. The UE shall not indicate to the higher layers if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11].

udt-RestrictingTime

If present and when the *udt-Restricting* changes from TRUE, the UE runs a timer for a period equal to rand * *udt-RestrictingTime*, where rand is a random number drawn that is uniformly distributed in the range $0 \le \text{rand} < 1$ value in seconds. The timer stops if *udt-Restricting* changes to TRUE. Upon timer expiry, the UE indicates to the higher layers that the restriction is alleviated.

unicastFreqHoppingInd

This field indicates if the UE is allowed to indicate support of frequency hopping for unicast MPDCCH/PDSCH/PUSCH as described in TS 36.321 [6]. This field is included only in the BR version of SI message carrying SystemInformationBlockType2.

ul-Bandwidth

Parameter: transmission bandwidth configuration, N_{RB}, in uplink, see TS 36.101 [42, table 5.6-1]. Value n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on. If for FDD this parameter is absent, the uplink bandwidth is equal to the downlink bandwidth. For TDD this parameter is absent and it is equal to the downlink bandwidth. NOTE 1.

ul-CarrierFreq

For FDD: If absent, the (default) value determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1] applies.

For TDD: This parameter is absent and it is equal to the downlink frequency. NOTE 1.

up-CloT-EPS-Optimisation

This field indicates if the UE is allowed to resume the connection with User plane CloT EPS Optimisation, see TS 24.301 [35].

useFullResumeID

This field indicates if the UE indicates full resume ID of 40 bits in RRCConnectionResumeRequest.

videoServiceCauseIndication

Indicates whether the UE is requested to use the establishment cause *mo-VoiceCall* for mobile originating MMTEL video calls.

voiceServiceCauseIndication

Indicates whether UE is requested to use the establishment cause *mo-VoiceCall* for mobile originating MMTEL voice calls.

Conditional presence	Explanation
ul-FreqMax	The field is mandatory present if <i>ul-CarrierFreq</i> (i.e. without suffix) is present and set to <i>maxEARFCN</i> . Otherwise the field is not present.

NOTE 1: E-UTRAN sets this field to the same value for all instances of SI message that are broadcasted within the same cell.

SystemInformationBlockType3

The IE *SystemInformationBlockType3* contains cell re-selection information common for intra-frequency, inter-frequency and/ or inter-RAT cell re-selection (i.e. applicable for more than one type of cell re-selection but not necessarily all) as well as intra-frequency cell re-selection information other than neighbouring cell related.

SystemInformationBlockType3 information element

```
-- ASN1START
SystemInformationBlockType3 ::=
                                    SEOUENCE {
                                        SEQUENCE {
    cellReselectionInfoCommon
        q-Hyst
                                            ENUMERATED {
                                                dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                                dB12, dB14, dB16, dB18, dB20, dB22, dB24},
        speedStateReselectionPars
                                            SEOUENCE
            mobilityStateParameters
                                                MobilityStateParameters,
            q-HystSF
                                            SEQUENCE -
                sf-Medium
                                                ENUMERATED {
                                                        dB-6, dB-4, dB-2, dB0,
                                                 ENUMERATED {
                sf-High
```

```
dB-6, dB-4, dB-2, dB0}
           }
      }
                                                                      OPTIONAL
                                                                                     -- Need OP
   cellReselectionServingFreqInfo SEQUENCE {
    s-NonIntraSearch Reselec
    threshServingLow Reselec
                                     ReselectionThreshold OPTIONAL,
                                                                                     -- Need OP
       threshServingLow
                                          ReselectionThreshold,
                                         CellReselectionPriority
       cellReselectionPriority
    intraFreqCellReselectionInfo
                                    SEQUENCE {
                                         Q-RxLevMin,
       q-RxLevMin
                                         ReselectionThreshold OPTIONAL,
AllowedMeasBandwidth OPTIONAL,
PresenceAntennaPort1
       p-Max
                                                                                     -- Need OP
                                                                                     -- Need OP
       s-IntraSearch
                                PresenceAntenna
NeighCellConfig,
T-Reselection,
       {\tt allowedMeasBandwidth}
                                                                                     -- Need OP
       presenceAntennaPort1
       neighCellConfig
       t-ReselectionEUTRA
                                          SpeedStateScaleFactors OPTIONAL
       t-ReselectionEUTRA-SF
                                                                                     -- Need OP
   lateNonCriticalExtension
                                         OCTET STRING (CONTAINING SystemInformationBlockType3-
v10j0-IEs) OPTIONAL,
          OPTIONAL,
IntraSearch-v920
s-IntraSearchP-r9
                                       SEQUENCE {
   [[ s-IntraSearch-v920
                                          ReselectionThreshold,
           s-IntraSearchO-r9
                                             ReselectionThresholdO-r9
                                                                     OPTIONAL,
                                                                                     -- Need OP
                                        SEQUENCE {
       s-NonIntraSearch-v920
                                         ReselectionThreshold,
ReselectionThresholdQ-r9
           s-NonIntraSearchP-r9
           s-NonIntraSearchQ-r9
                                                                     OPTIONAL,
OPTIONAL,
                                                                                     -- Need OP
                                          Q-QualMin-r9
                                                                                     -- Need OP
       q-QualMin-r9
       threshServingLowQ-r9
                                          ReselectionThresholdQ-r9 OPTIONAL
                                                                                     -- Need OP
    ]],
   [[ q-QualMinWB-r11
                                         Q-QualMin-r9
                                                                    OPTIONAL -- Cond WB-RSRO
   ]],
[[ q-QualMinRSRQ-OnAllSymbols-r12
                                             Q-QualMin-r9
                                                                         OPTIONAL
Cond RSRO
   ]],
   [[ cellReselectionServingFreqInfo-v1310 CellReselectionServingFreqInfo-v1310 OPTIONAL,
Need OP
       redistributionServingInfo-r13
cellSelectionInfoCE-r13
                                              RedistributionServingInfo-r13 OPTIONAL, --Need OR
                                              CellSelectionInfoCE-r13 OPTIONAL,
                                                                                        -- Need
OP
       t-ReselectionEUTRA-CE-r13
                                            T-ReselectionEUTRA-CE-r13 OPTIONAL
                                                                                         -- Need
   ]],
                                           CellSelectionInfoCE1-r13 OPTIONAL
   [[ cellSelectionInfoCE1-r13
                                                                                     -- Need OP
   OrxlevminCE1
   11
redistributionFactorCell-r13
                                      ENUMERATED{true}
                                                                     OPTIONAL,
                                                                                 --Need OP
   t360-r13
                                      ENUMERATED {min4, min8, min16, min32,infinity,
                                        spare3,spare2,spare1},
   redistrOnPagingOnly-r13 ENUMERATED {true} OPTIONAL
}
CellReselectionServingFreqInfo-v1310 ::= SEQUENCE { cellReselectionSubPriority-r13 CellRe
                                           CellReselectionSubPriority-r13
-- Late non critical extensions
{\tt SystemInformationBlockType3-v10j0-IEs} \ ::= \ {\tt SEQUENCE} \ \{
   freqBandInfo-r10 NS-PmaxList-r10 OPTIONAL, -- Need OR multiBandInfoList-v10j0 MultiBandInfoList-v10j0 OPTIONAL, -- Need OR nonCriticalExtension SystemInformationBlockType3-v1010-IEs
   freqBandInfo-r10
   OPTIONAL
}
{\tt SystemInformationBlockType3-v1010-IEs} \ ::= \ {\tt SEQUENCE} \ \{
   freqBandInfo-v1010
                                                                              -- Need OR
   nonCriticalExtension
                                      SEQUENCE {}
```

-- ASN1STOP

SystemInformationBlockType3 field descriptions

allowedMeasBandwidth

If absent, the value corresponding to the downlink bandwidth indicated by the *dl-Bandwidth* included in *MasterInformationBlock* applies.

cellSelectionInfoCE

Parameters included in coverage enhancement S criteria. They may be used by the UE to select/reselect a cell in which it works in CE mode on the concerned non serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency.

cellSelectionInfoCE1

Parameters included in coverage enhancement S criteria. They may be used by the UE to select/reselect a cell in which it works in CE mode on the concerned non serving frequency. E-UTRAN includes this IE only if cellSelectionInfoCE in SIB3 is present.

cellReselectionInfoCommon

Cell re-selection information common for cells.

cellReselectionServingFreqInfo

Information common for Cell re-selection to inter-frequency and inter-RAT cells.

fregBandInfo

A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, applicable for the intra-frequency neighouring E-UTRA cells if the UE selects the frequency band from freqBandIndicator in SystemInformationBlockType1. If E-UTRAN includes freqBandInfo-v10l0 it includes the same number of entries, and listed in the same order, as in freqBandInfo-r10.

intraFreqcellReselectionInfo

Cell re-selection information common for intra-frequency cells.

multiBandInfoList-v10j0

A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, applicable for the intra-frequency neighouring E-UTRA cells if the UE selects the frequency bands in *multiBandInfoList* (i.e. without suffix) or *multiBandInfoList-v9e0*. If E-UTRAN includes *multiBandInfoList-v10j0*, it includes the same number of entries, and listed in the same order, as in *multiBandInfoList-v10j0* it includes the same number of entries, and listed in the same order, as in *multiBandInfoList-v10j0*.

p-Max

Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability.

redistrOnPagingOnly

If this field is present and the UE is redistribution capable, the UE shall only wait for the paging message to trigger E-UTRAN inter-frequency redistribution procedure as specified in 5.2.4.10 of TS 36.304 [4].

a-Hvst

Parameter Q_{hyst} in TS 36.304 [4], Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.

q-HystSF

Parameter "Speed dependent ScalingFactor for Q_{hyst} " in TS 36.304 [4]. The sf-Medium and sf-High concern the additional hysteresis to be applied, in Medium and High Mobility state respectively, to Q_{hyst} as defined in TS 36.304 [4]. In dB. Value dB-6 corresponds to -6dB, dB-4 corresponds to -4dB and so on.

q-QualMin

Parameter "Q_{qualmin}" in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for Q_{qualmin}. NOTE 1.

q-QualMinRSRQ-OnAllSymbols

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.

q-QualMinWB

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.

a-RxLevMin

Parameter "Q_{rxlevmin}" in TS 36.304 [4], applicable for intra-frequency neighbour cells.

redistributionFactorCell

If redistributionFactorCell is present, redistributionFactorServing is only applicable for the serving cell otherwise it is applicable for serving frequency

redistributionFactorServing

Parameter redistributionFactorServing in TS 36.304 [4].

s-IntraSearch

Parameter "S_{IntraSearchP}" in TS 36.304 [4]. If the field *s-IntraSearchP* is present, the UE applies the value of *s-IntraSearchP* instead. Otherwise if neither *s-IntraSearch* nor *s-IntraSearchP* is present, the UE applies the (default) value of infinity for S_{IntraSearchP}.

s-IntraSearchP

Parameter "S_{IntraSearchP}" in TS 36.304 [4]. See descriptions under s-IntraSearch.

SystemInformationBlockType3 field descriptions

s-IntraSearchQ

Parameter "S_{IntraSearchQ}" in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for S_{IntraSearchQ}.

s-NonIntraSearch

Parameter "S_{nonIntraSearchP}" in TS 36.304 [4]. If the field *s-NonIntraSearchP* is present, the UE applies the value of *s-NonIntraSearchP* instead. Otherwise if neither *s-NonIntraSearch* nor *s-NonIntraSearchP* is present, the UE applies the (default) value of infinity for S_{nonIntraSearchP}.

s-NonIntraSearchP

Parameter "SnonIntraSearchP" in TS 36.304 [4]. See descriptions under s-NonIntraSearch.

s-NonIntraSearchQ

Parameter " $S_{\text{nonIntraSearchQ}}$ " in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for $S_{\text{nonIntraSearchQ}}$.

speedStateReselectionPars

Speed dependent reselection parameters, see TS 36.304 [4]. If this field is absent, i.e, *mobilityStateParameters* is also not present, UE behaviour is specified in TS 36.304 [4].

t360

Parameter "T360" in TS 36.304 [4]. Value *min4* corresponds to 4 minutes, value *min8* corresponds to 8 minutes, and so on.

threshServingLow

Parameter "Thresh_{Serving, LowP}" in TS 36.304 [4].

threshServingLowQ

Parameter "Thresh_{Serving, LowQ}" in TS 36.304 [4].

t-ReselectionEUTRA

Parameter "Treselection_{EUTRA}" in TS 36.304 [4].

t-ReselectionEUTRA-SF

Parameter "Speed dependent ScalingFactor for Treselection_{EUTRA}" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

NOTE 1: The value the UE applies for parameter "Q_{qualmin}" in TS 36.304 [4] depends on the *q-QualMin* fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

q-QualMinRSRQ-OnAllSymbols	q-QualMinWB	Value of parameter "Q _{qualmin} " in TS 36.304 [4]
Included	Included	q-QualMinRSRQ-OnAllSymbols – (q-QualMin – q-
		QualMinWB)
Included	Not included	q-QualMinRSRQ-OnAllSymbols
Not included	Included	q-QualMinWB
Not included	Not included	g-QualMin

Conditional presence	Explanation
QrxlevminCE1	The field is optionally present, Need OR, if <i>q-RxLevMinCE1-r13</i> is set below -140 dBm.
	Otherwise the field is not present.
RSRQ	The field is optionally present, Need OR, if threshServingLowQ is present in SIB3;
	otherwise it is not present.
WB-RSRQ	The field is optionally present, need OP if the measurement bandwidth indicated by
	allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present.

SystemInformationBlockType4

The IE *SystemInformationBlockType4* contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters as well as blacklisted cells.

SystemInformationBlockType4 information element

SystemInformationBlockType4 field descriptions

csg-PhysCellIdRange

Set of physical cell identities reserved for CSG cells on the frequency on which this field was received. The received csg-PhysCellIdRange applies if less than 24 hours has elapsed since it was received and the UE is camped on a cell of the same primary PLMN where this field was received. The 3 hour validity restriction (section 5.2.1.3) does not apply to this field. The UE shall not apply any stored csg-PhysCellIdRange when it is in any cell selection state defined in TS 36.304 [4].

intraFreqBlackCellList

List of blacklisted intra-frequency neighbouring cells.

intraFreqNeighbCellList

List of intra-frequency neighbouring cells with specific cell re-selection parameters.

a-OffsetCell

Parameter "Qoffsets,n" in TS 36.304 [4].

Conditional presence	Explanation
CSG	This field is optional, need OP, for non-CSG cells, and mandatory for CSG cells.

SystemInformationBlockType5

The IE *SystemInformationBlockType5* contains information relevant only for inter-frequency cell re-selection i.e. information about other E-UTRA frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

SystemInformationBlockType5 information element

```
-- ASN1START
SystemInformationBlockType5 ::=
                                    SEQUENCE {
    interFreqCarrierFreqList
                                       InterFreqCarrierFreqList,
    lateNonCriticalExtension
                                                            (CONTAINING SystemInformationBlockType5-
                                            OCTET STRING
v8h0-IEs)
                       OPTIONAL,
    [[ interFreqCarrierFreqList-v1250 InterFreqCarrierFreqList-v1250
                                                                            OPTIONAL,
                                                                                        -- Need OR
        interFreqCarrierFreqListExt-r12 InterFreqCarrierFreqListExt-r12
                                                                            OPTIONAL
                                                                                        -- Need OR
    ]],
       interFreqCarrierFreqListExt-v1280
                                            InterFreqCarrierFreqListExt-v1280
                                                                                OPTIONAL
                                                                                             -- Need
    [ [
OR
       interFreqCarrierFreqList-v1310
                                            InterFreqCarrierFreqList-v1310
                                                                                OPTIONAL,
                                                                                             -- Need
OR
        interFreqCarrierFreqListExt-v1310
                                            InterFreqCarrierFreqListExt-v1310
                                                                                OPTIONAL
                                                                                             -- Need
OR
    ]],
    [[ interFreqCarrierFreqList-v1350
                                            InterFreqCarrierFreqList-v1350 OPTIONAL,
                                                                                         -- Need OR
    interFreqCarrierFreqListExt-v1350
                                        InterFreqCarrierFreqListExt-v1350
                                                                            OPTIONAL
                                                                                         -- Need OR
    11,
    [[
        interFreqCarrierFreqListExt-v1360
                                            InterFreqCarrierFreqListExt-v1360
                                                                                OPTIONAL
                                                                                             -- Need
OR
                                            INTEGER (1..8)
                                                                            OPTIONAL
    [ [
       scptm-FreqOffset-r14
                                                                                        -- Need OP
SystemInformationBlockType5-v8h0-IEs ::= SEQUENCE {
```

```
interFreqCarrierFreqList-v8h0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v8h0
        OPTIONAL, -- Need OP
   nonCriticalExtension
                                  SystemInformationBlockType5-v9e0-IEs
    OPTIONAL
}
SystemInformationBlockType5-v9e0-IEs ::= SEQUENCE {
   interFreqCarrierFreqList-v9e0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v9e0
           OPTIONAL, -- Need OR
    nonCriticalExtension
                                  SystemInformationBlockType5-v10j0-IEs OPTIONAL
}
{\tt SystemInformationBlockType5-v10j0-IEs} ::= {\tt SEQUENCE} \ \{
   interFreqCarrierFreqList-v10j0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v10j0
               OPTIONAL, -- Need OR
   nonCriticalExtension
                                   SystemInformationBlockType5-v1010-IEs
   OPTTONAL.
SystemInformationBlockType5-v1010-IEs ::=
                                          SEQUENCE {
   interFreqCarrierFreqList-v1010 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1010
               OPTIONAL, -- Need OR
    nonCriticalExtension
                                   SEQUENCE {}
                                                                   OPTIONAL
InterFreqCarrierFreqList ::=
                                  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo
InterFreqCarrierFreqList-v1250 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-v1250
InterFreqCarrierFreqList-v1310 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-v1310
InterFreqCarrierFreqList-v1350 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-v1350
InterFreqCarrierFreqListExt-r12 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-r12
InterFreqCarrierFreqListExt-v1280 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-
        v10j0
InterFreqCarrierFreqListExt-v1310 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-
        v1310
InterFreqCarrierFreqListExt-v1350 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-
        v1350
InterFreqCarrierFreqListExt-v1360 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-
InterFreqCarrierFreqInfo ::= SEQUENCE {
    dl-CarrierFreq
                                       ARFCN-ValueEUTRA,
   q-RxLevMin
                                       O-RxLevMin,
   p-Max
                                       P-Max
                                                                      OPTIONAL,
                                                                                       -- Need OP
    t-ReselectionEUTRA
                                       T-Reselection.
    t-ReselectionEUTRA-SF
                                      SpeedStateScaleFactors
                                                                       OPTIONAL,
                                                                                       -- Need OP
    threshX-High
                                       ReselectionThreshold.
   threshX-Low
                                      ReselectionThreshold,
   allowedMeasBandwidth
                                      AllowedMeasBandwidth,
    presenceAntennaPort1
                                      PresenceAntennaPort1,
    cellReselectionPriority
                                      CellReselectionPriority
                                                                     OPTIONAL,
                                                                                       -- Need OP
   neighCellConfig
                                       NeighCellConfig,
                                                                      DEFAULT dB0,
    g-OffsetFreg
                                      O-OffsetRange
    interFreqNeighCellList
                                                                       OPTIONAL,
                                       InterFreqNeighCellList
                                                                                       -- Need OR
    interFreqBlackCellList
                                       InterFreqBlackCellList
                                                                       OPTIONAL,
                                                                                       -- Need OR
    [[ q-QualMin-r9
                                       Q-QualMin-r9
                                                                       OPTIONAL,
                                                                                      -- Need OP
        threshX-0-r9
                                      SEQUENCE {
                                       ReselectionThresholdQ-r9,
           threshX-HighQ-r9
                                           ReselectionThresholdQ-r9
           threshX-LowQ-r9
        }
                                                                       OPTIONAL
                                                                                       -- Cond RSRQ
    ]],
       q-QualMinWB-r11
                                       O-OualMin-r9
                                                                       OPTIONAL
                                                                                   -- Cond WB-RSRO
}
InterFreqCarrierFreqInfo-v8h0 ::=
                                      SEQUENCE {
    multiBandInfoList
                                       MultiBandInfoList
                                                                       OPTIONAL
                                                                                   -- Need OR
InterFreqCarrierFreqInfo-v9e0 ::= SEQUENCE {
```

```
dl-CarrierFreq-v9e0
                                                           ARFCN-ValueEUTRA-v9e0 OPTIONAL, -- Cond dl-FreqMax
      multiBandInfoList-v9e0
                                                              MultiBandInfoList-v9e0 OPTIONAL
                                                                                                                        -- Need OR
}
InterFreqCarrierFreqInfo-v10j0 ::= SEQUENCE {
                                              NS-PmaxList-r10
                                                                                                        OPTIONAL,
     fregBandInfo-r10
                                                               MultiBandInfoList-v10j0 OPTIONAL
      multiBandInfoList-v10j0
                                                                                                                               -- Need OR
}
InterFreqCarrierFreqInfo-v1010 ::= SEQUENCE {
                                             NS-PmaxList-v1010
     freqBandInfo-v1010
                                                                                                        OPTIONAL,
                                                                                                                               -- Need OR
      multiBandInfoList-v1010
                                                              MultiBandInfoList-v1010 OPTIONAL
                                                                                                                              -- Need OR
}
InterFreqCarrierFreqInfo-v1250 ::=
                                                            SEQUENCE {
     reducedMeasPerformance-r12 ENUMERATED {true} OPTIONAL, -- Need OP
      q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9
                                                                                                           OPTIONAL -- Cond RSRO2
InterFreqCarrierFreqInfo-r12 ::=
                                                              SEQUENCE {
                                                              ARFCN-ValueEUTRA-r9,
     dl-CarrierFreg-r12
      q-RxLevMin-r12
                                                              Q-RxLevMin,
                                                                                                                  OPTIONAL,
                                                                                                                                            -- Need OP
      p-Max-r12
                                                               P-Max
      t-ReselectionEUTRA-r12
                                                             T-Reselection,
                                                            SpeedStateScaleFactors
ReselectionThreshold,
      t-ReselectionEUTRA-SF-r12
                                                                                                                 OPTIONAL.
                                                                                                                                           -- Need OP
      threshX-High-r12
      threshX-Low-r12
                                                            ReselectionThreshold,
      allowedMeasBandwidth-r12
                                                              AllowedMeasBandwidth,
                                                            PresenceAntennaPort1,
      presenceAntennaPort1-r12
                                                              CellReselectionPriority
      cellReselectionPriority-r12
                                                                                                               OPTIONAL,
                                                                                                                                           -- Need OP
      neighCellConfig-r12
                                                              NeighCellConfig,
      q-OffsetFreq-r12
                                                              Q-OffsetRange
                                                                                                                DEFAULT dB0,
                                                                                                                 OPTIONAL,
      interFreqNeighCellList-r12 InterFreqNeighCellList interFreqBlackCellList-r12 InterFreqBlackCellList
                                                                                                                                           -- Need OR
                                                                                                                 OPTIONAL,
                                                                                                                                           -- Need OR
      q-QualMin-r12
                                                                                                                 OPTIONAL,
                                                              Q-QualMin-r9
                                                                                                                                           -- Need OP
                                                              SEQUENCE {
      threshX-Q-r12
                                                              ReselectionThresholdQ-r9,
            threshX-HighQ-r12
                                                                     ReselectionThresholdQ-r9
             threshX-LowO-r12
                                                                                                                OPTIONAL,
                                                                                                                                     -- Cond RSRO
      q-QualMinWB-r12
                                                              Q-QualMin-r9
                                                                                                                 OPTIONAL, -- Cond WB-RSRQ
                                                              MultiBandInfoList-r11
      multiBandInfoList-r12 MultiBandInfoList-r11 reducedMeasPerformance-r12 ENUMERATED {true} q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9
      multiBandInfoList-r12
                                                                                                                 OPTIONAL,
                                                                                                                                     -- Need OR
                                                                                                               OPTIONAL,
                                                                                                                                    -- Need OP
                                                                                                                OPTIONAL,
                                                                                                                                    -- Cond RSRO2
}
InterFreqCarrierFreqInfo-v1310 ::= SEQUENCE {
                                                                                                                     OPTIONAL,
     cellReselectionSubPriority-r13
                                                           CellReselectionSubPriority-r13
                                                                                                                                                -- Need
      redistributionInterFreqInfo-r13 RedistributionInterFreqInfo-r13 cellSelectionInfoCE-r13 CellSelectionInfoCE-r13 OF t-PageLectionFiltPa-CF-r13 T-PageLectionFiltPa-CF-r13 OF t-PageLectionF
                                                                                                                      OPTIONAL, --Need OP
                                                              CellSelectionInfoCE-r13 OPTIONAL, -- Need OP
T-ReselectionEUTRA-CE-r13 OPTIONAL -- Need OP
      t-ReselectionEUTRA-CE-r13
                                                                                                                                     -- Need OP
}
InterFreqCarrierFreqInfo-v1350 ::= SEQUENCE {
     cellSelectionInfoCE1-r13
                                                              CellSelectionInfoCE1-r13
                                                                                                                      OPTIONAL -- Need OP
InterFreqCarrierFreqInfo-v1360 ::= SEQUENCE {
      InterFreqNeighCellList ::=
                                                      SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo
InterFreqNeighCellInfo ::= SEQUENCE {
      physCellId
                                                               PhysCellId,
      q-OffsetCell
                                                               Q-OffsetRange
}
InterFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange
RedistributionInterFreqInfo-r13 :=
                                                               SEQUENCE {
                                                              RedistributionFactor-r13 OPTIONAL,
     redistributionFactorFreq-r13
                                                                                                                                     --Need OP
      redistributionNeighCellList-r13
                                                                    RedistributionNeighCellList-r13 OPTIONAL --Need
OP
RedistributionNeighCellList-r13 ::= SEQUENCE (SIZE (1..maxCellInter)) OF RedistributionNeighCell-r13
```

SystemInformationBlockType5 field descriptions

cellSelectionInfoCE1

Parameters included in coverage enhancement S criteria. E-UTRAN includes this IE only in an entry of InterFreqCarrierFreqList-v1350 or InterFreqCarrierFreqListExt-v1350 if cellSelectionInfoCE is present in the corresponding entry of InterFreqCarrierFreqList-v1310 or InterFreqCarrierFreqListExt-v1310 is present.

freqBandInfo

A list of *additionalPmax* and *additionalSpectrumEmission* values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for the frequency band represented by *dl-CarrierFreq* for which cell reselection parameters are common. If E-UTRAN includes *freqBandInfo-v10lo* it includes the same number of entries, and listed in the same order, as in *freqBandInfo-r10*.

interFreqBlackCellList

List of blacklisted inter-frequency neighbouring cells.

interFreqCarrierFreqList

List of neighbouring inter-frequencies. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. If E-UTRAN includes *interFreqCarrierFreqList-v8h0*, *interFreqCarrierFreqList-v9e0*, *InterFreqCarrierFreqList-v1250 InterFreqCarrierFreqList-v1310 and/or InterFreqCarrierFreqList-v1350*, it includes the same number of entries, and listed in the same order, as in *interFreqCarrierFreqList* (i.e. without suffix). See Annex D for more descriptions.

interFreqCarrierFreqListExt

List of additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. EUTRAN may include <code>interFreqCarrierFreqListExt</code> even if <code>interFreqCarrierFreqList(i.e.</code> without suffix) does not include <code>maxFreq</code> entries. If E-UTRAN includes <code>InterFreqCarrierFreqListExt-v1310</code> and/or <code>InterFreqCarrierFreqListExt-v1350</code>, it includes the same number of entries, and listed in the same order, as in <code>interFreqCarrierFreqListExt-r12</code>.

interFreqNeighCellList

List of inter-frequency neighbouring cells with specific cell re-selection parameters.

multiBandInfoList

Indicates the list of frequency bands in addition to the band represented by dl-CarrierFreq for which cell reselection parameters are common. E-UTRAN indicates at most *maxMultiBands* frequency bands (i.e. the total number of entries across both *multiBandInfoList* and *multiBandInfoList-v9e0* is below this limit).

multiBandInfoList-v10j0

A list of additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for the frequency bands in multiBandInfoList (i.e. without suffix) and multiBandInfoList-v9e0. If E-UTRAN includes multiBandInfoList-v10j0, it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix). If E-UTRAN includes multiBandInfoList-v10j0 it includes the same number of entries, and listed in the same order, as in multiBandInfoList-v10j0.

p-Max

Value applicable for the neighbouring E-UTRA cells on this carrier frequency. If absent the UE applies the maximum power according to the UE capability.

q-OffsetCell

Parameter "Qoffsets,n" in TS 36.304 [4].

q-OffsetFreq

Parameter "Qoffsetfrequency" in TS 36.304 [4].

q-QualMin

Parameter " $Q_{qualmin}$ " in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for $Q_{qualmin}$. NOTE 1.

q-QualMinRSRQ-OnAllSymbols

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.

q-QualMinWB

If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.

redistributionFactorFreq

Parameter redistributionFactorFreq in TS 36.304 [4].

redistributionFactorCell

Parameter redistributionFactorCell in TS 36.304 [4].

reducedMeasPerformance

Value *TRUE* indicates that the neighbouring inter-frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the neighbouring inter-frequency is configured for normal measurement performance, see TS 36.133 [16].

scptm-FreqOffset

Parameter Qoffsetscptm in TS 36.304 [4]. Actual value Qoffsetscptm = field value * 2 [dB]. If the field is not present, the UE uses infinite dBs for the SC-PTM frequency offset with cell ranking as specified in TS 36.304 [4].

threshX-High

Parameter "Thresh_{X, HighP}" in TS 36.304 [4].

SystemInformationBlockType5 field descriptions	
threshX-HighQ	
Parameter "Threshx, HighQ" in TS 36.304 [4].	
threshX-Low	
Parameter "Threshx, Lowp" in TS 36.304 [4].	
threshX-LowQ	
Parameter "Threshx, Lowq" in TS 36.304 [4].	
t-ReselectionEUTRA	
Parameter "Treselectioneutra" in TS 36.304 [4].	
t-ReselectionEUTRA-SF	
Parameter "Speed dependent ScalingFactor for TreselectionEUTRA" in TS 36.304 [4]. If the field is not present, the UE	
behaviour is specified in TS 36.304 [4].	

NOTE 1: The value the UE applies for parameter "Q_{qualmin}" in TS 36.304 [4] depends on the *q-QualMin* fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

q-QualMinRSRQ-OnAllSymbols	q-QualMinWB	Value of parameter "Q _{qualmin} " in TS 36.304 [4]
Included	Included	q-QualMinRSRQ-OnAllSymbols – (q-QualMin – q-
		QualMinWB)
Included	Not included	q-QualMinRSRQ-OnAllSymbols
Not included	Included	q-QualMinWB
Not included	Not included	g-QualMin

Conditional presence	Explanation
dl-FreqMax	The field is mandatory present if, for the corresponding entry in <i>InterFreqCarrierFreqList</i>
	(i.e. without suffix), dl-CarrierFreq (i.e. without suffix) is set to maxEARFCN. Otherwise
	the field is not present.
QrxlevminCE1	The field is optionally present, Need OR, if <i>q-RxLevMinCE1-r13</i> is set below -140 dBm.
	Otherwise the field is not present.
RSRQ	The field is mandatory present if <i>threshServingLowQ</i> is present in
	systemInformationBlockType3; otherwise it is not present.
RSRQ2	The field is mandatory present for all EUTRA carriers listed in SIB5 if q-QualMinRSRQ-
	OnAllSymbols is present in SIB3; otherwise it is not present and the UE shall delete any
	existing value for this field.
WB-RSRQ	The field is optionally present, need OP if the measurement bandwidth indicated by
	allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present.

The IE *SystemInformationBlockType6* contains information relevant only for inter-RAT cell re-selection i.e. information about UTRA frequencies and UTRA neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

SystemInformationBlockType6 information element

```
-- ASN1START
SystemInformationBlockType6 ::=
                                      SEQUENCE {
    carrierFreqListUTRA-FDD
                                          CarrierFreqListUTRA-FDD
                                                                            OPTIONAL,
    carrierFreqListUTRA-TDD
                                          CarrierFreqListUTRA-TDD
                                                                            OPTIONAL,
                                                                                              -- Need OR
    t-ReselectionUTRA
                                          T-Reselection,
    t-ReselectionUTRA-SF
                                          SpeedStateScaleFactors
                                                                            OPTIONAL,
                                                                                              -- Need OP
    lateNonCriticalExtension
                                          OCTET STRING
                                                          (CONTAINING SystemInformationBlockType6-
                             OPTIONAL,
v8h0-IEs)
    [[ carrierFreqListUTRA-FDD-v1250 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF
                                          CarrierFreqInfoUTRA-v1250
                                                                           OPTIONAL,
                                                                                          -- Cond UTRA-FDD
        carrierFreqListUTRA-TDD-v1250 SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF
        CarrierFreqInfoUTRA-v1250 OPTIONAL, -- Cond UTRA-TDD carrierFreqListUTRA-FDD-Ext-r12 CarrierFreqListUTRA-FDD-Ext-r12 OPTIONAL, -- Cond UTRA-FDD
        carrierFreqListUTRA-TDD-Ext-r12
                                              CarrierFreqListUTRA-TDD-Ext-r12 OPTIONAL
                                                                                                  -- Cond
UTRA-TDD
   ]]
```

```
}
SystemInformationBlockType6-v8h0-IEs ::= SEQUENCE {
   carrierFreqListUTRA-FDD-v8h0 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqInfoUTRA-
FDD-v8h0 OPTIONAL, -- Cond UTRA-FDD
                                       SEQUENCE {}
   nonCriticalExtension
                                                                           OPTIONAL
   reducedMeasPerformance-r12 SEQUENCE {
CarrierFreqInfoUTRA-v1250 ::=
                                   ENUMERATED {true}
                                                          OPTIONAL
CarrierFreqListUTRA-FDD ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD
CarrierFreqUTRA-FDD ::=
carrierFreq
cellReselectionPriority
                                   SEQUENCE {
                                    ARFCN-ValueUTRA,
                                       CellReselectionPriority
                                                                  OPTIONAL,
                                                                                       -- Need OP
    threshX-High
                                       ReselectionThreshold,
                                       ReselectionThreshold,
    threshX-Low
    q-RxLevMin
                                       INTEGER (-60..-13),
                                       INTEGER (-50..33),
    p-MaxUTRA
    q-QualMin
                                      INTEGER (-24..0),
           threshX-HighQ-r9 ReselectorshX-LowQ-r9 Reselectorsh
    [[ threshX-Q-r9
                                      ReselectionThresholdQ-r9,
                                           ReselectionThresholdQ-r9
                                                                       OPTIONAL
                                                                                       -- Cond RSRO
    ]]
}
CarrierFreqInfoUTRA-FDD-v8h0 ::=
                                           SEQUENCE {
   multiBandInfoList
                                       SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-
UTRA-FDD
                       OPTIONAL -- Need OR
CarrierFreqListUTRA-FDD-Ext-r12 ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF
                                    CarrierFreqUTRA-FDD-Ext-r12
CarrierFreqUTRA-FDD-Ext-r12 ::=
                                               SEQUENCE {
    carrierFreq-r12
cellReselectionPriority-r12
CellReselectionPriority
ReselectionThreshold,
   carrierFreq-r12
                                       CellReselectionPriority
                                                                     OPTIONAL, -- Need OP
                                       ReselectionThreshold,
   threshX-Low-r12
    q-RxLevMin-r12
                                       INTEGER (-60..-13),
   p-MaxUTRA-r12
                                       INTEGER (-50..33),
    q-QualMin-r12
           threshX-HighQ-r12 ReselecthreshX-LowQ-r12 ReselecthreshX-LowQ-r12
                                       INTEGER (-24..0),
    threshX-0-r12
                                      ReselectionThresholdQ-r9,
ReselectionThresholdQ-r9
                                                                   OPTIONAL,
                                                                               -- Cond RSRQ
                                      SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-
   multiBandInfoList-r12
                       OPTIONAL, -- Need OR
IITRA-FDD
   reducedMeasPerformance-r12
                                      ENUMERATED {true}
                                                                       OPTIONAL, -- Need OP
}
CarrierFreqListUTRA-TDD ::=
                              SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF CarrierFreqUTRA-TDD
CarrierFreqUTRA-TDD ::=
                                   SEQUENCE {
                                       ARFCN-ValueUTRA,
   carrierFreq
    cellReselectionPriority
                                       CellReselectionPriority
                                                                     OPTIONAL,
                                                                                      -- Need OP
    threshX-High
                                       ReselectionThreshold,
    threshX-Low
                                       ReselectionThreshold,
    q-RxLevMin
                                       INTEGER (-60..-13),
                                       INTEGER (-50..33),
    p-MaxUTRA
CarrierFreqListUTRA-TDD-Ext-r12 ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF
                                    CarrierFreqUTRA-TDD-r12
CarrierFreqUTRA-TDD-r12 ::= SEQUENCE {
                                       ARFCN-ValueUTRA,
   carrierFreq-r12
    cellReselectionPriority-r12
                                       CellReselectionPriority
                                                                      OPTIONAL,
                                                                                       -- Need OP
    threshX-High-r12
                                       ReselectionThreshold,
    threshX-Low-r12
                                      ReselectionThreshold,
    q-RxLevMin-r12
                                       INTEGER (-60..-13),
                                    INTEGER (-50..33),
    p-MaxUTRA-r12
```

SystemInformationBlockType6 field descriptions

carrierFreqListUTRA-FDD

List of carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. If E-UTRAN includes *carrierFreqListUTRA-FDD-v8h0* and/or *carrierFreqListUTRA-FDD-v1250*, it includes the same number of entries, and listed in the same order, as in *carrierFreqListUTRA-FDD* (i.e. without suffix). See Annex D for more descriptions.

carrierFreqListUTRA-FDD-Ext

List of additional carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include *carrierFreqListUTRA-FDD-Ext* even if *carrierFreqListUTRA-FDD* (i.e without suffix) does not include *maxUTRA-FDD-Carrier* entries.

carrierFreqListUTRA-TDD

List of carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this If E-UTRAN includes *carrierFreqListUTRA-TDD-v1250*, it includes the same number of entries, and listed in the same order, as in *carrierFreqListUTRA-TDD* (i.e. without suffix).

carrierFreqListUTRA-TDD-Ext

List of additional carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include *carrierFreqListUTRA-TDD-Ext* even if *carrierFreqListUTRA-TDD* (i.e without suffix) does not include *maxUTRA-TDD-Carrier* entries.

multiBandInfoList

Indicates the list of frequency bands in addition to the band represented by carrierFreq in the *CarrierFreqUTRA-FDD* for which UTRA cell reselection parameters are common.

p-MaxUTRA

The maximum allowed transmission power on the (uplink) carrier frequency, see TS 25.304 [40]. In dBm

g-QualMin

Parameter "Q_{qualmin}" in TS 25.304 [40]. Actual value = field value [dB].

q-RxLevMin

Parameter "Q_{rxlevmin}" in TS 25.304 [40]. Actual value = field value * 2+1 [dBm].

reducedMeasPerformance

Value *TRUE* indicates that the UTRA carrier frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the UTRA carrier frequency is configured for normal measurement performance, see TS 36.133 [16].

t-ReselectionUTRA

Parameter "Treselection_{UTRAN}" in TS 36.304 [4].

t-ReselectionUTRA-SF

Parameter "Speed dependent ScalingFactor for Treselection_{UTRA}" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

threshX-High

Parameter "Threshx, HighP" in TS 36.304 [4].

threshX-HighQ

Parameter "Threshx, HighQ" in TS 36.304 [4].

threshX-Low

Parameter "Threshx, LowP" in TS 36.304 [4].

threshX-LowQ

Parameter "Threshx, LowQ" in TS 36.304 [4].

Conditional presence	Explanation
RSRQ	The field is mandatory present if the threshServingLowQ is present in
	systemInformationBlockType3; otherwise it is not present.
UTRA-FDD	The field is optionally present, need OR, if the <i>carrierFreqListUTRA-FDD</i> is present.
	Otherwise it is not present.
UTRA-TDD	The field is optionally present, need OR, if the <i>carrierFreqListUTRA-TDD</i> is present.
	Otherwise it is not present.

The IE *SystemInformationBlockType7* contains information relevant only for inter-RAT cell re-selection i.e. information about GERAN frequencies relevant for cell re-selection. The IE includes cell re-selection parameters for each frequency.

SystemInformationBlockType7 information element

```
-- ASN1START
SystemInformationBlockType7 ::=
                                    SEQUENCE {
    t-ReselectionGERAN
                                       T-Reselection,
    t-ReselectionGERAN-SF
                                        SpeedStateScaleFactors
                                                                            OPTIONAL,
                                                                                        -- Need OR
                                                                                       -- Need OR
                                        CarrierFreqsInfoListGERAN
                                                                            OPTIONAL,
    carrierFreqsInfoList
    lateNonCriticalExtension
                                           OCTET STRING
                                                                        OPTIONAL
CarrierFreqsInfoListGERAN ::=
                                       SEQUENCE (SIZE (1..maxGNFG)) OF CarrierFreqsInfoGERAN
                                   SEQUENCE {
CarrierFreqsInfoGERAN ::=
    carrierFreqs
                                        CarrierFreqsGERAN,
    commonInfo
                                        SEQUENCE {
       cellReselectionPriority
                                           CellReselectionPriority
                                                                           OPTIONAL,
                                                                                        -- Need OP
                                            BIT STRING (SIZE (8)),
       ncc-Permitted
        q-RxLevMin
                                           INTEGER (0..45),
       p-MaxGERAN
                                           INTEGER (0..39)
                                                                            OPTIONAL,
                                                                                       -- Need OP
        threshX-High
                                            ReselectionThreshold,
                                            ReselectionThreshold
       threshX-Low
    },
 - ASN1STOP
```

SystemInformationBlockType7 field descriptions

carrierFreqs

The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.

carrierFreqsInfoList

Provides a list of neighbouring GERAN carrier frequencies, which may be monitored for neighbouring GERAN cells. The GERAN carrier frequencies are organised in groups and the cell reselection parameters are provided per group of GERAN carrier frequencies.

commonInfo

Defines the set of cell reselection parameters for the group of GERAN carrier frequencies.

ncc-Permitted

Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if the BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

p-MaxGERAN

Maximum allowed transmission power for GERAN on an uplink carrier frequency, see TS 45.008 [28]. Value in dBm. Applicable for the neighbouring GERAN cells on this carrier frequency. If *pmaxGERAN* is absent, the maximum power according to the UE capability is used.

q-RxLevMin

Parameter " $Q_{rxlevmin}$ " in TS 36.304 [4], minimum required RX level in the GSM cell. The actual value of $Q_{rxlevmin}$ in dBm = (field value * 2) – 115.

threshX-High

Parameter "Thresh_{X, HighP}" in TS 36.304 [4].

threshX-Low

Parameter "Threshx, LowP" in TS 36.304 [4].

t-ReselectionGERAN

Parameter "Treselection_{GERAN}" in TS 36.304 [4].

t-ReselectionGERAN-SF

Parameter "Speed dependent ScalingFactor for Treselection_{GERAN}" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

The IE *SystemInformationBlockType8* contains information relevant only for inter-RAT cell re-selection i.e. information about CDMA2000 frequencies and CDMA2000 neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

SystemInformationBlockType8 information element

```
-- ASN1START
SystemInformationBlockType8 ::=
                                   SEQUENCE {
                                                                           OPTIONAL,
    systemTimeInfo
                                       SystemTimeInfoCDMA2000
                                                                                       -- Need OR
    searchWindowSize
                                       INTEGER (0..15)
                                                                           OPTIONAL,
                                                                                       -- Need OR
                                       SEQUENCE {
    parametersHRPD
       preRegistrationInfoHRPD
                                           PreRegistrationInfoHRPD,
                                           CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
       cellReselectionParametersHRPD
                                                                          OPTIONAL,
                                                                                       -- Need OR
    parameters1XRTT
                                       SEQUENCE {
       csfb-RegistrationParam1XRTT
                                        CSFB-RegistrationParam1XRTT OPTIONAL,
BIT STRING (SIZE (42)) OPTIONAL,
                                                                                      -- Need OP
                                                                                       -- Need OR
        longCodeState1XRTT
        cellReselectionParameters1XRTT
                                           CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
                                                                           OPTIONAL,
                                                                                       -- Need OR
       csfb-SupportForDualRxUEs-r9 ROOLBAN
    lateNonCriticalExtension
                                                                           OPTIONAL,
                                                                           OPTIONAL,
                                                                                       -- Need OR
        cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL,
Cond NCL-HRPD
       cellReselectionParameters1XRTT-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL,
Cond NCL-1XRTT
       csfb-RegistrationParam1XRTT-v920
                                         CSFB-RegistrationParam1XRTT-v920
                                                                                   OPTIONAL,
Cond REG-1XRTT
       ac-BarringConfig1XRTT-r9
                                           AC-BarringConfig1XRTT-r9
                                                                       OPTIONAL
                                                                                   -- Cond REG-
1XRTT
    [[ csfb-DualRxTxSupport-r10
                                           ENUMERATED {true}
                                                                       OPTIONAL
                                                                                   -- Cond REG-
1XRTT
                                           SIB8-PerPLMN-List-r11
       sib8-PerPLMN-List-r11
                                                                       OPTIONAL
    ΓΓ
                                                                                   -- Need OR
    11
CellReselectionParametersCDMA2000 ::= SEQUENCE {
                      BandClassListCDMA2000,
   bandClassList
    neighCellList
                                       NeighCellListCDMA2000,
    t-ReselectionCDMA2000
    t-ReselectionCDMA2000
t-ReselectionCDMA2000-SF
                                 T-Reselection,
                                      SpeedStateScaleFactors
                                                                          OPTIONAL
                                                                                       -- Need OP
CellReselectionParametersCDMA2000-r11 ::= SEQUENCE {
   bandClassList
                                      BandClassListCDMA2000,
    neighCellList-r11
                                       SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-r11,
    t-ReselectionCDMA2000
                                       T-Reselection,
    t-ReselectionCDMA2000-SF
                                                                          OPTIONAL -- Need OP
                                      SpeedStateScaleFactors
CellReselectionParametersCDMA2000-v920 ::= SEQUENCE {
    neighCellList-v920
                                           NeighCellListCDMA2000-v920
NeighCellListCDMA2000 ::=
                                  SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000
NeighCellCDMA2000 ::= SEQUENCE {
   bandClass
                                       BandclassCDMA2000,
   neighCellsPerFreqList
                                       NeighCellsPerBandclassListCDMA2000
NeighCellCDMA2000-r11 ::= SEQUENCE {
   bandClass
                                       BandclassCDMA2000.
                                       SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000-
    neighFreqInfoList-r11
r11
NeighCellsPerBandclassListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000
NeighCellsPerBandclassCDMA2000 ::= SEQUENCE {
                                       ARFCN-ValueCDMA2000,
   arfcn
```

```
physCellIdList
                                        PhysCellIdListCDMA2000
NeighCellsPerBandclassCDMA2000-r11 ::= SEQUENCE {
                                         ARFCN-ValueCDMA2000,
    physCellIdList-r11
                                         SEQUENCE (SIZE (1..40)) OF PhysCellIdCDMA2000
NeighCellListCDMA2000-v920 ::=
                                   SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-v920
   neighCellsPerFreqList-v920 SEQUENCE {
NeighCellCDMA2000-v920 ::=
                                        NeighCellsPerBandclassListCDMA2000-v920
NeighCellsPerBandclassListCDMA2000-v920 ::= SEQUENCE (SIZE (1..16)) OF
NeighCellsPerBandclassCDMA2000-v920
NeighCellsPerBandclassCDMA2000-v920 ::= SEQUENCE {
   physCellIdList-v920
                                        PhysCellIdListCDMA2000-v920
PhysCellIdListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF PhysCellIdCDMA2000
PhysCellIdListCDMA2000-v920 ::=
                                   SEQUENCE (SIZE (0..24)) OF PhysCellIdCDMA2000
BandClassListCDMA2000 ::=
                                    SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassInfoCDMA2000
BandClassInfoCDMA2000 ::= SEQUENCE {
   bandClass
                                         BandclassCDMA2000,
    cellReselectionPriority
                                         CellReselectionPriority
                                                                            OPTIONAL, -- Need OP
    threshX-High
                                         INTEGER (0..63),
    threshX-Low
                                        INTEGER (0..63),
}
AC-BarringConfig1XRTT-r9 ::=
                                   SEQUENCE {
   ac-BarringOto9-r9
                                      INTEGER (0..63),
   ac-Barring10-r9
                                         INTEGER (0..7),
   ac-Barring11-r9
                                        INTEGER (0..7),
   ac-Barring12-r9
                                        INTEGER (0..7),
   ac-Barring13-r9
                                         INTEGER (0..7),
   ac-Barring14-r9
                                        INTEGER (0..7),
                                        INTEGER (0..7),
INTEGER (0..7),
   ac-Barring15-r9
   ac-BarringMsg-r9
   ac-BarringReg-r9
                                        INTEGER (0..7),
   ac-BarringEmg-r9
                                        INTEGER (0..7)
}
SIB8-PerPLMN-List-r11 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF SIB8-PerPLMN-r11
SIB8-PerPLMN-r11 ::=
                                    SEOUENCE {
   8-PerPLMN-r11 ::=
plmn-Identity-r11
parametersCDMA2000-r11
   plmn-Identity-r11
                                        INTEGER (1..maxPLMN-r11),
                                         CHOICE {
        explicitValue
                                             ParametersCDMA2000-r11,
        defaultValue
}
ParametersCDMA2000-r11 ::= systemTimeInfo-r11
                                    SEQUENCE {
                                        CHOICE {
        explicitValue
                                            SystemTimeInfoCDMA2000,
        defaultValue
                                             NULL
                                                                     OPTIONAL, -- Need OR
       renwindowSize-r11 INTEGER (0
ametersHRPD-r11 SEQUENCE {
preRegistrationInfoHRPD-r11 PreReg
    searchWindowSize-r11
                                        INTEGER (0..15),
    parametersHRPD-r11
        preRegistrationInfoHRPD-r11 PreRegistrationInfoHRPD,
cellReselectionParametersHRPD-r11 CellReselectionParametersCDMA2000-r11 OPTIONAL -- Need
OR
    parameters1XRTT-r11
csfb-Pari
                                        SEQUENCE {
        csfb-RegistrationParamlXRTT-rll CSFB-RegistrationParamlXRTT
                                                                                OPTIONAL, -- Need OP
        csfb-RegistrationParam1XRTT-Ext-r11 CSFB-RegistrationParam1XRTT-v920
                                                                                 OPTIONAL, -- Cond
REG-1XRTT-PerPLMN
        longCodeState1XRTT-r11
                                            BIT STRING (SIZE (42)) OPTIONAL, -- Cond PerPLMN-LC
        cellReselectionParameters1XRTT-r11 CellReselectionParametersCDMA2000-r11
                                                                                     OPTIONAL, --
       ac-BarringConfig1XRTT-r11
                                            AC-BarringConfig1XRTT-r9
                                                                                 OPTIONAL, -- Cond
REG-1XRTT-PerPLMN
```

```
csfb-SupportForDualRxUEs-r11 BOOLEAN OPTIONAL, -- Need OR csfb-DualRxTxSupport-r11 ENUMERATED {true} OPTIONAL -- Cond REG-1XRTT-PerPLMN
} OPTIONAL, -- Need OR
...
}
-- ASN1STOP
```

SystemInformationBlockType8 field descriptions

ac-BarringConfig1XRTT

Contains the access class barring parameters the UE uses to calculate the access class barring factor, see C.S0097 [53].

ac-Barring0to9

Parameter used for calculating the access class barring factor for access overload classes 0 through 9. It is the parameter "PSIST" in C.S0004 [34] for access overload classes 0 through 9.

ac-BarringEmg

Parameter used for calculating the access class barring factor for emergency calls and emergency message transmissions for access overload classes 0 through 9. It is the parameter "PSIST_EMG" in C.S0004 [34].

ac-BarringMsg

Parameter used for modifying the access class barring factor for message transmissions. It is the parameter "MSG_PSIST" in C.S0004 [34].

ac-BarringN

Parameter used for calculating the access class barring factor for access overload class N (N = 10 to 15). It is the parameter "PSIST" in C.S0004 [34] for access overload class N.

ac-BarringReg

Parameter used for modifying the access class barring factor for autonomous registrations. It is the parameter "REG_PSIST" in C.S0004 [34].

bandClass

Identifies the Frequency Band in which the Carrier can be found. Details can be found in C.S0057 [24, Table 1.5].

bandClassList

List of CDMA2000 frequency bands.

cellReselectionParameters1XRTT

Cell reselection parameters applicable only to CDMA2000 1xRTT system.

cellReselectionParameters1XRTT-Ext

Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system.

cellReselectionParameters1XRTT-v920

Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system. The field is not present if *cellReselectionParameters1XRTT* is not present; otherwise it is optionally present.

cellReselectionParametersHRPD

Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system

cellReselectionParametersHRPD-Ext

Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system.

cellReselectionParametersHRPD-v920

Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system. The field is not present if *cellReselectionParametersHRPD* is not present; otherwise it is optionally present.

csfb-DualRxTxSupport

Value TRUE indicates that the network supports dual Rx/Tx enhanced 1xCSFB, which enables UEs capable of dual Rx/Tx enhanced 1xCSFB to switch off their 1xRTT receiver/transmitter while camped in E-UTRAN [51].

csfb-RegistrationParam1XRTT

Contains the parameters the UE will use to determine if it should perform a CDMA2000 1xRTT Registration/Re-Registration. This field is included if either CSFB or enhanced CS fallback to CDMA2000 1xRTT is supported.

csfb-SupportForDualRxUEs

Value TRUE indicates that the network supports dual Rx CSFB [51].

IongCodeState1XRTT

The state of long code generation registers in CDMA2000 1XRTT system as defined in C.S0002 [12, Section 1.3] at $\lceil t/10 \rceil \times 10 + 320$ ms, where t equals to the cdma-SystemTime. This field is required for reporting CGI for 1xRTT,

SRVCC handover and enhanced CS fallback to CDMA2000 1xRTT operation. Otherwise this IE is not needed. This field is excluded when estimating changes in system information, i.e. changes of *longCodeState1XRTT* should neither result in system information change notifications nor in a modification of *systemInfoValueTag* in SIB1.

SystemInformationBlockType8 field descriptions

neighCellList

List of CDMA2000 neighbouring cells. The total number of neighbouring cells in neighCellList for each RAT (1XRTT or HRPD) is limited to 32.

neighCellList-v920

Extended List of CDMA2000 neighbouring cells. The combined total number of CDMA2000 neighbouring cells in both neighCellList and neighCellList-v920 is limited to 32 for HRPD and 40 for 1xRTT.

neighCellsPerFreqList

List of carrier frequencies and neighbour cell ids in each frequency within a CDMA2000 Band, see C.S0002 [12] or C.S0024 [26].

neiahCellsPerFreaList-v920

Extended list of neighbour cell ids, in the same CDMA2000 Frequency Band as the corresponding instance in "NeighCellListCDMA2000".

parameters1XRTT

Parameters applicable for interworking with CDMA2000 1XRTT system.

parametersCDMA2000

Provides the corresponding SIB8 parameters for the CDMA2000 network associated with the PLMN indicated in *plmn-ldentity*. A choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) values common for all PLMNs i.e. the values not included in *sib8-PerPLMN-List*.

parametersHRPD

Parameters applicable only for interworking with CDMA2000 HRPD systems.

physCellIdList

Identifies the list of CDMA2000 cell ids, see C.S0002 [12] or C.S0024 [26].

physCellIdList-v920

Extended list of CDMA2000 cell ids, in the same CDMA2000 ARFCN as the corresponding instance in "NeighCellsPerBandclassCDMA2000".

plmn-Identity

Indicates the PLMN associated with this CDMA2000 network. Value 1 indicates the PLMN listed 1st in the 1st plmn-IdentityList included in SIB1, value 2 indicates the PLMN listed 2nd in the same plmn-IdentityList, or when no more PLMN are present within the same plmn_identityList, then the PLMN listed 1st in the subsequent plmn-IdentityList within the same SIB1 and so on. A PLMN which identity is not indicated in the sib8-PerPLMN-List, does not support inter-working with CDMA2000.

preRegistrationInfoHRPD

The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE.

searchWindowSize

The search window size is a CDMA2000 parameter to be used to assist in searching for the neighbouring pilots. For values see C.S0005 [25, Table 2.6.6.2.1-1] and C.S0024 [26, Table 8.7.6.2-4]. This field is required for a UE with *rx-ConfigHRPD*= *single* and/ or *rx-Config1XRTT*= *single* to perform handover, cell re-selection, UE measurement based redirection and enhanced 1xRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4].

sib8-PerPLMN-List

This field provides the values for the interworking CDMA2000 networks corresponding, if any, to the UE's RPLMN.

systemTimeInfo

Information on CDMA2000 system time. This field is required for a UE with *rx-ConfigHRPD= single* and/ or *rx-Config1XRTT= single* to perform handover, cell re-selection, UE measurement based redirection and enhanced 1xRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4]. This field is excluded when estimating changes in system information, i.e. changes of *systemTimeInfo* should neither result in system information change notifications nor in a modification of *systemInfoValueTag* in SIB1.

For the field included in ParametersCDMA2000, a choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) value common for all PLMNs i.e. the value not included in sib8-PerPLMN-List.

threshX-High

Parameter "Threshx, HighP" in TS 36.304 [4]. This specifies the high threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log_{10} E_c/ l_o) in units of 0.5 dB, as defined in C.S0005 [25].

threshX-Low

Parameter "Thresh_{X, LowP}" in TS 36.304 [4]. This specifies the low threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log_{10} E_c/I_o) in units of 0.5 dB, as defined in C.S0005 [25].

t-ReselectionCDMA2000

Parameter "Treselection_{CDMA_HRPD}" or "Treselection_{CDMA_1xRTT}" in TS 36.304 [4].

SystemInformationBlockType8 field descriptions

t-ReselectionCDMA2000-SF

Parameter "Speed dependent ScalingFactor for Treselection_{CDMA-HRPD}" or Treselection_{CDMA-1xRTT}" in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

Conditional presence	Explanation
NCL-1XRTT	The field is optional present, need OR, if cellReselectionParameters1xRTT is present;
	otherwise it is not present.
NCL-HRPD	The field is optional present, need OR, if cellReselectionParametersHRPD is present;
	otherwise it is not present.
PerPLMN-LC	The field is optional present, need OR, when systemTimeInfo is included in
	SIB8PerPLMN for this CDMA2000 network; otherwise it is not present.
REG-1XRTT	The field is optional present, need OR, if csfb-RegistrationParam1XRTT is present;
	otherwise it is not present.
REG-1XRTT-PerPLMN	The field is optional present, need OR, if csfb-RegistrationParam1XRTT is included in
	SIB8PerPLMN for this CDMA2000 network; otherwise it is not present.

SystemInformationBlockType9

The IE SystemInformationBlockType9 contains a home eNB name (HNB Name).

SystemInformationBlockType9 information element

```
-- ASN1START

SystemInformationBlockType9 ::= SEQUENCE {
   hnb-Name OCTET STRING (SIZE(1..48)) OPTIONAL, -- Need OR
   ...,
   lateNonCriticalExtension OCTET STRING OPTIONAL
}

-- ASN1STOP
```

SystemInformationBlockType9 field descriptions

hnb-Name

Carries the name of the home eNB, coded in UTF-8 with variable number of bytes per character, see TS 22.011 [10].

SystemInformationBlockType10

The IE SystemInformationBlockType10 contains an ETWS primary notification.

SystemInformationBlockType10 information element

```
-- ASN1START
SystemInformationBlockType10 ::=
                                    SEQUENCE {
   messageIdentifier
                                       BIT STRING (SIZE (16)),
    serialNumber
                                        BIT STRING (SIZE (16)),
    warningType
                                        OCTET STRING (SIZE (2)),
                                        OCTET STRING (SIZE (50))
                                                                                     -- Need OP
   dummy
                                                                    OPTIONAL,
    lateNonCriticalExtension
                                       OCTET STRING
                                                                     OPTIONAL
-- ASN1STOP
```

SystemInformationBlockType10 field descriptions

messageldentifier

Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

serialNumber

Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

dummy

This field is not used in the specification. If received it shall be ignored by the UE.

warningType

Identifies the warning type of the ETWS primary notification and provides information on emergency user alert and UE popup. The first octet (which is equivalent to the first octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.50]) contains the first octet of the equivalent IE defined in and encoded according to TS 23.041 [37, 9.3.24], and so on.

SystemInformationBlockType11

The IE SystemInformationBlockType11 contains an ETWS secondary notification.

SystemInformationBlockType11 information element

```
-- ASN1START
SystemInformationBlockTypel1 ::= SEQUENCE {
                                           BIT STRING (SIZE (16)),
    messageIdentifier
    serialNumber
                                           BIT STRING (SIZE (16)),
    warningMessageSegmentType
                                           ENUMERATED {notLastSegment, lastSegment},
    warningMessageSegmentType
warningMessageSegmentNumber
warningMessageSegment
                                            INTEGER (0..63),
                                           OCTET STRING,
    dataCodingScheme
                                           OCTET STRING (SIZE (1))
                                                                               OPTIONAL,
                                                                                             -- Cond Segment1
    lateNonCriticalExtension
                                                OCTET STRING
                                                                               OPTIONAL
-- ASN1STOP
```

SystemInformationBlockType11 field descriptions

dataCodingScheme

Identifies the alphabet/coding and the language applied variations of an ETWS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.52]) contains the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38].

messageldentifier

Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

serialNumber

Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

warningMessageSegment

Carries a segment of the *Warning Message Contents* IE defined in TS 36.413 [39, 9.2.1.53]. The first octet of the *Warning Message Contents* IE is equivalent to the first octet of the *CB data* IE defined in and encoded according to TS 23.041 [37, 9.4.2.2.5] and so on.

warningMessageSegmentNumber

Segment number of the ETWS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on.

warningMessageSegmentType

Indicates whether the included ETWS warning message segment is the last segment or not.

Conditional presence	Explanation
Segment1	The field is mandatory present in the first segment of SIB11, otherwise it is not present.

The IE *SystemInformationBlockType12* contains a CMAS notification.

SystemInformationBlockType12 information element

SystemInformationBlockType12 field descriptions

dataCodingScheme

Identifies the alphabet/coding and the language applied variations of a CMAS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.52]) contains the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38].

messageldentifier

Identifies the source and type of CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

serialNumber

Identifies variations of a CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.

warningMessageSegment

Carries a segment of the *Warning Message Contents* IE defined in TS 36.413 [39]. The first octet of the *Warning Message Contents* IE is equivalent to the first octet of the *CB data* IE defined in and encoded according to TS 23.041 [37, 9.4.2.2.5] and so on.

warningMessageSegmentNumber

Segment number of the CMAS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on.

warningMessageSegmentType

Indicates whether the included CMAS warning message segment is the last segment or not.

Conditional presence	Explanation
Segment1	The field is mandatory present in the first segment of SIB12, otherwise it is not present.

SystemInformationBlockType13

The IE *SystemInformationBlockType13* contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.

SystemInformationBlockType13 information element

SystemInformationBlockType13 field descriptions

notificationConfig

Indicates the MBMS notification related configuration parameters. The UE shall ignore this field when *dl-Bandwidth* included in *MasterInformationBlock* is set to n6.

SystemInformationBlockType14

The IE SystemInformationBlockType14 contains the EAB parameters.

SystemInformationBlockType14 information element

```
-- ASN1START
SystemInformationBlockType14-r11 ::=
                                        SEOUENCE {
                                            CHOICE {
    eab-Param-r11
        eab-Common-r11
                                                EAB-Config-r11,
        eab-PerPLMN-List-r11
                                                SEQUENCE (SIZE (1..maxPLMN-r11)) OF EAB-ConfigPLMN-
r11
                                                           OPTIONAL, -- Need OR
    lateNonCriticalExtension
                                            OCTET STRING
                                                                    OPTIONAL,
}
EAB-ConfigPLMN-r11 ::=
                                    SEQUENCE {
    eab-Config-r11
                                       EAB-Config-r11
                                                                    OPTIONAL -- Need OR
EAB-Config-r11 ::=
                                    SEOUENCE {
    eab-Category-r11
                                        ENUMERATED {a, b, c},
                                        BIT STRING (SIZE (10))
    eab-BarringBitmap-r11
-- ASN1STOP
```

SystemInformationBlockType14 field descriptions

eab-BarringBitmap

Extended access class barring for AC 0-9. The first/ leftmost bit is for AC 0, the second bit is for AC 1, and so on.

eab-Category

Indicates the category of UEs for which EAB applies. Value *a* corresponds to all UEs, value *b* corresponds to the UEs that are neither in their HPLMN nor in a PLMN that is equivalent to it, and value *c* corresponds to the UEs that are neither in the PLMN listed as most preferred PLMN of the country where the UEs are roaming in the operator-defined PLMN selector list on the USIM, nor in their HPLMN nor in a PLMN that is equivalent to their HPLMN, see TS 22.011 [10].

eab-Common

The EAB parameters applicable for all PLMN(s).

eab-PerPLMN-List

The EAB parameters per PLMN, listed in the same order as the PLMN(s) listed across the *plmn-IdentityList* fields in *SystemInformationBlockType1*.

SystemInformationBlockType15

The IE *SystemInformationBlockType15* contains the MBMS Service Area Identities (SAI) of the current and/or neighbouring carrier frequencies.

SystemInformationBlockType15 information element

```
mbms-SAI-InterFreqList-r11
                                           MBMS-SAI-InterFreqList-r11
                                                                            OPTIONAL.
                                                                                        -- Need OR
    lateNonCriticalExtension
                                            OCTET STRING
                                                                            OPTIONAL,
    [[ mbms-SAI-InterFreqList-v1140
                                           MBMS-SAI-InterFreqList-v1140
                                                                            OPTIONAL
                                                                                        -- Cond
InterFreq
    ]],
       mbms-IntraFreqCarrierType-r14
                                           MBMS-CarrierType-r14
                                                                            OPTIONAL, -- Need OR
    [ [
       mbms-InterFreqCarrierTypeList-r14
                                           MBMS-InterFreqCarrierTypeList-r14 OPTIONAL
                                                                                            -- Need
OR
    ]]
MBMS-SAI-List-r11 ::=
                                        SEQUENCE (SIZE (1..maxSAI-MBMS-r11)) OF MBMS-SAI-r11
MBMS-SAI-r11 ::=
                                        INTEGER (0..65535)
MBMS-SAI-InterFreqList-r11 ::=
                                       SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-r11
MBMS-SAI-InterFreqList-v1140 ::=
                                       SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-v1140
MBMS-SAI-InterFreq-r11 ::=
                                        SEQUENCE {
    dl-CarrierFreq-r11
                                            ARFCN-ValueEUTRA-r9,
                                            MBMS-SAI-List-r11
   mbms-SAI-List-r11
MBMS-SAI-InterFreq-v1140 ::=
                                        SEQUENCE {
       multiBandInfoList-r11
                                           MultiBandInfoList-r11
                                                                            OPTIONAL
}
MBMS-InterFreqCarrierTypeList-r14 ::=
                                       SEQUENCE (SIZE (1..maxFreq)) OF MBMS-CarrierType-r14
MBMS-CarrierType-r14 ::=
                                        SEQUENCE {
    carrierType-r14
                                            ENUMERATED {mbms, fembmsMixed, fembmsDedicated},
    frameOffset-r14
                                            INTEGER (0..3)
                                                                            OPTIONAL
                                                                                        -- Need OR
-- ASN1STOP
```

SystemInformationBlockType15 field descriptions

carrierType

Indicates whether the carrier is pre-Rel-14 MBMS carrier (*mbms*) or FeMBMS/Unicast mixed carrier (*fembmsMixed*) or MBMS-dedicated carrier (*fembmsDedicated*).

frameOffset

For MBMS-dedicated carrier, the *frameOffset* gives the radio frame which contains PBCH by SFN mod 4 = *frameOffset*.

mbms-InterFreqCarrierTypeList

Indicates whether this is an feMBMS carrier. The field is included only if *mbms-SAI-InterFreqList-r11* is included. The number of entries is the same in both fields and carrier type relates to the frequency indicated in *mbms-SAI-InterFreqList-r11* in the corresponding entry index.

mbms-IntraFreqCarrierType

Contains indication whether the carrier is pre-Rel-14 MBMS carrier, FeMBMS/Unicast mixed carrier or MBMS-dedicated carrier.

mbms-SAI-InterFreqList

Contains a list of neighboring frequencies including additional bands, if any, that provide MBMS services and the corresponding MBMS SAIs.

mbms-SAI-IntraFreq

Contains the list of MBMS SAIs for the current frequency. A duplicate MBMS SAI indicates that this and all following SAIs are not offered by this cell but only by neighbour cells on the current frequency. For MBMS service continuity, the UE shall use all MBMS SAIs listed in *mbms-SAI-IntraFreq* to derive the MBMS frequencies of interest.

mbms-SAI-List

Contains a list of MBMS SAIs for a specific frequency.

multiBandInfoList

A list of additional frequency bands applicable for the cells participating in the MBSFN transmission.

Conditional presence	Explanation
InterFreq	The field is optionally present, need OR, if the mbms-SAI-InterFreqList-r11 is present.
	Otherwise it is not present.

The IE *SystemInformationBlockType16* contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

NOTE: The UE may use the time information for numerous purposes, possibly involving upper layers e.g. to assist GPS initialisation, to synchronise the UE clock (a.o. to determine MBMS session start/stop).

SystemInformationBlockType16 information element

```
-- ASN1START
SystemInformationBlockType16-r11 ::=
                                           SEQUENCE
   timeInfo-r11
                                           SEQUENCE
       timeInfoUTC-r11
                                           INTEGER (0..549755813887),
       dayLightSavingTime-r11
                                           BIT STRING (SIZE (2))
                                                                       OPTIONAL,
                                                                                    -- Need OR
                                           INTEGER (-127..128)
INTEGER (-63..64)
                                                                       OPTIONAL,
                                                                                   -- Need OR
       leapSeconds-r11
       localTimeOffset-r11
                                                                       OPTIONAL
                                                                                   -- Need OR
                                                                       OPTIONAL,
                                                                                   -- Need OR
   lateNonCriticalExtension
                                       OCTET STRING
                                                                   OPTIONAL,
-- ASN1STOP
```

SystemInformationBlockType16 field descriptions

dayLightSavingTime

It indicates if and how daylight saving time (DST) is applied to obtain the local time. The semantics is the same as the semantics of the *Daylight Saving Time* IE in TS 24.301 [35] and TS 24.008 [49]. The first/leftmost bit of the bit string contains the b2 of octet 3, i.e. the value part of the *Daylight Saving Time* IE, and the second bit of the bit string contains b1 of octet 3.

leapSeconds

Number of leap seconds offset between GPS Time and UTC. UTC and GPS time are related i.e. GPS time - leapSeconds = UTC time.

localTimeOffset

Offset between UTC and local time in units of 15 minutes. Actual value = field value * 15 minutes. Local time of the day is calculated as UTC time + *localTimeOffset*.

timeInfoUTC

Coordinated Universal Time corresponding to the SFN boundary at or immediately after the ending boundary of the SI-window in which *SystemInformationBlockType16* is transmitted. The field counts the number of UTC seconds in 10 ms units since 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900). NOTE 1.

This field is excluded when estimating changes in system information, i.e. changes of *timeInfoUTC* should neither result in system information change notifications nor in a modification of *systemInfoValueTag* in SIB1.

NOTE 1: The UE may use this field together with the leapSeconds field to obtain GPS time as follows: GPS Time (in seconds) = timeInfoUTC (in seconds) - 2,524,953,600 (seconds) + leapSeconds, where 2,524,953,600 is the number of seconds between 00:00:00 on Gregorian calendar date 1 January, 1900 and 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time).

SystemInformationBlockType17

The IE *SystemInformationBlockType17* contains information relevant for traffic steering between E-UTRAN and WLAN.

SystemInformationBlockType17 information element

```
WLAN-OffloadInfoPerPLMN-r12 ::= SEQUENCE { wlan-OffloadConfigCommon-r12 WLAN-OffloadConfigCommon-r12
                                                                           OPTIONAL,
                                              WLAN-OffloadConfig-r12
                                                                                         -- Need OR
                                                                                        -- Need OR
        wlan-Id-List-r12
                                              WLAN-Id-List-r12
                                                                           OPTIONAL,
WLAN-Id-List-r12 ::=
                                     SEQUENCE (SIZE (1..maxWLAN-Id-r12)) OF WLAN-Identifiers-r12
WLAN-Identifiers-r12 ::=
                                    SEQUENCE {
                                     OCTET STRING (SIZE (1..32))
    ssid-r12
                                                                       OPTIONAL, -- Need OR
                                     OCTET STRING (SIZE (6))
                                                                      OPTIONAL, -- Need OR
    bssid-r12
    hessid-r12
                                                                           OPTIONAL, -- Need OR
                                     OCTET STRING (SIZE (6))
-- ASN1STOP
```

SystemInformationBlockType17 field descriptions bssid Basic Service Set Identifier (BSSID) defined in IEEE 802.11-2012 [67]. hessid Homogenous Extended Service Set Identifier (HESSID) defined in IEEE 802.11-2012 [67]. ssid Service Set Identifier (SSID) defined in IEEE 802.11-2012 [67]. wlan-OffloadInfoPerPLMN-List The WLAN offload configuration per PLMN includes the same number of entries, listed in the same order as the

SystemInformationBlockType18

PLMN(s) listed across the plmn-IdentityList fields in SystemInformationBlockType1.

The IE *SystemInformationBlockType18* indicates E-UTRAN supports the sidelink UE information procedure and may contain sidelink communication related resource configuration information.

SystemInformationBlockType18 information element

```
-- ASN1START
SystemInformationBlockType18-r12 ::= SEQUENCE {
    commConfig-r12
                         SEQUENCE {
                                            SL-CommRxPoolList-r12,
        commRxPool-r12
       commTxPoolNormalCommon-r12
commTxPoolExceptional-r12
commSyncConfig-r12
                                                                       OPTIONAL, -- Need OR
                                           SL-CommTxPoolList-r12
                                                                                        -- Need OR
                                           SL-CommTxPoolList-r12
                                                                        OPTIONAL, -- Need OR
                                           SL-SyncConfigList-r12
                                                                           OPTIONAL, -- Need OR
    lateNonCriticalExtension
                               OCTET STRING
                                                                            OPTIONAL,
    [[ commTxPoolNormalCommonExt-r13
        commTxResourceUC-ReqAllowed-r13
commTxAllowRelayCommon-r13
                                               SL-CommTxPoolListExt-r13 OPTIONAL,
                                                                                        -- Need OR
                                               ENUMERATED {true} OPTIONAL, -- Need OR
                                                                           OPTIONAL
                                               ENUMERATED {true}
                                                                                        -- Need OR
    ]]
-- ASN1STOP
```

SystemInformationBlockType18 field descriptions

commRxPool

Indicates the resources by which the UE is allowed to receive sidelink communication while in RRC_IDLE and while in RRC_CONNECTED.

commSyncConfig

Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures *commSyncConfig* including *txParameters* when configuring UEs by dedicated signalling to transmit synchronisation information.

commTxAllowRelayCommon

Indicates whether the UE is allowed to transmit relay related sidelink communication data using the transmission pools included in *SystemInformationBlockType18* i.e. either via *commTxPoolNormalCommon*, *commTxPoolNormalCommonExt* or via *commTxPoolExceptional*.

commTxPoolExceptional

Indicates the resources by which the UE is allowed to transmit sidelink communication in exceptional conditions, as specified in 5.10.4.

commTxPoolNormalCommon

Indicates the resources by which the UE is allowed to transmit sidelink communication while in RRC_IDLE or when in RRC_CONNECTED while transmitting sidelink via a frequency other than the primary.

commTxPoolNormalCommonExt

Indicates transmission resource pool(s) in addition to the pool(s) indicated by field *commTxPoolNormalCommon*, by which the UE is allowed to transmit sidelink communication while in RRC_IDLE or when in RRC_CONNECTED while transmitting sidelink via a frequency other than the primary. E-UTRAN configures *commTxPoolNormalCommonExt* only when it configures *commTxPoolNormalCommon*.

commTxResourceUC-ReqAllowed

Indicates whether the UE is allowed to request transmission pools for non-relay related one-to-one sidelink communication.

SystemInformationBlockType19

The IE *SystemInformationBlockType19* indicates E-UTRAN supports the sidelink UE information procedure and may contain sidelink discovery related resource configuration information.

SystemInformationBlockType19 information element

```
-- ASN1START
SystemInformationBlockType19-r12 ::= SEQUENCE {
                          SEQUENCE {
    discConfig-r12
        discRxPool-r12
                                             SL-DiscRxPoolList-r12,
        discTxPoolCommon-r12 SL-DiscTxPoolList-r12 OPTIONAL, -- Cond Tx discTxPowerInfo-r12 SL-DiscTxPowerInfoList-r12 OPTIONAL, -- Cond Tx SL-SyncConfig-r12 SL-SyncConfigList-r12 OPTIONAL -- Need OPTIONAL, --
                                                                                             -- Need OR
                                                                                         -- Need OR
                                                                                OPTIONAL, -- Need OR
    }
discInterFreqList-r12
lateNonCriticalExtension
                                                                                         -- Need OR
                                         SL-CarrierFreqInfoList-r12
                                                                          OPTIONAL,
                                          OCTET STRING
                                                                                 OPTIONAL,
    [[ discConfig-v1310
                                          SEQUENCE {
            discInterFreqList-v1310
                                              SL-CarrierFreqInfoList-v1310 OPTIONAL, -- Need OR
            gapRequestsAllowedCommon
                                              ENUMERATED {true} OPTIONAL -- Need OR
            relayUE-Config-r13 SEQUENCE {
remoteUE-Config-r13 SL-Disc
                                                                            OPTIONAL.
                                                                                         -- Need OR
        discConfigRelay-r13
                                              SL-DiscConfigRelayUE-r13,
                                              SL-DiscConfigRemoteUE-r13
                                                                            OPTIONAL,
                                                                                         -- Need OR
        discConfigPS-13
                                          SEQUENCE {
            discRxPoolPS-r13
                                              SL-DiscRxPoolList-r12.
            discTxPoolPS-Common-r13
                                              SL-DiscTxPoolList-r12
                                                                            OPTIONAL
                                                                                         -- Need OR
                                                                            OPTIONAL
                                                                                         -- Need OR
    ]]
SL-CarrierFreqInfoList-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-CarrierFreqInfo-r12
SL-CarrierFreqInfoList-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-CarrierFreqInfo-v1310
SL-CarrierFreqInfo-r12::= SEQUENCE {
                                         ARFCN-ValueEUTRA-r9,
    carrierFreq-r12
    plmn-IdentityList-r12
                                      PLMN-IdentityList4-r12
                                                                        OPTIONAL
                                                                                     -- Need OP
SL-DiscConfigRelayUE-r13 ::= SEQUENCE {
```

```
OPTIONAL,
    threshHigh-r13
                              RSRP-RangeSL4-r13
                                                                                         -- Need OR
    threshLow-r13
                               RSRP-RangeSL4-r13
                                                                           OPTIONAL,
                              ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf} OPTIONAL, -- Cond
    hystMax-r13
ThreshHigh
    hystMin-r13
                              ENUMERATED {dB0, dB3, dB6, dB9, dB12} OPTIONAL -- Cond ThreshLow
SL-DiscConfigRemoteUE-r13 ::= SEQUENCE {
    threshHigh-r13 RSRP-RangeSL4-r13
                                                                           OPTIONAL, -- Need OR
    hystMax-r13
                               ENUMERATED {dB0, dB3, dB6, dB9, dB12} OPTIONAL,
                                                                                       -- Cond ThreshHigh
    reselectionInfoIC-r13 ReselectionInfoRelay-r13
ReselectionInfoRelay-r13 ::= SEQUENCE {
   q-RxLevMin-r13
                                       Q-RxLevMin,
    -- Note that the mapping of invidual values may be different for PC5, but the granularity/
    -- number of values is same as for Uu
    filterCoefficient-r13
                                   FilterCoefficient,
    minHyst-r13
                                   ENUMERATED {dB0, dB3,
                                           dB6, dB9, dB12, dBinf} OPTIONAL -- Need OR
}
SL-CarrierFreqInfo-v1310::= SEQUENCE {
discResourcesNonPS-r13 SL-ResourcesInterFreq-r13 OPTIONAL, -- Need OR
discResourcesPS-r13 SL-ResourcesInterFreq-r13 OPTIONAL, -- Need OR
discConfigOther-r13 SL-DiscConfigOtherInterFreq-r13 OPTIONAL, -- Need OR
}
PLMN-IdentityList4-r12 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo2-r12
PLMN-IdentityInfo2-r12 ::=
                                   CHOICE {
    plmnIdentity-r12
   plmn-Index-r12
                                       INTEGER (1..maxPLMN-r11),
                                       PLMN-Identity
}
SL-DiscTxResourcesInterFreq-r13 ::= CHOICE {
   acquireSI-FromCarrier-r13 NULL,
discTxPoolCommon-r13 SL-DiscTxPoolList-r12,
    requestDedicated-r13
                                      NULL,
    noTxOnCarrier-r13
                                       NULL
}
SL-DiscConfigOtherInterFreq-r13::= SEQUENCE {
                                                                        OPTIONAL,
   txPowerInfo-r13 SL-DiscTxPowerInfoList-r12
refCarrierCommon-r13 ENUMERATED {pCell}
discSyncConfig-r13 SL-SyncConfigListNFreq-r13
discCellSelectionInfo-r13 CellSelectionInfoNFreq-r13
                                                                                             -- Cond Tx
                                                                                             -- Need OR
                                                                               OPTIONAL,
                                                                                             -- Need OR
                                                                              OPTIONAL
                                                                                             -- Need OR
SL-ResourcesInterFreq-r13 ::= SEQUENCE {
                                                                               OPTIONAL,
   discRxResourcesInterFreq-r13 SL-DiscRxPoolList-r12
                                                                                             -- Need OR
                                      SL-DiscTxResourcesInterFreq-r13 OPTIONAL
    discTxResourcesInterFreq-r13
                                                                                             -- Need OR
-- ASN1STOP
```

SystemInformationBlockType19 field descriptions

discCellSelectionInfo

Parameters that may be used by the UE to select/ reselect a cell on the concerned non serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency. See TS 36.304 [4, 11.4].

discInterFreaList

Indicates the neighbouring frequencies on which sidelink discovery announcement is supported. May also provide further information i.e. reception resource pool and/ or transmission resource pool, or an indication how resources could be obtained.

discRxPool

Indicates the resources by which the UE is allowed to receive non-PS related sidelink discovery announcements while in RRC IDLE and while in RRC CONNECTED.

discRxPoolPS

Indicates the resources by which the UE is allowed to receive PS related sidelink discovery announcements while in RRC_IDLE and while in RRC_CONNECTED.

discRxResourcesInterFreq

Indicates the resource pool configuration for receiving discovery announcements on a carrier frequency.

discSyncConfig

Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures *discSyncConfig* including *txParameters* when configuring UEs by dedicated signalling to transmit synchronisation information.

discTxPoolCommon

Indicates the resources by which the UE is allowed to transmit non-PS related sidelink discovery announcements while in RRC_IDLE.

discTxPoolPS-Common

Indicates the resources by which the UE is allowed to transmit PS related sidelink discovery announcements while in RRC_IDLE.

discTxResourcesInterFreq

For the concerned frequency, either provides the UE with a pool of sidelink discovery announcement transmission resources the UE is allowed to use while in RRC_IDLE, or indicates whether such transmission is allowed, and if so how the UE may obtain the required resources. Value *noTxOnCarrier* indicates that the UE is not allowed to transmit sidelink discovery announcements on the concerned frequency. Value *acquireSI-FromCarrier* indicates that the required resources are to be obtained by autonomously acquiring SIB19 and other relevant SIBs from the concerned frequency. Value *requestDedicated* indicates, that for the concerned carrier, the required sidelink discovery resources are to be obtained by means of a dedicated resource request using the *SidelinkUEInformation* message.

plmn-IdentityList

List of PLMN identities for the neighbouring frequency indicated by *carrierFreq*. Absence of the field indicates the same PLMN identities as listed across the *plmn-ldentityList* fields (without suffix) in *SystemInformationBlockType1*.

plmn-Index

Index of the corresponding entry across the *plmn-IdentityList* fields (without suffix) within *SystemInformationBlockType1*.

refCarrierCommon

Indicates if the PCell (RRC_CONNECTED)/ serving cell (RRC_IDLE) is to be used as reference for DL measurements and synchronization, instead of the DL frequency paired with the one used to transmit sidelink discovery announcements on, see TS 36.213 [23, 14.3.1].

reselectionInfolC

Includes the parameters used by the UE when selecting/ reselecting a sidelink relay UE.

SL-CarrierFreqInfoList-v1310

If included, the UE shall include the same number of entries, and listed in the same order, as in *SL-CarrierFreqInfoList-r12*.

threshHigh, threshLow (relayUE)

Indicates when a sidelink remote UE or sidelink relay UE that is in network coverage may use the broadcast PS related sidelink discovery Tx resource pool, if broadcast, or request Tx resources by dedicated signalling otherwise. For remote UEs, this parameter is used similarly for relay related sidelink communication.

Conditional presence	Explanation
ThreshHigh	The field is mandatory present if <i>threshHigh</i> is included in the corresponding IE.
	Otherwise the field is not present and UE shall delete any existing value for this field.
ThreshLow	The field is mandatory present if <i>threshLow</i> is included. Otherwise the field is not present
	UE shall delete any existing value for this field.
Tx	The field is mandatory present if <i>discTxPoolCommon</i> is included. Otherwise the field is
	optional present, need OR.

The IE *SystemInformationBlockType20* contains the information required to acquire the control information associated transmission of MBMS using SC-PTM.

SystemInformationBlockType20 information element

```
-- ASN1START
SystemInformationBlockType20-r13 ::= SEQUENCE {
    sc-mcch-RepetitionPeriod-r13
                                         ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256},
    sc-mcch-Repetition 1
sc-mcch-Offset-r13 INTEGER (U..10),
sc-mcch-FirstSubframe-r13 INTEGER (0..9),
INTEGER (2..9) OPTIONAL,
rf2 rf4, rf8
    sc-mcch-ModificationPeriod-rl3 ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256,
                                          rf512, rf1024, r2048, rf4096, rf8192, rf16384, rf32768,
                                               rf65536},
    lateNonCriticalExtension
    [[ br-BCCH-Config-r14
                                              SEQUENCE {
            sc-mcch-RepetitionPeriod-v1430 ENUMERATED {rf1}, sc-mcch-ModificationPeriod-v1430 INTEGER (1..maxAvailNarrowBands-r13),
            sc-mcch-RepetitionPeriod-v1430
            mpdcch-NumRepetition-SC-MCCH-r14 ENUMERATED {r1, r2, r4, r8, r16,
                                                               r32, r64, r128, r256},
            mpdcch-StartSF-SC-MCCH-r14
                                                  CHOICE {
                fdd-r14
                                                      ENUMERATED {v1, v1dot5, v2, v2dot5, v4,
                                                                   v5, v8, v10},
                                                       ENUMERATED \{v1, v2, v4, v5, v8, v10, v20\}
                 tdd-r14
            mpdcch-PDSCH-HoppingConfig-SC-MCCH-r14 ENUMERATED {off, ce-ModeA, ce-ModeB},
            sc-mcch-CarrierFreq-r14 ARFCN-ValueEUTRA-r9,
            sc-mcch-Offset-BR-r14
                                                  INTEGER (0..10),
            sc-mcch-RepetitionPeriod-BR-r14 ENUMERATED {rf32, rf128, rf512, rf1024,
                                                       rf2048, rf4096, rf8192, rf16384},
            sc-mcch-ModificationPeriod-BR-r14 ENUMERATED { rf32, rf128, rf256, rf512, rf1024,
                                                      rf2048, rf4096, rf8192, rf16384, rf32768,
                                                       rf65536, rf131072, rf262144, rf524288,
                                                       rf1048576}
                                                                                OPTIONAL,
        sc-mcch-SchedulingInfo-r14
                                             SC-MCCH-SchedulingInfo-r14
                                                                                            -- Need OP
                                                                               OPTIONAL,
        {\tt pdsch-maxNumRepetitionCEmodeA-SC-MTCH-r14}
                                              ENUMERATED { r16, r32 }
                                                                          OPTIONAL, -- Need OR
        pdsch-maxNumRepetitionCEmodeB-SC-MTCH-r14
                                              ENUMERATED {
                                                  r192, r256, r384, r512, r768, r1024,
                                                  r1536, r2048}
                                                                                OPTIONAL
                                                                                             -- Need OR
    ]]
}
SC-MCCH-SchedulingInfo-r14::=
                                SEOUENCE
                                          ENUMERATED {psf10, psf20, psf100, psf300,
    onDurationTimerSCPTM-r14
                                                  psf500, psf1000, psf1200, psf1600},
                                          ENUMERATED {psf0, psf1, psf2, psf4, psf8, psf16,
    drx-InactivityTimerSCPTM-r14
                                                  psf32, psf64, psf128, psf256, ps512,
                                                  psf1024, psf2048, psf4096, psf8192, psf16384},
    schedulingPeriodStartOffsetSCPTM-r14
                                              CHOICE {
        sf10
                                                  INTEGER(0..9),
                                                  INTEGER(0..19),
        sf20
        sf32
                                                  INTEGER(0..31),
        sf40
                                                   INTEGER(0..39),
        sf64
                                                  INTEGER(0..63),
        sf80
                                                  INTEGER(0..79),
        sf128
                                                  INTEGER(0..127)
        sf160
                                                  INTEGER(0..159),
        sf256
                                                  INTEGER(0..255),
        sf320
                                                  INTEGER(0..319),
        sf512
                                                  INTEGER(0..511),
        sf640
                                                  INTEGER(0..639),
        sf1024
                                                  INTEGER(0..1023),
        sf2048
                                                  INTEGER(0..2047),
                                                  INTEGER(0..4095),
        sf4096
        sf8192
                                                  INTEGER(0..8191)
    },
    . . .
```

-- ASN1STOP

SystemInformationBlockType20 field descriptions

br-BCCH-Config-r14

The field is present if SystemInformationBlockType20 is sent on BR-BCCH. Otherwise the field is absent.

drx-InactivityTimerSCPTM

Timer for listening to SC-MCCH scheduling in TS 36.321 [6]. Value in number of MPDCCH sub-frames. Value psf0 corresponds to 0 MPDCCH sub-frame, psf1 corresponds to 1 MPDCCH sub-frame and so on.

mpdcch-Narrowband-SC-MCCH

Narrowband for MPDCCH for SC-MCCH, see TS 36.213 [23].

mpdcch-NumRepetitions-SC-MCCH

The maximum number of MPDCCH repetitions the UE needs to monitor for SC-MCCH, see TS 36.213 [23].

mpdcch-StartSF-SC-MCCH

Configuration of the starting subframes of the MPDCCH search space for SC-MCCH, see TS 36.213 [23].

mpdcch-PDSCH-HoppingConfig-SC-MCCH

Frequency hopping configuration for MPDCCH/PDSCH for SC-MCCH, see TS 36.213 [23].

onDurationTimerSCPTM

Indicates the duration in subframes during which SC-MCCH may be scheduled in MPDCCH sub-frames, see TS 36.321 [6].

pdsch-maxNumRepetitionCEmodeA-SC-MTCH

Maximum value to indicate the set of PDSCH repetition numbers for SC-MTCH to UEs in CE mode A, see TS 36.213 [23].

pdsch-maxNumRepetitionCEmodeB-SC-MTCH

Maximum value to indicate the set of PDSCH repetition numbers for SC-MTCH CE to UEs in mode B, see TS 36.213 [23].

schedulingPeriodStartOffsetSCPTM

SCPTM-SchedulingCycle and SCPTM-SchedulingOffset in TS 36.321 [6]. The value of SCPTM-SchedulingCycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. The value of SCPTM-SchedulingOffset is in number of sub-frames.

sc-mcch-CarrierFreq

Downlink carrier used for all multicast SC-MCCH transmissions.

sc-mcch-duration

Indicates, starting from the subframe indicated by *sc-mcch-FirstSubframe*, the duration in subframes during which SC-MCCH may be scheduled in PDCCH sub-frames, see TS 36.321 [6]. Absence of this IE means that SC-MCCH is only scheduled in the subframe indicated by *sc-mcch-FirstSubframe*.

sc-mcch-ModificationPeriod

Defines periodically appearing boundaries, i.e. radio frames for which SFN mod *sc-mcch-ModificationPeriod* = 0. The contents of different transmissions of SC-MCCH information can only be different if there is at least one such boundary in-between them. Value rf2 corresponds to 2 radio frames, value rf4 corresponds to 4 radio frames and so on. In case sc-mcch-ModificationPeriod-v1430 is configured, the UE shall ignore the configuration of *sc-mcch-ModificationPeriod-r13*.

sc-mcch-ModificationPeriod-BR

Defines periodically appearing boundaries for BL UE or UE in CE, i.e. radio frames for which (H-SFN*1024 + SFN) mod *sc-mcch-ModificationPeriod-BR* = 0 if hyperSFN is present in *SystemInformationBlockType1-BR* or radio frames for which SFN mod *sc-mcchModificationPeriod-BR* = 0 otherwise. The contents of different transmissions of SC-MCCH information can only be different if there is at least one such boundary in-between them. Value rf32 corresponds to 32 radio frames, value rf128 corresponds to 128 radio frames and so on.

sc-mcch-FirstSubframe

Indicates the first subframe in which SC-MCCH is scheduled

sc-mcch-Offset

Indicates, together with the *sc-mcch-RepetitionPeriod*, the radio frames in which SC-MCCH is scheduled i.e. SC-MCCH is scheduled in radio frames for which: SFN mod sc-*mcch-RepetitionPeriod* = *sc-mcch-Offset*.

sc-mcch-Offset-BR

Indicates, together with the *sc-mcch-RepetitionPeriod-BR*, the boundary of the SC-MCCH repetition period for BL UE or UE in CE: (H-SFN*1024 + SFN) mod *sc-mcch-RepetitionPeriod-BR* = *sc-mcch-Offset-BR* if hyperSFN is present in *SystemInformationBlockType1-BR* or radio frames for which (SFN mod mod *sc-mcch-RepetitionPeriod-BR*) = *sc-mcch-Offset-BR* otherwise.

sc-mcch-RepetitionPeriod

Defines the interval between transmissions of SC-MCCH information, in radio frames. Value rf2 corresponds to 2 radio frames, rf4 corresponds to 4 radio frames and so on. In case *sc-mcch-RepetitionPeriod-v1430* is configured, the UE shall ignore the configuration of *sc-mcch-RepetitionPeriod-r13*.

sc-mcch-RepetitionPeriod-BR

Defines the interval between transmissions of SC-MCCH information for BL UE or UE in CE, in radio frames. Value rf32 corresponds to 32 radio frames, rf128 corresponds to 128 radio frames and so on.

sc-mcch-SchedulingInfo

DRX information for the SC-MCCH. If this field is absent, DRX is not used for SC-MCCH reception.

The IE SystemInformationBlockType21 contains V2X sidelink communication configuration.

SystemInformationBlockType21 information element

```
-- ASN1START
SystemInformationBlockType21-r14 ::= SEQUENCE {
       sl-V2X-ConfigCommon-r14
                                                                         SL-V2X-ConfigCommon-r14
                                                                                                                                             OPTIONAL,
                                                                                                                                                                  -- Need OR
       lateNonCriticalExtension
                                                                          OCTET STRING
                                                                                                                                             OPTIONAL,
SL-V2X-ConfigCommon-r14 ::= SEQUENCE {
       v2x-CommTxPoolNormalCommon-r14 SL-CommTxPoolListV2X-r14
p2x-CommTxPoolNormalCommon-r14 SL-CommTxPoolListV2X-r14
                                                                                                                                            OPTIONAL,
                                                                                                                                                                    -- Need OR
      v2x-CommTxPoolNormalCommon-r14 SL-CommTxPoolListV2X-r14 OPTIONAL, p2x-CommTxPoolNormalCommon-r14 SL-CommTxPoolListV2X-r14 OPTIONAL, v2x-CommTxPoolExceptional-r14 SL-CommResourcePoolV2X-r14 OPTIONAL, v2x-SyncConfig-r14 SL-SyncConfigListV2X-r14 OPTIONAL, v2x-InterFreqInfoList-r14 SL-InterFreqInfoListV2X-r14 OPTIONAL, v2x-ResourceSelectionConfig-r14 SL-CommTxPoolSensingConfig-r14 OPTIONAL, zoneConfig-r14 SL-ZoneConfig-r14 OPTIONAL, typeTxSync-r14 SL-TypeTxSync-r14 OPTIONAL, thresSL-TyPrioritization-r14 SL-Priority-r13 OPTIONAL,
                                                                        SL-CommTxPoolListV2X-r14
                                                                                                                                         OPTIONAL,
                                                                                                                                                                   -- Need OR
                                                                                                                                                                   -- Need OR
      thresSL-TxPrioritization-r14 SL-Priority-r13
anchorCarrierFreqList-r14 SL-AnchorCarrierFreqList-V2X-r14
offsetDFN-r14 INTEGER (0..1000)
cbr-CommonTxConfigList-r14 SL-CBR-CommonTxConfigList-r14
                                                                                                                                            OPTIONAL,
                                                                                                                                                                   -- Need OR
                                                                                                                                           OPTIONAL,
                                                                                                                                                                   -- Need OR
                                                                                                                                                                   -- Need OR
                                                                                                                                                                   -- Need OR
                                                                                                                                            OPTIONAL
-- ASN1STOP
```

SystemInformationBlockType21 field descriptions

anchorCarrierFreqList

Indicates carrier frequencies which may include inter-carrier resource configuration for V2X sidelink communication.

cbr-CommonTxConfigList

Indicates the common list of CBR ranges and the list of PSSCH transmissions parameter configurations available to configure congestion control to the UE for V2X sidelink communication.

offsetDFN

Indicates the timing offset for the UE to determine DFN timing when GNSS is used for timing reference for the PCell. Value 0 corresponds to 0 milliseconds, value 1 corresponds to 0.001 milliseconds, value 2 corresponds to 0.002 milliseconds, and so on.

p2x-CommTxPoolNormalCommon

Indicates the resources by which the UE is allowed to transmit P2X related V2X sidelink communication. *zoneID* is not configured in the pools in this field.

thresSL-TxPrioritization

Indicates the threshold used to determine whether SL V2X transmission is prioritized over uplink transmission if they overlap in time (see TS 36.321 [6]). This value shall overwrite *thresSL-TxPrioritization* configured in *SL-V2X-Preconfiguration* if any.

typeTxSync

Indicates the prioritized synchronization type (i.e. eNB or GNSS) for performing V2X sidelink communication on the carrier frequency on which this field is broadcast.

v2x-CommRxPool

Indicates the resources by which the UE is allowed to receive V2X sidelink communication while in RRC_IDLE and in RRC_CONNECTED.

v2x-CommTxPoolExceptional

Indicates the resources by which the UE is allowed to transmit V2X sidelink communication in exceptional conditions, as specified in 5.10.13.

v2x-CommTxPoolNormalCommon

Indicates the resources by which the UE is allowed to transmit non-P2X related V2X sidelink communication when in RRC_IDLE or when in RRC_CONNECTED while transmitting V2X sidelink communication via a frequency other than the primary. E-UTRAN configures one resource pool per zone.

v2x-InterFreqInfoList

Indicates synchronization and resource allocation configurations of neighboring frequencies for V2X sidelink communication.

v2x-ResourceSelectionConfig

Indicates V2X sidelink communication configurations used for UE autonomous resource selection.

v2x-SyncConfig

Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information for V2X sidelink communication. E-UTRAN configures *v2x-SyncConfig* including *txParameters* when configuring UEs to transmit synchronisation information.

zoneConfig

Indicates zone configurations used for V2X sidelink communication in 5.10.13.2.

6.3.2 Radio resource control information elements

Antennalnfo

The IE *AntennaInfoCommon* and the *AntennaInfoDedicated* are used to specify the common and the UE specific antenna configuration respectively.

Antennalnfo information elements

```
-- ASN1START
AntennaInfoCommon ::=
                                    SEOUENCE {
    antennaPortsCount
                                        ENUMERATED {an1, an2, an4, spare1}
AntennaInfoDedicated ::=
                                    SEOUENCE {
    transmissionMode
                                        ENUMERATED {
                                            tm1, tm2, tm3, tm4, tm5, tm6,
                                            tm7, tm8-v920},
    codebookSubsetRestriction
                                        CHOICE {
        n2TxAntenna-tm3
                                            BIT STRING (SIZE (2)),
        n4TxAntenna-tm3
                                            BIT STRING (SIZE (4)),
        n2TxAntenna-tm4
                                            BIT STRING (SIZE (6)),
        n4TxAntenna-tm4
                                            BIT STRING (SIZE (64)),
        n2TxAntenna-tm5
                                            BIT STRING (SIZE (4)),
```

```
n4TxAntenna-tm5 BIT STRING (SIZE (16)),
      n2TxAntenna-tm6
                                      BIT STRING (SIZE (4)),
      n4TxAntenna-tm6
                                     BIT STRING (SIZE (16))
       OPTIONAL,
                                                                     -- Cond TM
   ue-TransmitAntennaSelection
                                 CHOICE {
         release
                                      NULL,
                                      ENUMERATED {closedLoop, openLoop}
}
AntennaInfoDedicated-v920 ::= SEQUENCE {
   codebookSubsetRestriction-v920 CHOICE {
      n2TxAntenna-tm8-r9
n4TxAntenna-tm8-r9
                                   BIT STRING (SIZE (6)),
                                      BIT STRING (SIZE (32))
       OPTIONAL
                                                                     -- Cond TM8
}
AntennaInfoDedicated-r10 ::= SEQUENCE {
                                  ENUMERATED {
   transmissionMode-r10
                                      tm1, tm2, tm3, tm4, tm5, tm6, tm7, tm8-v920, tm9-v1020, tm10-v1130, spare6, spare5, spare4,
                                      spare3, spare2, spare1},
   codebookSubsetRestriction-r10
                                 BIT STRING OPTIONAL,
                                                                   -- Cond TMX
   ue-TransmitAntennaSelection CHOICE{
                                  NULL,
      release
                                   ENUMERATED {closedLoop, openLoop}
      setup
OPTIONAL --
Need OR
}
AntennaInfoDedicated-v1250 ::= SEQUENCE {
   alternativeCodebookEnabledFor4TX-r12 BOOLEAN
AntennaInfoDedicated-v1430 ::= SEQUENCE {
  ce-UE-TxAntennaSelection-config-r14
                                         ENUMERATED {on} OPTIONAL -- Need OR
-- ASN1STOP
```

Antennalnfo field descriptions

alternativeCodebookEnabledFor4TX

Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting. E-UTRAN only configures the field if the UE is configured with a) *tm8* with 4 CRS ports, *tm9* or *tm10* with 4 CSI-RS ports and b) PMI/RI reporting.

antennaPortsCount

Parameter represents the number of cell specific antenna ports where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.2.1].

ce-ue-TxAntennaSelection-config

Configuration of UL closed-loop transmit antenna selection for non-BL UE in CE Mode A, see TS 36.212 [22].

codebookSubsetRestriction

Parameter: codebookSubsetRestriction, see TS 36.213 [23, 7.2] and TS 36.211 [21, 6.3.4.2.3]. The number of bits in the codebookSubsetRestriction for applicable transmission modes is defined in TS 36.213 [23, Table 7.2-1b]. If the UE is configured with transmissionMode tm8, E-UTRAN configures the field codebookSubsetRestriction if PMI/RI reporting is configured. If the UE is configured with transmissionMode tm9, E-UTRAN configures the field codebookSubsetRestriction if PMI/RI reporting is configured and if the number of CSI-RS ports is greater than 1. E-UTRAN does not configure the field codebookSubsetRestriction in other cases where the UE is configured with transmissionMode tm8 or tm9. Furthermore, E-UTRAN does not configure the field codebookSubsetRestriction if the UE is configured with eMIMO-Type unless it is set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.

maxLayersMIMO

Indicates the maximum number of layers for spatial multiplexing used to determine the rank indication bit width and Kc determination of the soft buffer size for the corresponding serving cell according to TS 36.212 [22]. EUTRAN configures this field only when *transmissionMode* is set to *tm3*, *tm4*, *tm9* or *tm10* for the corresponding serving cell. When configuring the field for a serving cell which *transmissionMode* is set to *tm3* or *tm4*, EUTRAN only configures value *fourLayers*: For a serving cell which *transmissionMode* is set to *tm9* or *tm10*, EUTRAN only configures the field only if *intraBandContiguousCC-InfoList* is indicated for the band and the band combination of the corresponding serving cell or the UE supports *maxLayersMIMO-Indication*.

transmissionMode

Points to one of Transmission modes defined in TS 36.213 [23, 7.1] where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc.

ue-TransmitAntennaSelection

For value *setup* the field indicates whether UE transmit antenna selection control is closed-loop or open-loop as described in TS 36.213 [23, 8.7]. EUTRAN configures the same value for all serving cells.

Conditional presence	Explanation
TM	The field is mandatory present if the <i>transmissionMode</i> is set to tm3, tm4, tm5 or tm6.
	Otherwise the field is not present and the UE shall delete any existing value for this field.
TM8	The field is optional present, need OR, if AntennalnfoDedicated is included and
	transmissionMode is set to tm8. If AntennaInfoDedicated is included and
	transmissionMode is set to a value other than tm8, the field is not present and the UE
	shall delete any existing value for this field. Otherwise the field is not present.
TMX	The field is mandatory present if the <i>transmissionMode-r10</i> is set to <i>tm3</i> , <i>tm4</i> , <i>tm5</i> or <i>tm6</i> .
	The field is optionally present, need OR, if the <i>transmissionMode-r10</i> is set to <i>tm8</i> or <i>tm9</i> .
	Otherwise the field is not present and the UE shall delete any existing value for this field.

- AntennalnfoUL

The IE AntennaInfoUL is used to specify the UL antenna configuration.

AntennalnfoUL information elements

AntennalnfoUL field descriptions

fourAntennaPortActivated

Parameter indicates if four antenna ports are used. See TS 36.213 [23, 8.2]. E-UTRAN optionally configures fourAntennaPortActivated only if transmissionModeUL is set to tm2.

transmissionModeUL

Points to one of UL Transmission modes defined in TS 36.213 [23, 8.0] where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc.

CQI-ReportConfig

The IE *CQI-ReportConfig* is used to specify the CQI reporting configuration.

CQI-ReportConfig information elements

```
-- ASN1START
                                  SEQUENCE {
CQI-ReportConfig ::=
   cgi-ReportModeAperiodic
                                  CQI-ReportModeAperiodic OPTIONAL,
                                                                            -- Need OR
   nomPDSCH-RS-EPRE-Offset
                                   INTEGER (-1..6),
   cqi-ReportPeriodic
                                  CQI-ReportPeriodic OPTIONAL
                                                                            -- Need ON
CQI-ReportConfig-v920 ::=
                              SECTIENCE {
                                                        OPTIONAL,
                                  ENUMERATED {setup}
   cqi-Mask-r9
                                                                       -- Cond cqi-Setup
   pmi-RI-Report-r9
                                  ENUMERATED {setup}
                                                        OPTIONAL
                                                                      -- Cond PMIRI
CQI-ReportConfig-r10 ::=
                         SEQUENCE {
   nomPDSCH-RS-EPRE-Offset
                                      CQI-ReportAperiodic-r10
                                                                    OPTIONAL,
                                                                                -- Need ON
                                  INTEGER (-1..6),
   cqi-ReportPeriodic-r10
                                      CQI-ReportPeriodic-r10
                                                                    OPTIONAL,
                                                                                -- Need ON
   pmi-RI-Report-r9
                                      ENUMERATED {setup}
                                                                                -- Cond
                                                                    OPTIONAL.
PMIRIPCell
   csi-SubframePatternConfig-r10
                                      CHOICE {
       release
                                     NULL,
                                     SEQUENCE {
       setup
           csi-MeasSubframeSet1-r10
                                            MeasSubframePattern-r10.
           csi-MeasSubframeSet2-r10
                                             MeasSubframePattern-r10
   }
                                                                    OPTIONAL
                                                                                -- Need ON
}
CQI-ReportConfig-v1130 ::= SEQUENCE {
   cqi-ReportPeriodic-v1130
                                      CQI-ReportPeriodic-v1130,
   cqi-ReportBoth-r11
                                      COI-ReportBoth-r11
CQI-ReportConfig-v1250 ::= SEQUENCE {
   csi-SubframePatternConfig-r12
                                      CHOICE {
                                      NULL,
       release
                                      SEQUENCE {
       setup
                                        BIT STRING (SIZE (10))
           csi-MeasSubframeSets-r12
                                         OPTIONAL,
CQI-ReportBoth-v1250 OPTIONAL,
   cqi-ReportBoth-v1250
                                                                 OPTIONAL, -- Need ON
   cqi-ReportAperiodic-v1250 CQI-ReportAperiodic-v1250
                                                         OPTIONAL, -- Need ON
   altCQI-Table-r12
                              ENUMERATED {
                                 allSubframes, csi-SubframeSet1,
                                                                OPTIONAL
                                  csi-SubframeSet2, spare1}
                                                                                -- Need OP
       cqi-ReportBoth-v1310
CQI-ReportConfig-v1310 ::=
                                  SEOUENCE {
                                         CQI-ReportBoth-v1310
                                                                   OPTIONAL,
                                                                                -- Need ON
                                          CQI-ReportAperiodic-v1310 OPTIONAL,
       cqi-ReportAperiodic-v1310
                                                                                   -- Need ON
                                                                                    -- Need ON
       cqi-ReportPeriodic-v1310
                                         CQI-ReportPeriodic-v1310
                                                                    OPTIONAL
}
CQI-ReportConfig-v1320 ::=
                                  SEQUENCE {
                                         CQI-ReportPeriodic-v1320 OPTIONAL
       cqi-ReportPeriodic-v1320
}
CQI-ReportConfig-v1430 ::=
                                  SEQUENCE {
       cqi-ReportAperiodicHybrid-r14
                                         CQI-ReportAperiodicHybrid-r14 OPTIONAL
                                                                                    -- Need ON
```

```
-ReportConfigSCell-r10 ::= SEQUENCE {
    cqi-ReportModeAperiodic-r10 CQI-ReportModeAperiodic OPTIONAL,
    nomPDSCH-RS-EPRE-Offset-r10 INTEGER (-1..6),
    cqi-ReportPeriodicSCell-r10 CQI-ReportPeriodic-r10 OPT
CQI-ReportConfigSCell-r10 ::=
                                                                                 -- Need OR
                                    ENUMERATED {setup}
                                                                     OPTIONAL,
                                                                                 -- Need ON
   pmi-RI-Report-r10
                                                                    OPTIONAL
                                                                                 -- Cond
PMIRISCell
}
CQI-ReportPeriodic ::=
                          CHOICE {
   release
                                  NULL.
                                  SEQUENCE {
   setup
       cqi-PUCCH-ResourceIndex
                                          INTEGER (0..1185),
       cqi-pmi-ConfigIndex
                                          INTEGER (0..1023),
       cqi-FormatIndicatorPeriodic
                                          CHOICE {
           widebandCQI
                                              NULL,
           subbandCQI
                                              SEOUENCE {
               k
                                                  INTEGER (1..4)
       ri-ConfigIndex
                                          INTEGER (0..1023) OPTIONAL,
                                                                                     -- Need OR
       simultaneousAckNackAndCQI
                                        BOOLEAN
}
CQI-ReportPeriodic-r10 ::=
                             CHOICE {
   release
                                      NULL,
                                      SEQUENCE {
       cgi-PUCCH-ResourceIndex-r10
       INTEGER (0..1184),
                                          INTEGER (0..1184)
                                                                        OPTIONAL.
                                                                                    -- Need OR
       cqi-FormatIndicatorPeriodic-r10 CHOICE {
           widebandCQI-r10
                                              SEQUENCE {
               csi-ReportMode-r10 ENUMERATED {submode1, submode2} OPTIONAL
                                                                                     -- Need OR
           subbandCQI-r10
                                              SEQUENCE {
                                              INTEGER (1..4),
              k
               periodicityFactor-r10
                                                  ENUMERATED {n2, n4}
       ri-ConfigIndex
                                      INTEGER (0..1023)
                                                             OPTIONAL,
                                                                                     -- Need OR
       simultaneousAckNackAndCQI
                                    BOOLEAN,
       cqi-Mask-r9
                                      ENUMERATED {setup}
                                                             OPTIONAL,
                                                                                     -- Need OR
       cqi-Mask-r9
csi-ConfigIndex-r10
                                      CHOICE {
           release
                                         NULL,
           setup
                                          SEQUENCE {
               cqi-pmi-ConfigIndex2-r10 INTEGER (0..1023), ri-ConfigIndex2-r10 INTEGER (0..1023)
                                                                    OPTIONAL
                                                                                     -- Need OR
       }
               OPTIONAL
                                                                                     -- Need ON
   }
}
                             SEQUENCE {
CQI-ReportPeriodic-v1130 ::=
                                              ENUMERATED {setup} OPTIONAL,
   simultaneousAckNackAndCQI-Format3-r11
                                                                                 -- Need OR
    cqi-ReportPeriodicProcExtToReleaseList-rll CQI-ReportPeriodicProcExtToReleaseList-rll
              -- Need ON
   OPTIONAL,
   cqi-ReportPeriodicProcExtToAddModList-r11 CQI-ReportPeriodicProcExtToAddModList-r11 OPTIONAL
    -- Need ON
}
CQI-ReportPeriodic-v1310 ::= SEQUENCE {
   cri-ReportConfig-r13
                                  CRI-ReportConfig-r13
                                                                     OPTIONAL, -- Need OR
   CQI-ReportPeriodic-v1320 ::= SEQUENCE {
                                 ENUMERATED {n2, n4}
   periodicityFactorWB-r13
                                                            OPTIONAL
                                                                             -- Need OR
CQI-ReportPeriodicProcExtToAddModList-r11 ::=
                                                SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF CQI-
ReportPeriodicProcExt-r11
CQI-ReportPeriodicProcExtToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF CQI-
ReportPeriodicProcExtId-r11
CQI-ReportPeriodicProcExt-r11 ::= SEQUENCE {
```

```
cqi-ReportPeriodicProcExtId-r11 CQI-ReportPeriodicProcExtId-r11,
                                     INTEGER (0..1023),
    cqi-pmi-ConfigIndex-r11
    cqi-FormatIndicatorPeriodic-r11 CHOICE {
        widebandCQI-r11
                                     SEQUENCE {
            csi-ReportMode-r11
                                         ENUMERATED {submode1, submode2} OPTIONAL
                                                                                      -- Need OR
        subbandCQI-r11
                                     SEQUENCE {
                                         INTEGER (1..4),
            k
            periodicityFactor-r11
                                         ENUMERATED {n2, n4}
    ri-ConfigIndex-r11
                                     INTEGER (0..1023)
                                                                          OPTIONAL.
                                                                                       -- Need OR
    csi-ConfigIndex-r11
                                     CHOICE {
        release
                                         NULL,
        setup
                                         SEQUENCE {
            cqi-pmi-ConfigIndex2-r11
                                            INTEGER (0..1023),
            ri-ConfigIndex2-r11
                                             INTEGER (0..1023)
                                                                      OPTIONAL
                                                                                       -- Need OR
    }
                                                                                       -- Need ON
                                                                      OPTIONAL,
    [[ cri-ReportConfig-r13
                                        CRI-ReportConfig-r13
                                                                              OPTIONAL -- Need ON
    ]],
        periodicityFactorWB-r13
                                       ENUMERATED {n2, n4}
                                                                      OPTIONAL
                                                                                      -- Need ON
    ]]
CQI-ReportAperiodic-r10 ::=
                                CHOICE {
    release
                                         NULL,
                                         SEQUENCE {
    setup
        cqi-ReportModeAperiodic-r10
                                             CQI-ReportModeAperiodic,
        aperiodicCSI-Trigger-r10
                                             SEOUENCE {
            trigger1-r10
                                             BIT STRING (SIZE (8)),
            trigger2-r10
                                             BIT STRING (SIZE (8))
                                                                               OPTIONAL
                                                                                         -- Need OR
}
                                     CHOICE {
CQI-ReportAperiodic-v1250 ::=
                                        NULL,
    release
                                         SEQUENCE {
    setup
        aperiodicCSI-Trigger-v1250
                                             SEQUENCE {
            trigger-SubframeSetIndicator-r12 ENUMERATED {s1, s2},
            trigger1-SubframeSetIndicator-r12
                                                 BIT STRING (SIZE (8)),
            trigger2-SubframeSetIndicator-r12 BIT STRING (SIZE (8))
    }
}
CQI-ReportAperiodic-v1310 ::=
                                     CHOICE {
    release
    setup
                                         SEOUENCE {
        aperiodicCSI-Trigger-v1310
                                             SEQUENCE {
            trigger1-r13
                                             BIT STRING (SIZE (32)),
            trigger2-r13
                                             BIT STRING (SIZE (32)),
            trigger3-r13
                                             BIT STRING (SIZE (32)),
                                             BIT STRING (SIZE (32)),
            trigger4-r13
            trigger5-r13
                                             BIT STRING (SIZE (32)),
            trigger6-r13
                                             BIT STRING (SIZE (32))
                                                                               OPTIONAL, -- Need ON
        aperiodicCSI-Trigger2-r13
                                         CHOICE {
                                             NULL,
            release
                                         SEQUENCE {
            setup
                trigger1-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
                trigger2-SubframeSetIndicator-r13 BIT STRING (SIZE (32)), trigger3-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
                trigger4-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
                trigger5-SubframeSetIndicator-r13
                                                     BIT STRING (SIZE (32)),
                trigger6-SubframeSetIndicator-r13 BIT STRING (SIZE (32))
            }
        }
                                                                               OPTIONAL
                                                                                         -- Need ON
}
CQI-ReportAperiodicProc-r11 ::=
                                     SEQUENCE {
    cqi-ReportModeAperiodic-r11
                                         CQI-ReportModeAperiodic,
    trigger01-r11
                                         BOOLEAN,
    trigger10-r11
                                         BOOLEAN,
    trigger11-r11
                                         BOOLEAN
```

```
}
CQI-ReportAperiodicProc-v1310 ::= SEQUENCE {
    trigger001-r13
                                            BOOLEAN,
    trigger010-r13
                                            BOOLEAN.
    trigger011-r13
                                           BOOLEAN,
    trigger100-r13
                                            BOOLEAN,
    trigger101-r13
                                           BOOLEAN,
    trigger110-r13
                                            BOOLEAN,
    trigger111-r13
                                            BOOLEAN
}
CQI-ReportAperiodicHybrid-r14 ::=
                                        SEQUENCE {
    triggers-r14
                                            CHOICE {
        oneBit-r14
                                                SEQUENCE {
            trigger1-Indicator-r14
                                                    BIT STRING (SIZE (8))
         },
         twoBit-r14
                                                SEQUENCE {
             trigger01-Indicator-r14 BIT STRING (SIZE (8)),
trigger10-Indicator-r14 BIT STRING (SIZE (8)),
trigger11-Indicator-r14 BIT STRING (SIZE (8))
                                               BIT STRING (SIZE (32)),
BIT STRING (SIZE (32)),
         threeBit-r14
             trigger001-Indicator-r14
             trigger010-Indicator-r14
trigger011-Indicator-r14
                                                    BIT STRING (SIZE (32)),
BIT STRING (SIZE (32)),
                                                BIT STRING (SIZE (32)),
BIT STRING (SIZE (32)),
BIT STRING (SIZE (32)),
BIT STRING (SIZE (32)),
             trigger011-Indicator-r14
trigger100-Indicator-r14
trigger101-Indicator-r14
trigger110-Indicator-r14
             trigger111-Indicator-r14
                                                   BIT STRING (SIZE (32))
    }
                                                                           OPTIONAL -- Need OR
}
CQI-ReportModeAperiodic ::=
                                            ENUMERATED {
                                                rm12, rm20, rm22, rm30, rm31,
                                                rm32-v1250, rm10-v1310, rm11-v1310
}
CQI-ReportBoth-r11 ::=
                                  SEQUENCE {
    csi-IM-ConfigToReleaseList-rll CSI-IM-ConfigToReleaseList-rll OPTIONAL, csi-IM-ConfigToAddModList-rll CSI-IM-ConfigToAddModList-rll OPTIONAL,
                                           CSI-IM-ConfigToAddModList-r11 OPTIONAL,
                                                                                             -- Need ON
    csi-ProcessToReleaseList-r11
csi-ProcessToAddModList-r11
                                           CSI-ProcessToReleaseList-r11 OPTIONAL,
CSI-ProcessToAddModList-r11 OPTIONAL
                                                                                             -- Need ON
                                                                                             -- Need ON
}
COI-ReportBoth-v1250 ::=
                                      SEQUENCE {
    csi-IM-ConfigToReleaseListExt-r12 CSI-IM-ConfigId-v1250 OPTIONAL, csi-IM-ConfigToAddModListExt-r12 CSI-IM-ConfigExt-r12 OPTIONAL
                                                                                         -- Need ON
                                                                                        -- Need ON
}
CQI-ReportBoth-v1310 ::=
                                       SEOUENCE {
    OPTIONAL
                                                                                                 -- Need ON
}
CSI-IM-ConfigToAddModList-r11 ::=
                                           SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-Config-r11
CSI-IM-ConfigToAddModListExt-r13 ::=
                                          SEQUENCE (SIZE (1..maxCSI-IM-v1310)) OF CSI-IM-ConfigExt-r12
CSI-IM-ConfigToReleaseList-r11 ::=
                                          SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-ConfigId-r11
CSI-IM-ConfigToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-IM-v1310)) OF CSI-IM-ConfigId-
v_1310
CSI-ProcessToAddModList-r11 ::=
                                      SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-Process-r11
CSI-ProcessToReleaseList-r11 ::=
                                      SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-ProcessId-r11
CQI-ReportBothProc-r11 ::=
                                        SEQUENCE {
                                                                              OPTIONAL,
    ri-Ref-CSI-ProcessId-r11
                                            CSI-ProcessId-r11
                                                                                                 -- Need OR
                                                                                                 -- Need OR
    pmi-RI-Report-r11
                                            ENUMERATED {setup}
                                                                               OPTIONAL
CRI-ReportConfig-r13 ::=
                                        CHOICE {
    release
    setup
                                            SEQUENCE {
        cri-ConfigIndex-r13
                                                CRI-ConfigIndex-r13,
```

```
CRI-ConfigIndex-rl3 ::= INTEGER (0..1023)
-- ASN1STOP
```

CQI-ReportConfig field descriptions

altCQI-Table

Indicates the applicability of the alternative CQI table (i.e. Table 7.2.3-2 in TS 36.213 [23]) for both aperiodic and periodic CSI reporting for the concerned serving cell. Value *allSubframes* means the alternative CQI table applies to all the subframes and CSI processes, if configured, and value *csi-SubframeSet1* means the alternative CQI table applies to CSI subframe set1, and value *csi-SubframeSet2* means the alternative CQI table applies to CSI subframe set2. EUTRAN sets the value to *csi-SubframeSet1* or *csi-SubframeSet2* only if *transmissionMode* is set in range *tm1* to *tm9* and *csi-SubframePatternConfig-r10* is configured for the concerned serving cell and different CQI tables apply to the two CSI subframe sets; otherwise EUTRAN sets the value to *allSubframes*. If this field is not present, the UE shall use Table 7.2.3-1 in TS 36.213 [23] for all subframes and CSI processes, if configured.

aperiodicCSI-Trigger

Indicates for which serving cell(s) the aperiodic CSI report is triggered when one or more SCells are configured.
trigger1 corresponds to the CSI request field 10 or 0101, trigger2 corresponds to the CSI request field 11 or 011,
trigger3 corresponds to the CSI request field 100, see TS 36.213 [23, table 7.2.1-1A], and so on. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means no aperiodic CSI report is triggered) or value 1 (means the aperiodic CSI report is triggered). At most 5 bits can be set to value 1 in the bit string in aperiodicCSI-Trigger-v10 and in aperiodicCSI-Trigger-v1250 and at most 32 bits can be set to value 1 in the bit string in aperiodicCSI-Trigger-v1310.
E-UTRAN configures value 1 only for cells configured with transmissionMode set in range tm1 to tm9. One value applies for all serving cells configured with transmissionMode set in range tm1 to tm9 (the associated functionality is common i.e. not performed independently for each cell).

trigger01-IndicatorN, trigger10-IndicatorN, trigger11-IndicatorN

Indicates for which eMIMO-Type the aperiodic CSI report is triggered (the corresponding CSI process, CSI subframe set}-pair(s) and/or a serving cell) as applicable, See TS 36.213 [23, table 7.2.1-1D, 7.2.1-1E].

trigger001-IndicatorN.. trigger111-IndicatorN

Indicates for which eMIMO-Type the aperiodic CSI report is triggered (the corresponding CSI process, CSI subframe set}-pair(s) and/or a serving cell) as applicable, See TS 36.213 [23, table 7.2.1-1A, 7.2.1-1B, and 7.2.1-1C].

cgi-Mask

Limits CQI/PMI/PTI/RI reports to the on-duration period of the DRX cycle, see TS 36.321 [6]. One value applies for all CSI processes and all serving cells (the associated functionality is common i.e. not performed independently for each cell).

cqi-FormatIndicatorPeriodic

Parameter: *PUCCH CQI Feedback Type*, see TS 36.213 [23, table 7.2.2-1]. Depending on transmissionMode, reporting mode is implicitly given from the table.

cqi-pmi-ConfigIndex

Parameter: *CQI/PMI Periodicity and Offset Configuration Index I_{CQI/PMI}*, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. If subframe patterns for CSI (CQI/PMI/PTI/RI) reporting are configured (i.e. *csi-SubframePatternConfig* is configured), the parameter applies to the subframe pattern corresponding to *csi-MeasSubframeSet1* or corresponding to the CSI subframe set 1 indicated by *csi-MeasSubframeSets-r12*.

cgi-pmi-ConfigIndex2

Parameter: CQI/PMI Periodicity and Offset Configuration Index IcquipMI, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12.

cqi-PUCCH-ResourceIndex, cqi-PUCCH-ResourceIndexP1

Parameter $n_{\text{PUCCH}}^{(2,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 7.2]. E-UTRAN does not apply value 1185. One value applies for all CSI processes.

cgi-ReportAperiodic

E-UTRAN does not configure *CQI-ReportAperiodic* when transmission mode 10 is configured for all serving cells. E-UTRAN configures *cqi-ReportAperiodic-v1250* only if *cqi-ReportAperiodic-r10* and *csi-MeasSubframeSets-r12* are configured. E-UTRAN configures *cqi-ReportAperiodic-v1310* only if *cqi-ReportAperiodic-r10* is configured.

cqi-ReportModeAperiodic

Parameter: reporting mode. Value rm12 corresponds to Mode 1-2, rm20 corresponds to Mode 2-0, rm22 corresponds to Mode 2-2 etc. PUSCH reporting modes are described in TS 36.213 [23, 7.2.1]. The UE shall ignore *cqi-ReportModeAperiodic-r10* when transmission mode 10 is configured for the serving cell on this carrier frequency. The UE shall ignore *cqi-ReportModeAperiodic-r10* configured for the PCell/ PSCell when the transmission bandwidth of the PCell/PSCell in downlink is 6 resource blocks.

CQI-ReportPeriodicProcExt

A set of periodic CQI related parameters for which E-UTRAN may configure different values for each CSI process. For a serving frequency E-UTRAN configures one or more *CQI-ReportPeriodicProcExt* only when transmission mode 10 is configured for the serving cell on this carrier frequency.

cri-ConfigIndex

Parameter: *cri-ConfigIndex Icri*see TS 36.213 [23]. The parameter applies to the subframe pattern corresponding to *csi-MeasSubframeSet1*. EUTRAN configures the field if subframe patterns for CSI (CQI/PMI/PTI/RI/CRI) reporting are configured (i.e. *csi-SubframePatternConfig* is configured).

CQI-ReportConfig field descriptions

cri-ConfigIndex2

Parameter: *cri-ConfigIndex I_{CRI}*see TS 36.213 [23]. The parameter applies to the subframe pattern corresponding to *csi-MeasSubframeSets* or corresponding to the CSI subframe set 2 indicated by *csi-MeasSubframeSets*. E-UTRAN configures *cri-ConfigIndex2* only if *cri-ConfigIndex* is configured.

cri-ReportConfig

E-UTRAN configures the field only if the UE is configured with *eMIMO-Ty*pe set to "*beamformed*" and if multiple references to RS configuration using non-zero power transmission are configured (i.e. if *csi-RS-ConfigNZPIdListExt* is configured).

csi-ConfigIndex

E-UTRAN configures csi-ConfigIndex only for PCell and only if csi-SubframePatternConfig is configured. The UE shall release csi-ConfigIndex if csi-SubframePatternConfig is released.

csi-IM-ConfigToAddModList

For a serving frequency E-UTRAN configures one or more *CSI-IM-Config* only when transmission mode 10 is configured for the serving cell on this carrier frequency.

csi-MeasSubframeSets

Indicates the two CSI subframe sets. Value 0 means the subframe belongs to CSI subframe set 1 and value 1 means the subframe belongs to CSI subframe set 2. CSI subframe set 1 refers to $C_{CSI,0}$ in TS 36.213 [23, 7.2] and CSI subframe set 2 refers to $C_{CSI,1}$ in TS 36.213 [23, 7.2]. EUTRAN does not configure csi-cs

csi-MeasSubframeSet1, csi-MeasSubframeSet2

Indicates the CSI measurement subframe sets. csi-MeasSubframeSet1 refers to $C_{CSI,0}$ in TS 36.213 [23, 7.2] and csi-MeasSubframeSet2 refers to $C_{CSI,1}$ in TS 36.213 [23, 7.2]. E-UTRAN only configures the two CSI measurement subframe sets for the PCeII.

csi-ProcessToAddModList

For a serving frequency E-UTRAN configures one or more *CSI-Process* only when transmission mode 10 is configured for the serving cell on this carrier frequency.

csi-ReportMode

Parameter: PUCCH_format1-1_CSI_reporting_mode, see TS 36.213 [23, 7.2.2].

Κ

Parameter: K, see TS 36.213 [23, 7.2.2].

nomPDSCH-RS-EPRE-Offset

Parameter: Δ_{offset} see TS 36.213 [23, 7.2.3]. Actual value = field value * 2 [dB].

periodicityFactor, periodicityFactorWB

Parameter: H', see TS 36.213 [23, 7.2.2]. EUTRAN configures field periodicityFactorWB only when the UE is configured with eMIMO-Type set to nonPrecoded and with cqi-FormatIndicatorPeriodic set to widebandCQI.

pmi-RI-Report

See TS 36.213 [23, 7.2]. The presence of this field means PMI/RI reporting is configured; otherwise the PMI/RI reporting is not configured. EUTRAN configures this field only when *transmissionMode* is set to *tm8*, *tm9* or *tm10*. The UE shall ignore *pmi-RI-Report-r9*/ *pmi-RI-Report-r10* when transmission mode 10 is configured for the serving cell on this carrier frequency.

ri-ConfigIndex

Parameter: *RI Config Index I_{RI}*, see TS 36.213 [23, 7.2.2-1B]. If subframe patterns for CSI (CQI/PMI/PTI/RI/CRI) reporting are configured (i.e. *csi-SubframePatternConfig* is configured), the parameter applies to the subframe pattern corresponding to *csi-MeasSubframeSet1*.

ri-ConfigIndex2

Parameter: *RI Config Index I_{RI}*, see TS 36.213 [23, 7.2.2-1B]. The parameter applies to the subframe pattern corresponding to *csi-MeasSubframeSet2* or corresponding to the CSI subframe set 2 indicated by *csi-MeasSubframeSets-r12*. E-UTRAN configures *ri-ConfigIndex2* only if *ri-ConfigIndex* is configured.

ri-Ref-CSI-ProcessId

CSI process whose RI value the UE inherits when reporting RI, in the same subframe, for CSI reporting. E-UTRAN ensures that the CSI process that inherits the RI value is configured in accordance with the conditions specified in TS 36.213 [23, 7.2.1, 7.2.2].

simultaneousAckNackAndCQI

Parameter: Simultaneous-AN-and-CQI, see TS 36.213 [23, 10.1]. TRUE indicates that simultaneous transmission of ACK/NACK and CQI is allowed. One value applies for all CSI processes. For SCells except for the PSCell and PUCCH SCell this field is not applicable and the UE shall ignore the value.

simultaneousAckNackAndCQI-Format3

Indicates that the UE shall perform simultaneous transmission of HARQ A/N and periodic CQI report multiplexing on PUCCH format 3, see TS 36.213 [23, 7.2, 10.1.1]. E-UTRAN configures this information only when *pucch-Format* is set to *format3*. One value applies for all CSI processes. For SCells except for the PSCell and PUCCH SCell this field is not applicable and the UE shall ignore the value.

simultaneousAckNackAndCQI-Format4-Format5

Indicates that the UE shall perform simultaneous transmission of HARQ A/N and periodic CSI report multiplexing on PUCCH format 4 and format 5, see TS 36.213 [23, 10.1.1]. E-UTRAN configures this information only when *pucch-Format* is set to *format4* or *format5*. One value applies for all CSI processes. For SCells except for the PSCell and PUCCH SCell this field is not applicable and the UE shall ignore the value.

CQI-ReportConfig field descriptions

trigger01

Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 01, for a CSI request applicable for the serving cell on the same frequency as the CSI process, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-1E].

trigger10, trigger11

Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 10 or 11, see TS 36.213 [23, table 7.2.1-1B]. EUTRAN configures at most 5 CSI processes, across all serving frequencies within each CG, to be triggered by a CSI request field set to value 10. The same restriction applies for value 11. In case E-UTRAN simultaneously triggers CSI requests for more than 5 CSI processes some limitations apply, see TS 36.213 [23].

trigger001

Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 001, for a CSI request applicable for the serving cell on the same frequency as the CSI process, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-E].

trigger010, trigger011, trigger100, trigger101, Trigger110, Trigger111

Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 010, 011, 100, 101, 110 or 111, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-1E].

trigger-SubframeSetIndicator

For a serving cell configured with *csi-MeasSubframeSets-r12*, indicates for which CSI subframe set the aperiodic CSI report is triggered for the serving cell if the aperiodic CSI is triggered by the CSI request field 01 or 001, see TS 36.213 [23, table 7.2.1-1C or table 7.2.1.-1E]. Value s1 corresponds to CSI subframe set 1 and value s2 corresponds to CSI subframe set 2.

trigger1-SubframeSetIndicator

If signalled in the *aperiodicCSI-Trigger-v1250*, indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 10, see TS 36.213 [23, table 7.2.1-1C] or by the CSI request field 010, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with *ServCellIndex*=0 and bit 1 in the bit string corresponds to the cell with *ServCellIndex*=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).

trigger2-SubframeSetIndicator

If signalled in the *aperiodicCSI-Trigger-v1250*, indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 11, see TS 36.213 [23, table 7.2.1-1C] or by the CSI request field 011, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with *ServCellIndex*=0 and bit 1 in the bit string corresponds to the cell with *ServCellIndex*=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).

trigger3-SubframeSetIndicator

Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field100, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).

trigger4-SubframeSetIndicator

Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 101, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).

trigger5-SubframeSetIndicator

Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 110, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).

trigger6-SubframeSetIndicator

Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 111, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex = 1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).

Conditional presence	Explanation
cqi-Setup	This field is not present for an Scell except for the PSCell, while it is conditionally present for the PCell and the PSCell according to the following. The field is optional present, need OR, if the <i>cqi-ReportPeriodic</i> in the <i>cqi-ReportConfig</i> is set to <i>setup</i> . If the field <i>cqi-ReportPeriodic</i> is present and set to <i>release</i> , the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.
PMIRI	The field is optional present, need OR, if <i>cqi-ReportPeriodic</i> is included and set to <i>setup</i> , or <i>cqi-ReportModeAperiodic</i> is included. If the field <i>cqi-ReportPeriodic</i> is present and set to <i>release</i> and <i>cqi-ReportModeAperiodic</i> is absent, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.
PMIRIPCell	The field is optional present, need OR, if cqi-ReportPeriodic is included in the CQI-ReportConfig-r10 and set to setup, or cqi-ReportAperiodic is included in the CQI-ReportConfig-r10 and set to setup. If the field cqi-ReportPeriodic is present in the CQI-ReportConfig-r10 and set to release and cqi-ReportAperiodic is included in the CQI-ReportConfig-r10 and set to release, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.
PMIRISCell	The field is optional present, need OR, if cqi-ReportPeriodicSCell is included and set to setup, or cqi-ReportModeAperiodic-r10 is included in the CQI-ReportConfigSCell. If the field cqi-ReportPeriodicSCell is present and set to release and cqi-ReportModeAperiodic-r10 is absent in the CQI-ReportConfigSCell, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.

CQI-ReportPeriodicProcExtId

The IE *CQI-ReportPeriodicProcExtId* is used to identify a periodic CQI reporting configuration that E-UTRAN may configure in addition to the configuration specified by the IE *CQI-ReportPeriodic-r10*. These additional configurations are specified by the IE *CQI-ReportPeriodicProcExt-r11*. The identity is unique within the scope of a carrier frequency.

CQI-ReportPeriodicProcExtId information elements

```
-- ASN1START

CQI-ReportPeriodicProcExtId-r11 ::= INTEGER (1..maxCQI-ProcExt-r11)

-- ASN1STOP
```

CrossCarrierSchedulingConfig

The IE *CrossCarrierSchedulingConfig* is used to specify the configuration when the cross carrier scheduling is used in a cell.

CrossCarrierSchedulingConfig information elements

```
-- ASN1START
CrossCarrierSchedulingConfig-r10 ::=
                                         SEQUENCE {
   schedulingCellInfo-r10
                                      CHOICE {
       own-r10
                                         SEQUENCE {
                                                                    -- No cross carrier
scheduling
           cif-Presence-r10
                                                 BOOLEAN
       other-r10
                                             SEQUENCE {
                                                                        -- Cross carrier
scheduling
           schedulingCellId-r10
                                              ServCellIndex-r10,
           pdsch-Start-r10
                                              INTEGER (1..4)
   }
                                   SEQUE
CHOICE {
                                         SEQUENCE {
CrossCarrierSchedulingConfig-r13 ::=
   schedulingCellInfo-r13
       own-r13
                                         SEQUENCE {
                                                                     -- No cross carrier
scheduling
           cif-Presence-r13
                                                 BOOLEAN
                                          SEQUENCE {
                                                                     -- Cross carrier scheduling
       other-r13
           schedulingCellId-r13
                                              ServCellIndex-r13,
           pdsch-Start-r13
                                              INTEGER (1..4),
```

CrossCarrierSchedulingConfig field descriptions

cif-Presence

The field is used to indicate whether carrier indicator field is present (value TRUE) or not (value FALSE) in PDCCH/EPDCCH DCI formats, see TS 36.212 [22, 5.3.3.1].

cif-InSchedulingCell

The field indicates the CIF value used in the scheduling cell to indicate this cell, see TS 36.212 [22, 5.3.3.1]. In case of carrier indicator field is present, the CIF value is 0.

pdsch-Start

The starting OFDM symbol of PDSCH for the concerned SCell, see TS 36.213 [23. 7.1.6.4]. Values 1, 2, 3 are applicable when *dl-Bandwidth* for the concerned SCell is greater than 10 resource blocks, values 2, 3, 4 are applicable when *dl-Bandwidth* for the concerned SCell is less than or equal to 10 resource blocks, see TS 36.211 [21, Table 6,7-1].

schedulingCellId

Indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. In case the UE is configured with crossCarrierSchedulingConfigLAA-UL, schedulingConfigLAA-UL indicated in crossCarrierSchedulingConfigLAA-UL only indicates which cell signals the uplink grants.

CSI-IM-Config

The IE *CSI-IM-Config* is the CSI Interference Measurement (IM) configuration that E-UTRAN may configure on a serving frequency, see TS 36.213 [23, 7.2.6].

CSI-IM-Config information elements

```
-- ASN1START
CSI-IM-Config-r11 ::=
                                 SEQUENCE {
    csi-IM-ConfigId-r11 CSI-IM-ConfigId-r11, resourceConfig-r11 INTEGER (0..31), subframeConfig-r11 INTEGER (0..154),
         interferenceMeasRestriction-r13
                                                BOOLEAN
                                                                  OPTIONAL
                                                                                 -- Need ON
    11
}
CSI-IM-ConfigExt-r12 ::= SEQUENCE {
    csi-IM-ConfigId-v1250 CSI-IM-
                                          CSI-IM-ConfigId-v1250,
    resourceConfig-r12
subframeConfig-r12
                                     INTEGER (0..31),
                                    INTEGER (0..154),
       interferenceMeasRestriction-r13 BOOLEAN
                                                                       OPTIONAL,
                                                                                      -- Need ON
         csi-IM-ConfigId-v1310
                                     CSI-IM-ConfigId-v1310 OPTIONAL
                                                                                      -- Need ON
    11
-- ASN1STOP
```

CSI-IM-Config field descriptions

resourceConfig

Parameter: CSI reference signal configuration, see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2] for 4 REs.

subframeConfig

Parameter: $I_{\mathrm{CSI-RS}}$, see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.3-1].

– CSI-IM-Configld

The IE *CSI-IM-ConfigId* is used to identify a CSI-IM configuration that is configured by the IE *CSI-IM-Config*. The identity is unique within the scope of a carrier frequency.

CSI-IM-ConfigId information elements

```
-- ASN1START

CSI-IM-ConfigId-rl1 ::= INTEGER (1..maxCSI-IM-rl1)
CSI-IM-ConfigId-rl2 ::= INTEGER (1..maxCSI-IM-rl2)
CSI-IM-ConfigId-vl250 ::= INTEGER (maxCSI-IM-rl2)
CSI-IM-ConfigId-vl310 ::= INTEGER (minCSI-IM-rl3)..maxCSI-IM-rl3)
CSI-IM-ConfigId-rl3 ::= INTEGER (1..maxCSI-IM-rl3)
-- ASN1STOP
```

– CSI-Process

The IE CSI-Process is the CSI process configuration that E-UTRAN may configure on a serving frequency.

CSI-Process information elements

```
-- ASN1START
CSI-Process-r11 ::=
                       SEQUENCE {
    csi-ProcessId-r11 CSI-ProcessId-r11, csi-RS-ConfigNZPId-r11 CSI-RS-ConfigNZPId
                                 CSI-RS-ConfigNZPId-r11,
    csi-IM-ConfigId-r11 CSI-IM-ConfigId-r11,
p-C-AndCBSRList-r11 P-C-AndCBSR-Pair-r13a,
cqi-ReportBothProc-r11 CQI-ReportBothProc-r11
                                                                                              -- Need OR
                                                                            OPTIONAL,
    cqi-ReportPeriodicProcId-rll INTEGER (0..maxCQI-ProcExt-rll)
                                                                            OPTIONAL,
                                                                                              -- Need OR
    cqi-ReportAperiodicProc-rll CQI-ReportAperiodicProc-rll
                                                                            OPTIONAL,
    [[ alternativeCodebookEnabledFor4TXProc-r12 ENUMERATED {true} OPTIONAL,
                                                                                          -- Need ON
        csi-IM-ConfigIdList-r12 CHOICE {
            release
            setup
                                          SEQUENCE (SIZE (1..2)) OF CSI-IM-ConfigId-r12
                                                                                         -- Need ON
                                                                             OPTIONAL,
                                          CHOICE {
        cqi-ReportAperiodicProc2-r12
                                           NULL,
                                          CQI-ReportAperiodicProc-r11
            setup
                                                                             OPTIONAL
                                                                                          -- Need ON
    ]],
       cqi-ReportAperiodicProc-v1310
                                          CHOICE {
                                               NULL,
            setup
                                               COI-ReportAperiodicProc-v1310
                                                                             OPTIONAL.
                                                                                              -- Need ON
        cqi-ReportAperiodicProc2-v1310 CHOICE {
            release
            setup
                                               CQI-ReportAperiodicProc-v1310
                                                                            OPTIONAL,
                                                                                              -- Need ON
                                          CSI-RS-ConfigEMIMO-r13
        eMIMO-Type-r13
                                                                            OPTIONAL
                                                                                              -- Need ON
                                          CSI-RS-ConfigEMIMO-v1430
    [[ eMIMO-Type-v1430
                                                                           OPTIONAL,
                                                                                              -- Need ON
        eMIMO-Hybrid-r14
                                          CSI-RS-ConfigEMIMO-Hybrid-r14
                                                                              OPTIONAL,
                                                                                              -- Need ON
                                                                                              -- Need ON
        advancedCodebookEnabled-r14
                                          BOOLEAN
                                                                             OPTIONAL
    ]]
-- ASN1STOP
```

CSI-Process field descriptions

advancedCodebookEnabled

Value TRUE indicates that the UE should use the advanced code book defined in TS 36.213 [23]. EUTRAN does not configure the field when the UE is configured with *eMIMO-Type* is set to *beamformed*, when the UE is configured with *eMIMO-Hybrid* or when the UE is configured with *semiOpenLoop*.

alternativeCodebookEnabledFor4TXProc

Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting for a CSI process. EUTRAN may configure the field only if the number of CSI-RS ports for non-zero power transmission CSI-RS configuration is 4.

cgi-ReportAperiodicProc

If csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1. If csi-MeasSubframeSet1-r10 or csi-MeasSubframeSet2-r10 are configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1 or CSI subframe set 2. Otherwise, cqi-ReportAperiodicProc applies for all subframes. E-UTRAN configures cqi-ReportAperiodicProc-v1310 only if cqi-ReportAperiodicProc-r11 is configured

cgi-ReportAperiodicProc2

cqi-ReportAperiodicProc2 is configured only if csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process. cqi-ReportAperiodicProc2 is for CSI subframe set 2. E-UTRAN shall set cqi-ReportModeAperiodic-r11 in cqi-ReportAperiodicProc2 the same as in cqi-ReportAperiodicProc. E-UTRAN configures cqi-ReportAperiodicProc2-v1310 only if cqi-ReportAperiodicProc2-r12 is configured.

cgi-ReportBothProc

Includes CQI configuration parameters applicable for both aperiodic and periodic CSI reporting, for which CSI process specific values may be configured. E-UTRAN configures the field if and only if *cqi-ReportPeriodicProcId* is included and/ or if *cqi-ReportAperiodicProc* is included.

cgi-ReportPeriodicProcId

Refers to a periodic CQI reporting configuration that is configured for the same frequency as the CSI process. Value 0 refers to the set of parameters defined by the REL-10 CQI reporting configuration fields, while the other values refer to the additional configurations E-UTRAN assigns by *CQI-ReportPeriodicProcExt-r11* (and as covered by *CQI-ReportPeriodicProcExtId*).

csi-IM-Configld

Refers to a CSI-IM configuration that is configured for the same frequency as the CSI process.

csi-IM-ConfigIdList

Refers to one or two CSI-IM configurations that are configured for the same frequency as the CSI process. *csi-IM-ConfigIdList* can include 2 entries only if *csi-MeasSubframeSets-r12* is configured for the same frequency as the CSI process. UE shall ignore *csi-IM-ConfigId-r11* if *csi-IM-ConfigIdList-r12* is configured.

csi-RS-ConfigNZPId

Refers to a CSI RS configuration using non-zero power transmission that is configured for the same frequency as the CSI process.

eMIMO-Type

Parameter: eMIMO-Type, see TS 36.213 [23], TS 36.211 [21]. If eMIMO-Type is set to nonPrecoded, the codebooks used for deriving CSI feedback are in TS 36.213 [23, Table 7.2.4-10 to Table 7.2.4-17]. Choice values nonPrecoded and beamformed correspond to 'CLASS A' and 'CLASS B' respectively, see TS 36.212 [22] and TS 36.213 [23].

p-C-AndCBSRList

The UE shall ignore *p-C-AndCBSRList-r11* if configured with *eMIMO-Type* unless it is set to *beamformed*, *alternativeCodebookEnabledBeamformed* is set to *FALSE* and *csi-RS-ConfigNZPIdListExt* is not configured,

CSI-ProcessId

The IE *CSI-ProcessId* is used to identify a CSI process that is configured by the IE *CSI-Process*. The identity is unique within the scope of a carrier frequency.

CSI-ProcessId information elements

```
-- ASN1START

CSI-ProcessId-r11 ::= INTEGER (1..maxCSI-Proc-r11)

-- ASN1STOP
```

– CSI-RS-Config

The IE CSI-RS-Config is used to specify the CSI (Channel-State Information) reference signal configuration.

CSI-RS-Config information elements

```
-- ASN1START
CSI-RS-Config-r10 ::= SEQUENCE {
                         CHOICE {
   csi-RS-r10
                             NULL,
       release
                                  SEQUENCE {
           antennaPortsCount-r10 ENUMERATED {an1, an2, an4, an8}, resourceConfig-r10 INTEGER (0..31), subframeConfig-r10 INTEGER (0..154), p-C-r10 INTEGER (-8..15)
                                                                 OPTIONAL,
                                                                                    -- Need ON
    zeroTxPowerCSI-RS-r10 ZeroTxPowerCSI-RS-Conf-r12
                                                                 OPTIONAL
                                                                                    -- Need ON
}
-- Need ON
                        r12 CHOICE {
NULL,
       release
                                      SEQUENCE {
       setup
           zeroTxPowerCSI-RS-List-r12 SEQUENCE (SIZE (1..maxDS-ZTP-CSI-RS-r12)) OF
ZeroTxPowerCSI-RS-r12
      }
                                                                 OPTIONAL
                                                                                        -- Need
ON
CSI-RS-Config-v1310 ::= SEQUENCE {
eMIMO-Type-r13 CSI-RS
                            CSI-RS-ConfigEMIMO-r13 OPTIONAL -- Need ON
-- Need ON
                                                                                 -- Need ON
    advancedCodebookEnabled-r14 BOOLEAN
                                                                                 -- Need ON
                                                                     OPTIONAL
}
ZeroTxPowerCSI-RS-Conf-r12 ::= CHOICE {
      release
                                      NULL,
       setup
                                       ZeroTxPowerCSI-RS-r12
}
ZeroTxPowerCSI-RS-r12 ::= SEQUENCE {
   zeroTxPowerCs1-xs-r12 ::= SEQUENCE {
zeroTxPowerResourceConfigList-r12 BIT STRING (SIZE (16)),
zeroTxPowerSubframeConfig-r12 INTEGER (0..154)
-- ASN1STOP
```

CSI-RS-Config field descriptions

ace-For4Tx-PerResourceConfigList

The field indicates the *alternativeCodeBookEnabledFor4TX-r12* per CSI-RS resource. E-UTRAN configures the field only if *csi-RS-ConfigNZPIdListExt* is configured.

antennaPortsCount

Parameter represents the number of antenna ports used for transmission of CSI reference signals where value an1 corresponds to 1 antenna port, an2 to 2 antenna ports and so on, see TS 36.211 [21, 6.10.5].

ds-ZeroTxPowerCSI-RS

Parameter for additional zeroTxPowerCSI-RS for a serving cell, concerning the CSI-RS included in discovery signals.

p-C

Parameter: P_c , see TS 36.213 [23, 7.2.5]. The UE shall ignore p-C-r10 if configured with eMIMO-Type unless it is set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.

resourceConfig

Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].

subframeConfig

Parameter: $I_{\mathrm{CSI-RS}}$, see TS 36.211 [21, table 6.10.5.3-1].

zeroTxPowerCSI-RS2

Parameter for additional *zeroTxPowerCSI-RS* for a serving cell. E-UTRAN configures the field only if *csi-MeasSubframeSets-r12* and *TM 1 – 9* are configured for the serving cell.

zeroTxPowerResourceConfigList

Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].

zeroTxPowerSubframeConfig

Parameter: $I_{\text{CSI-RS}}$, see TS 36.211 [21, table 6.10.5.3-1].

- CSI-RS-ConfigEMIMO

The IE CSI-RS-ConfigEMIMO is used to specify the CSI (Channel-State Information) reference signal configuration for EBF/ FD-MIMO.

CSI-RS-ConfigEMIMO information elements

```
-- ASN1START
CSI-RS-ConfigEMIMO-r13 ::= CHOICE {
                             NULL,
   release
                                CHOICE {
    setup
        nonPrecoded-r13
                                     CSI-RS-ConfigNonPrecoded-r13,
        beamformed-r13
                                     CSI-RS-ConfigBeamformed-r13
}
                                 CHOICE {
CSI-RS-ConfigEMIMO-v1430 ::=
   release
                                 CHOICE {
        nonPrecoded-v1430
                                          CSI-RS-ConfigNonPrecoded-v1430,
        beamformed-v1430
                                          CSI-RS-ConfigBeamformed-v1430
}
CSI-RS-ConfigEMIMO2-r14 ::= CHOICE {
    release
    setup
                                 CSI-RS-ConfigBeamformed-r14
}
CSI-RS-ConfigEMIMO-Hybrid-r14 ::= CHOICE {
   release
                                 NULL.
                                 SEQUENCE {
    setup
                                              INTEGER (0..1023)
                                                                                OPTIONAL,
        periodicityOffsetIndex-r14
                                                                                            -- Need OR
                                       INTEGER (U..1023)
CSI-RS-ConfigEMIMO2-r14 OPTIONAL -- Need ON
        eMIMO-Type2-r14
}
                                         SEQUENCE {
CSI-RS-ConfigNonPrecoded-r13 ::=
                                          P-C-AndCBSR-Pair-r13
   p-C-AndCBSRList-r13
                                                                                OPTIONAL,
                                                                                             -- Need OR
    codebookConfigN1-r13
                                              ENUMERATED {n1, n2, n3, n4, n8},
                                             ENUMERATED {n1, n2, n3, n4, n8},
    codebookConfigN2-r13
    codebookOverSamplingRateConfig-O1-r13 ENUMERATED {n4, n8} codebookOverSamplingRateConfig-O2-r13 ENUMERATED {n4, n8}
                                                                                OPTIONAL,
                                                                                            -- Need OR
                                                                                OPTIONAL,
                                                                                            -- Need OR
```

```
codebookConfig-r13
                                          INTEGER (1..4),
                                           SEQUENCE (SIZE (1..2)) OF CSI-IM-ConfigId-r13
    csi-IM-ConfigIdList-r13
   OPTIONAL, -- Need OR
   csi-RS-ConfigNZP-EMIMO-r13
                                           CSI-RS-ConfigNZP-EMIMO-r13
                                                                         OPTIONAL -- Need ON
}
CSI-RS-ConfigNonPrecoded-v1430::= SEQUENCE {
    csi-RS-ConfigNZP-EMIMO-v1430 CSI-RS
                                          CSI-RS-ConfigNZP-EMIMO-v1430 OPTIONAL,
                                                                                      -- Need ON
    codebookConfigN1-v1430
                                           ENUMERATED {n5, n6, n7, n10, n12, n14, n16},
    codebookConfigN2-r1430
                                           ENUMERATED {n5, n6, n7 },
   nzp-ResourceConfigTM9-Original-v1430 CSI-RS-Config-NZP-v1430
   CSi-RS-ConfigNZPIdListExt-r13 SEQUENCE
OPTIONAL
CSI-RS-ConfigBeamformed-r13 ::=
                                           SEQUENCE (SIZE (1..7)) OF CSI-RS-ConfigNZPId-r13
   OPTIONAL, -- Need OR
    csi-IM-ConfigIdList-r13
                                           SEQUENCE (SIZE (1..8)) OF CSI-IM-ConfigId-r13
    OPTIONAL, -- Need OR
    p-C-AndCBSR-PerResourceConfigList-r13 SEQUENCE (SIZE (1..8)) OF P-C-AndCBSR-Pair-r13
    OPTIONAL,
              -- Need OR
    ace-For4Tx-PerResourceConfigList-r13
                                           SEQUENCE (SIZE (1..7)) OF BOOLEAN OPTIONAL, -- Need
OR
                                               ENUMERATED {true}
    alternativeCodebookEnabledBeamformed-r13
                                                                  OPTIONAL,
                                                                               -- Need OR
    channelMeasRestriction-r13
                                           ENUMERATED {on}
                                                                   OPTIONAL
                                                                               -- Need OR
}
CSI-RS-ConfigBeamformed-r14 ::= SEQUENCE csi-RS-ConfigNZPIdListExt-r14 SEQUE
                                           SEQUENCE (SIZE (1..7)) OF CSI-RS-ConfigNZPId-r13
   OPTIONAL, -- Need OR
    csi-IM-ConfigIdList-r14
                                           SEQUENCE (SIZE (1..8)) OF CSI-IM-ConfigId-r13
    OPTIONAL, -- Need OR
    p-C-AndCBSR-PerResourceConfigList-r14 SEQUENCE (SIZE (1..8)) OF P-C-AndCBSR-Pair-r13
    OPTIONAL, -- Need OR
    ace-For4Tx-PerResourceConfigList-r14
                                          SEQUENCE (SIZE (1..7)) OF BOOLEAN OPTIONAL, -- Need
OR
                                               ENUMERATED {true} OPTIONAL,
MERATED {on} OPTIONAL,
    alternativeCodebookEnabledBeamformed-r14
                               ENUMERATED {on}
                                                                             -- Need OR
    channelMeasRestriction-r14
    csi-RS-ConfigNZP-ApList-r14
                                           SEQUENCE (SIZE (1..8)) OF CSI-RS-ConfigNZP-r11
                                                                          OPTIONAL, -- Need OR
    nzp-ResourceConfigOriginal-v1430 CSI-RS-Config-NZP-v1430 OPTIONAL, -- Need OR
    csi-RS-NZP-Activation-r14
                                           CSI-RS-ConfigNZP-Activation-r14 OPTIONAL
OR
}
CSI-RS-ConfigBeamformed-v1430::=
                                      SEQUENCE {
   csi-RS-ConfigNZP-ApList-r14
                                         SEQUENCE (SIZE (1..8)) OF CSI-RS-ConfigNZP-r11
                                                                          OPTIONAL, -- Need OR
                                                                OPTIONAL,
    nzp-ResourceConfigOriginal-v1430 CSI-RS-Config-NZP-v1430
                                                                              -- Need OR
    csi-RS-NZP-Activation-r14
                                           CSI-RS-ConfigNZP-Activation-r14 OPTIONAL
                                                                                           -- Need
OR
}
CSI-RS-Config-NZP-v1430::=
                              SEQUENCE {
    transmissionComb-r14
                                           NZP-TransmissionComb-r14 OPTIONAL,
                                                                                   -- Need OR
                                           NZP-FrequencyDensity-r14 OPTIONAL
                                                                                   -- Need OR
    frequencyDensity-r14
}
CSI-RS-ConfigNZP-Activation-r14::=
                                     SEQUENCE {
                                           ENUMERATED {semiPersistent, aperiodic},
    csi-RS-NZP-mode-r14
    activatedResources-r14
                                           INTEGER (0..4)
-- ASN1STOP
```

CSI-RS-ConfigEMIMO field descriptions

activatedResources

The number of activated CSI-RS resources, which concerns a subset of the aperiodic CSI-RS resources (for both semi-persistent and aperiodic mode). E-UTRAN configures at most the minimum between *nMaxResource* as configured by *MIMO-UE-ParametersPerTM-r1430* and the number of resources as configured by *csi-RS-ConfigNZP-ApList-r14*.

alternativeCodebookEnabledBeamformed

The field indicates whether code book in TS 36.213 [23, Table 7.2.4-18 to Table 7.2.4-20] is being used for deriving CSI feedback and reporting for a CSI process. E-UTRAN configures the field only for a process referring to a single RS configuration using non-zero power transmission (i.e a process for which *csi-RS-ConfigNZPIdListExt* is not configured). Field *alternativeCodebookEnabledBeamformed* corresponds to parameter alternativeCodebookEnabledCLASSB_K1 in TS 36.212 [22] and TS 36.213 [23].

codebookConfig

Indicates a sub-set of the codebook entry, see TS 36.213 [23].

codebookConfigNx

Indicates the number of antenna ports per polarization in dimension x as used for transmission of CSI reference signals. Value n1 corresponds to 1, value n2 corresponds to 2 and so on, see TS 36.213 [23]. E-UTRAN configures the field in accordance with the restrictions as specified in TS 36.213 [23]

codebookOverSamplingRateConfig-Ox

Indicates the spatial over-sampling rate in dimension x as used for transmission of CSI reference signals. Value n4 corresponds to 4 and value n8 corresponds to 8, see TS 36.213 [23].

csi-IM-Configld(List)

E-UTRAN configures the field *csi-IM-ConfigIdList* only if the IE is included in CSI-Process is configured (i.e. when TM10 is configured for the serving cell).

csi-RS-ConfigNZPIdListExt (in CSI-RS-ConfigBeamformed)

Indicates the NZP configuration(s)in addition to the original NZP configuration, as defined by *csi-RS-Config-r10* (TM9) or *csi-RS-ConfigNZPId-r11* (TM10). I.e. extends the size of the NZP configuration list (originally a single entry i.e. list of size 1) using the general principles specified in 5.1.2.

CSI-RS-ConfigBeamformed

If csi-RS-ConfigNZPIdListExt-r13 is configured, E-UTRAN configures the same total number of entries for NZP, csi-IM-ConfigIdList-r13 and p-C-AndCBSR-PerResourceConfigList-r13.

csi-RS-ConfigNZP-EMIMO

The field is used to configure NZP configurations additional to the one defined by the original NZP configuration as included in *CSI-RS-Config/ CSI-Process* when using 12 and 16 ports CSI-RS.

csi-RS-ConfigNZP-ApList

The field is used to configure NZP configurations for aperiodic or semi-persistent CSI RS reporting for which MAC controls activation. EUTRAN configures this field only when the UE is configured to use 2, 4 or and 8 ports CSI-RS, in which case EUTRAN configures the number of entries to be the same as the number of NZP resource configurations. For all these entries the UE shall ignore field *subframeConfig.* EUTRAN always configures this field together with *csi-RS-NZP-Activation*. Furthermore, for a given process, E-UTRAN does not simultaneously configure the periodic NZP configuration(s) and NZP CSI RS configurations for aperiodic or semi-persistent reporting.

p-C-AndCBSR-PerResourceConfigList

E-UTRAN does not configure the field *p-C-AndCBSR-PerResourceConfigList* if the UE is configured with *eMIMO-Type* set to *beamformed*, *alternativeCodebookEnabledBeamformed* is set to *FALSE* and *csi-RS-ConfigNZPIdListExt* is not configured.

periodicityOffsetIndex

This parameter is associated with the first EMIMO configuration of the hybrid eMIMO configuration.

CSI-RS-ConfigNZP

The IE *CSI-RS-ConfigNZP* is the CSI-RS resource configuration using non-zero power transmission that E-UTRAN may configure on a serving frequency.

CSI-RS-ConfigNZP information elements

```
-- ASN1START

CSI-RS-ConfigNZP-rll ::= SEQUENCE {
    csi-RS-ConfigNZPId-rll CSI-RS-ConfigNZPId-rll,
    antennaPortsCount-rll ENUMERATED {an1, an2, an4, an8},
    resourceConfig-rll INTEGER (0..31),
    subframeConfig-rll INTEGER (0..154),
    scramblingIdentity-rll INTEGER (0..503),
    qcl-CRS-Info-rll SEQUENCE {
        qcl-ScramblingIdentity-rll CT-SCOUNT-rll ENUMERATED {n1, n2, n4, spare1},
        mbsfn-SubframeConfigList-rll CHOICE {
```

```
release
                                NULL,
                                             SEQUENCE {
                setup
                    subframeConfigList
                                                 MBSFN-SubframeConfigList
                                                                           OPTIONAL
                                                                                        -- Need ON
                                                                           OPTIONAL,
                                                                                        -- Need OR
    ...,
[[ csi-RS-ConfigNZPId-v1310
                                       CSI-RS-ConfigNZPId-v1310
                                                                          OPTIONAL
                                                                                        -- Need ON
    ]],
    [[ transmissionComb-r14
                                         NZP-TransmissionComb-r14
                                                                           OPTIONAL,
                                                                                        -- Need OR
        transmissionComb-r14 NZP-TransmissionComb-r14 frequencyDensity-r14 NZP-FrequencyDensity-r14
                                                                                        -- Need OR
                                                                          OPTIONAL
    ]],
    [[ mbsfn-SubframeConfigList-v1430 CHOICE {
                release
                                             SEQUENCE {
                    subframeConfigList-v1430 MBSFN-SubframeConfigList-v1430
                                                                           OPTIONAL
                                                                                       -- Need OP
    ]]
}
CSI-RS-ConfigNZP-EMIMO-r13 ::= CHOICE {
                                 NULL,
                                SEQUENCE {
        nzp-resourceConfigList-r13 SEQUENCE (SIZE (1..2)) OF NZP-ResourceConfig-r13,
                                         ENUMERATED {cdm2, cdm4} OPTIONAL -- Need OR
        cdmType-r13
}
CSI-RS-ConfigNZP-EMIMO-v1430 ::=
                                    SEQUENCE {
    -- All extensions are for Non-Precoded so could be grouped by setup/ release choice
    nzp-resourceConfigListExt-r14 SEQUENCE (SIZE (0..4)) OF NZP-ResourceConfig-r13,
    cdmType-v1430
                                    ENUMERATED {cdm8 }
                                                             OPTIONAL -- Need OR
}
NZP-ResourceConfig-r13 ::= SEQUENCE {
   resourceConfig-r13
                             ResourceConfig-r13,
    [[ transmissionComb-r14 NZP-TransmissionComb-r14 OPTIONAL, -- Need OR frequencyDensity-r14 NZP-FrequencyDensity-r14 OPTIONAL -- Need OR
}
ResourceConfig-r13 ::=
                                    INTEGER (0..31)
NZP-TransmissionComb-r14 ::= INTEGER (0..2) NZP-FrequencyDensity-r14 ::= ENUMERATED \{d1, d2, d3\}
-- ASN1STOP
```

CSI-RS-ConfigNZP field descriptions

antennaPortsCount

Parameter represents the number of antenna ports used for transmission of CSI reference signals where an corresponds to 1, an 2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.5].

cdmType

Parameter: CDMType, see TS 36.211 [21, 6.10.5.2].

frequencyDensity

Indicates the frequency-domain density reduction. E-UTRAN configures the values in accordance with the restrictions specified in TS 36.213 [23].

mbsfn-SubframeConfigList

Indicates the MBSFN configuration for the CSI-RS resources. If qcl-CRS-Info-r11 is absent, the field is released.

nzp-resourceConfigList

Indicate a list of non-zero power transmission CSI-RS resources using parameter resourceConfig.

qcl-CRS-Info

Indicates CRS antenna ports that is quasi co-located with the CSI-RS antenna ports, see TS 36.213 [23, 7.2.5]. EUTRAN configures this field if and only if the UE is configured with *qcl-Operation* set to *typeB*.

resourceConfig

Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].

subframeConfig

Parameter: $I_{\rm CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].

scramblingIdentity

Parameter: Pseudo-random sequence generator parameter, $n_{\rm ID}$, see TS 36.213 [23, 7.2.5].

transmissionComb

Indicates the transmission combining offset. E-UTRAN configures the values in accordance with the restrictions specified in TS 36.213 [23].

– CSI-RS-ConfigNZPId

The IE *CSI-RS-ConfigNZPId* is used to identify a CSI-RS resource configuration using non-zero transmission power, as configured by the IE *CSI-RS-ConfigNZP*. The identity is unique within the scope of a carrier frequency.

CSI-RS-ConfigNZPId information elements

```
-- ASN1START

CSI-RS-ConfigNZPId-r11 ::= INTEGER (1..maxCSI-RS-NZP-r11)
CSI-RS-ConfigNZPId-v1310 ::= INTEGER (minCSI-RS-NZP-r13..maxCSI-RS-NZP-r13)
CSI-RS-ConfigNZPId-r13 ::= INTEGER (1..maxCSI-RS-NZP-r13)
-- ASN1STOP
```

– CSI-RS-ConfigZP

The IE *CSI-RS-ConfigZP* is the CSI-RS resource configuration, for which UE assumes zero transmission power, that E-UTRAN may configure on a serving frequency.

CSI-RS-ConfigZP information elements

CSI-RS-ConfigZP field descriptions

CSI-RS-ConfigZP-ApList

Indicates the aperiodic zero power CSI-RS present in a given subframe. See 36.213 [23, Table 7.1.9-2]. First entry in the list corresponds to aperiodic trigger 00, second entry in the list corresponds to aperiodic trigger 01 and so on.

resourceConfigList

Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].

subframeConfig

Parameter: $I_{\rm CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].

CSI-RS-ConfigZPId

The IE *CSI-RS-ConfigZPId* is used to identify a CSI-RS resource configuration for which UE assumes zero transmission power, as configured by the IE *CSI-RS-ConfigZP*. The identity is unique within the scope of a carrier frequency.

CSI-RS-ConfigZPId information elements

```
-- ASN1START

CSI-RS-ConfigZPId-r11 ::= INTEGER (1..maxCSI-RS-ZP-r11)

-- ASN1STOP
```

DataInactivityTimer

The IE *DataInactivityTimer* is used to control Data inactivity operation. Corresponds to the timer for data inactivity monitoring in TS 36.321 [6]. Value s1 corresponds to 1 second, s2 corresponds to 2 seconds and so on.

DataInactivityTimer information element

DMRS-Config

The IE DMRS-Config is the DMRS configuration that E-UTRAN may configure on a serving frequency.

DMRS-Config information elements

```
-- ASN1START
DMRS-Config-r11 ::=
                         CHOICE {
   release
                                 NULL,
        scramblingIdentity-rll SEQUENCE {
scramblingIdentity-rll
                                   INTEGER (0..503),
        scramblingIdentity2-r11
                                     INTEGER (0..503)
                                SEQUENCE {
DMRS-Config-v1310 ::=
        dmrs-tableAlt-r13
                                          ENUMERATED {true}
                                                                        OPTIONAL
                                                                                     -- Need OR
-- ASN1STOP
```

```
DMRS-Config field descriptions

scramblingIdentity, scramblingIdentity2

Parameter: n<sub>ID</sub> , see TS 36.211 [21, 6.10.3.1].

dmrs-tableAlt

The field indicates whether to use an alternative table for DMRS upon PDSCH transmission, see TS 36.213 [23].
```

DRB-Identity

The IE DRB-Identity is used to identify a DRB used by a UE.

DRB-Identity information elements

```
-- ASN1START

DRB-Identity ::= INTEGER (1..32)

-- ASN1STOP
```

EPDCCH-Config

The IE EPDCCH-Config specifies the subframes and resource blocks for EPDCCH monitoring that E-UTRAN may configure for a serving cell.

EPDCCH-Config information element

```
-- ASN1START
EPDCCH-Config-r11 ::=
                        SEQUENCE {
   config-rll CHOICE {
       release
                                NULL,
                                   SEQUENCE {
          subframePatternConfig-r11
                                   CHOICE {
                                       NULL.
              release
              setup
                                       SEOUENCE {
                 subframePattern-r11
                                          MeasSubframePattern-r10
                                                                       OPTIONAL, -- Need ON
          startSymbol-r11
                                   INTEGER (1..4)
                                                                       OPTIONAL, -- Need OP
          setConfigToReleaseList-rll EPDCCH-SetConfigToReleaseList-rll
                                                                       OPTIONAL, -- Need ON
                                                                       OPTIONAL -- Need ON
          setConfigToAddModList-rll EPDCCH-SetConfigToAddModList-rll
   }
EPDCCH-SetConfigToAddModList-r11 ::=
                                  SEQUENCE (SIZE(1..maxEPDCCH-Set-r11)) OF EPDCCH-SetConfig-
r11
EPDCCH-SetConfig-r11 ::=
                           SEQUENCE {
                       EPDCCH-SetConfigId-r11,
   setConfigId-r11
   transmissionType-r11
                               ENUMERATED {localised, distributed},
   resourceBlockAssignment-r11 SEQUENCE{
       numberPRB-Pairs-r11
                                   ENUMERATED {n2, n4, n8},
       resourceBlockAssignment-rll BIT STRING (SIZE(4..38))
   dmrs-ScramblingSequenceInt-r11 INTEGER (0..503),
   pucch-ResourceStartOffset-r11 INTEGER (0..2047)
                               PDSCH-RE-MappingQCL-ConfigId-r11 OPTIONAL, -- Need OR
   re-MappingQCL-ConfigId-r11
   [[ csi-RS-ConfigZPId2-r12
                                       CHOICE {
                                   NULL,
          release
                                   CSI-RS-ConfigZPId-r11
          setup
                                                             OPTIONAL
                                                                       -- Need ON
   ]],
   [[ numberPRB-Pairs-v1310
                                   CHOICE {
          release
                                       NULL,
          setup
                                       ENUMERATED {n6}
                                                             OPTIONAL, -- Need ON
```

```
mpdcch-config-r13
                                            CHOICE {
             release
                                                NULL,
                                                SEQUENCE {
             setup
                 csi-NumRepetitionCE-r13 ENUMERATED {sf1, sf2, sf4, sf8, sf16, sf32}, mpdcch-pdsch-HoppingConfig-r13 ENUMERATED {on,off},
                 ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8, v10},
ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare1}
                      fdd-r13
                  tdd-r13
                  },
                                                     ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},
                 mpdcch-NumRepetition-r13
                 mpdcch-Narrowband-r13
                                                     INTEGER (1.. maxAvailNarrowBands-r13)
             }
                                                                           OPTIONAL -- Need ON
         }
    ]]
}
EPDCCH-SetConfigId-r11 ::= INTEGER (0..1)
-- ASN1STOP
```

EPDCCH-Config field descriptions

csi-NumRepetitionCE

Number of subframes for CSI reference resource, see TS 36.213 [23]. Value sf1 corresponds to 1 subframe, sf2 corresponds to 2 subframes and so on.

csi-RS-ConfigZPId2

Indicates the rate matching parameters in addition to those indicated by *re-MappingQCL-ConfigId*. E-UTRAN configures this field only when tm10 is configured.

dmrs-ScramblingSequenceInt

The DMRS scrambling sequence initialization parameter $n_{\mathrm{ID},i}^{\mathrm{EPDCCH}}$ or $n_{\mathrm{ID},i}^{\mathrm{MPDCCH}}$ defined in TS 36.211 [21, 6.10.3A.1].

EPDCCH-SetConfig

Provides EPDCCH configuration set. See TS 36.213 [23, 9.1.4]. E-UTRAN configures at least one *EPDCCH-SetConfig when EPDCCH-Config* is configured. For BL UEs or UEs in CE, EUTRAN does not configure more than one EPDCCH-SetConfig.

mpdcch-Narrowband

Parameter: , see TS 36.211 [21, 6.8B.5]. Field values (1...maxAvailNarrowBands-r13) correspond to narrowband indices (0..[maxAvailNarrowBands-r13-1]) as specified in TS 36.211 [21].

mpdcch-NumRepetition

Maximum numbers of repetitions for UE-SS for MPDCCH, see TS 36.211 [21].

mpdcch-pdsch-HoppingConfig

Frequency hopping activation/deactivation for unicast MPDCCH/PDSCH, see TS 36.211 [21]. E-UTRAN does not configure the value on if freqHoppingParametersDL is not present in SystemInformationBlockType1.

mpdcch-StartSF-UESS

Starting subframe configuration for an MPDCCH UE-specific search space, see TS 36.211 [21]. Value v1 corresponds to 1, value v1dot5 corresponds to 1.5, and so on.

numberPRB-Pairs

Indicates the number of physical resource-block pairs used for the EPDCCH set. Value n2 corresponds to 2 physical resource-block pairs; n4 corresponds to 4 physical resource-block pairs and so on. Value n8 is not supported if *dl-Bandwidth* is set to 6 resource blocks. EUTRAN configures value up to n6 only for BL UEs or UEs in CE. Value n6 is only applicable to BL UEs or UEs in CE .

pucch-ResourceStartOffset

PUCCH format 1a, 1b and 3 resource starting offset for the EPDCCH set. See TS 36.213 [23, 10.1].

re-MappingQCL-ConfigId

Indicates the starting OFDM symbol, the related rate matching parameters and quasi co-location assumption for EPDCCH when the UE is configured with tm10. This field provides the identity of a configured *PDSCH-RE-MappingQCL-Config.* E-UTRAN configures this field only when tm10 is configured.

resourceBlockAssignment

Indicates the index to a specific combination of physical resource-block pair for EPDCCH set. See TS 36.213 [23, 9.1.4.4]. The size of *resourceBlockAssignment* is specified in TS 36.213 [23, 9.1.4.4] and based on *numberPRB-Pairs* and the signalled value of *dl-Bandwidth*. If *numberPRB-Pairs-v1310* field is present, the total number of physical resource-block pairs is 6 and it is composed of one subset of 2 physical resource-block pairs and another subset of 4 physical resource-block pairs, and the *resourceBlockAssignment* field defines the subset of 2 physical resource-block pairs.

setConfigld

Indicates the identity of the EPDCCH configuration set.

startSymbol

Indicates the OFDM starting symbol for any EPDCCH and PDSCH scheduled by EPDCCH on the same cell, see TS 36.213 [23, 9.1.4.1]. If not present, the UE shall release the configuration and shall derive the starting OFDM symbol of EPDCCH and PDSCH scheduled by EPDCCH from PCFICH. Values 1, 2, and 3 are applicable for *dl-Bandwidth* greater than 10 resource blocks. Values 2, 3, and 4 are applicable otherwise. E-UTRAN does not configure the field for UEs configured with tm10.

subframePatternConfig

Configures the subframes which the UE shall monitor the UE-specific search space on EPDCCH, except for predefined rules in TS 36.213 [23, 9.1.4]. If the field is not configured when EPDCCH is configured, the UE shall monitor the UE-specific search space on EPDCCH in all subframes except for pre-defined rules in TS 36.213 [23, 9.1.4].

transmissionType

Indicates whether distributed or localized EPDCCH transmission mode is used as defined in TS 36.211 [21, 6.8A.1].

EIMTA-MainConfig

The IE *EIMTA-MainConfig* is used to specify the eIMTA-RNTI used for eIMTA and the subframes used for monitoring PDCCH with eIMTA-RNTI. The IE *EIMTA-MainConfigServCell* is used to specify the eIMTA related parameters applicable for the concerned serving cell.

EIMTA-MainConfig information element

```
-- ASN1START
EIMTA-MainConfig-r12 ::=
                           CHOICE {
    release
                                    NULL,
                                    SEOUENCE {
        eimta-RNTI-r12
                                    C-RNTI,
        eimta-CommandPeriodicity-r12 ENUMERATED {sf10, sf20, sf40, sf80},
        eimta-CommandSubframeSet-r12 BIT STRING (SIZE(10))
}
EIMTA-MainConfigServCell-r12 ::=
                                    CHOICE {
    release
    setup
                                        SEQUENCE {
        eimta-UL-DL-ConfigIndex-r12
                                               INTEGER (1..5),
        eimta-HARQ-ReferenceConfig-r12
                                            ENUMERATED {sa2, sa4, sa5},
                                            CHOICE {
        mbsfn-SubframeConfigList-v1250
               release
                                                    NULL.
                                                    SEQUENCE {
                setup
                subframeConfigList-r12
                                                    MBSFN-SubframeConfigList
    }
 - ASN1STOP
```

EIMTA-MainConfig field descriptions

eimta-CommandPeriodicity

Configures the periodicity to monitor PDCCH with eIMTA-RNTI, see TS 36.213 [23, 13.1]. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.

eimta-CommandSubframeSet

Configures the subframe(s) to monitor PDCCH with eIMTA-RNTI within the periodicity configured by eimta-CommandPeriodicity. The 10 bits correspond to all subframes in the last radio frame within each periodicity. The left most bit is for subframe 0 and so on. Each bit can be of value 0 or 1. The value of 1 means that the corresponding subframe is configured for monitoring PDCCH with eIMTA-RNTI, and the value of 0 means otherwise. In case of TDD as PCell, only the downlink subframes indicated by the UL/ DL configuration in SIB1 can be configured for monitoring PDCCH with eIMTA-RNTI. In case of FDD as PCell, any of the ten subframes can be configured for monitoring PDCCH with eIMTA-RNTI.

eimta-HARQ-ReferenceConfig

Indicates UL/ DL configuration used as the DL HARQ reference configuration for this serving cell. Value sa2 corresponds to Configuration2, sa4 to Configuration4 etc, as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

eimta-UL-DL-ConfigIndex

Index of *I*, see TS 36.212 [22, 5.3.3.1.4]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

mbsfn-SubframeConfigList

Configure the MBSFN subframes for the UE on this serving cell. An uplink subframe indicated by the DL/UL subframe configuration in SIB1 can be configured as MBSFN subframe.

LogicalChannelConfig

The IE *LogicalChannelConfig* is used to configure the logical channel parameters.

LogicalChannelConfig information element

```
-- ASN1START
LogicalChannelConfig ::=
                                    SEOUENCE {
    ul-SpecificParameters
                                        SEQUENCE {
       priority
                                            INTEGER (1..16),
        prioritisedBitRate
                                             ENUMERATED -
                                                kBps0, kBps8, kBps16, kBps32, kBps64, kBps128,
                                                kBps256, infinity, kBps512-v1020, kBps1024-v1020,
                                                 kBps2048-v1020, spare5, spare4, spare3, spare2,
                                                spare1}
                                             ENUMERATED
        bucketSizeDuration
                                                 ms50, ms100, ms150, ms300, ms500, ms1000, spare2,
```

```
spare1},
      logicalChannelGroup
                                           INTEGER (0..3)
                                                                    OPTIONAL
                                                                                         -- Need OR
  }
          OPTIONAL,
                                                                                         -- Cond UL
      logicalChannelSR-Mask-r9
                                           ENUMERATED {setup}
                                                                    OPTIONAL
                                                                                    -- Cond SRmask
      logicalChannelSR-Prohibit-r12
                                           BOOLEAN
                                                                    OPTIONAL
                                                                                    -- Need ON
  [ [
  11.
  [[ laa-UL-Allowed-r14
                                           BOOLEAN
                                                                    OPTIONAL,
                                                                                    -- Need ON
      bitRateQueryProhibitTimer-r14
                                       ENUMERATED {
                                           s0, s0dot4, s0dot8, s1dot6, s3, s6, s12,
                                           s30}
                                                                OPTIONAL
                                                                               --Need OR
  ]]
- ASN1STOP
```

LogicalChannelConfig field descriptions

bitRateQueryProhibitTimer

The timer is used for bit rate recommendation query in TS 36.321 [6, 5.x], in seconds. Value s0 means 0s, s0dot4 means 0.4s and so on.

bucketSizeDuration

Bucket Size Duration for logical channel prioritization in TS 36.321 [6]. Value in milliseconds. Value ms50 corresponds to 50 ms, ms100 corresponds to 100 ms and so on.

laa-UL-Allowed

Indicates whether the data of a logical channel is allowed to be transmitted via UL of LAA SCells. Value *TRUE* indicates that the logical channel is allowed to be sent via UL of LAA SCells. Value *FALSE* indicates that the logical channel is not allowed to be sent via UL of LAA SCells.

logicalChannelGroup

Mapping of logical channel to logical channel group for BSR reporting in TS 36.321 [6].

logicalChannelSR-Mask

Controlling SR triggering on a logical channel basis when an uplink grant is configured. See TS 36.321 [6].

logicalChannelSR-Prohibit

Value *TRUE* indicates that the *logicalChannelSR-ProhibitTimer* is enabled for the logical channel. E-UTRAN only (optionally) configures the field (i.e. indicates value *TRUE*) if *logicalChannelSR-ProhibitTimer* is configured. See TS 36.321 [6].

prioritisedBitRate

Prioritized Bit Rate for logical channel prioritization in TS 36.321 [6]. Value in kilobytes/second. Value kBps0 corresponds to 0 kB/second, kBps8 corresponds to 8 kB/second, kBps16 corresponds to 16 kB/second and so on. Infinity is the only applicable value for SRB1 and SRB2

priority

Logical channel priority in TS 36.321 [6]. Value is an integer.

Conditional presence	Explanation
SRmask	The field is optionally present if <i>ul-SpecificParameters</i> is present, need OR; otherwise it is
	not present.
UL	The field is mandatory present for UL logical channels; otherwise it is not present.

LWA-Configuration

The IE LWA-Configuration is used to setup/modify/release LTE-WLAN Aggregation.

```
-- ASN1START
LWA-Configuration-r13 ::=
                                 CHOICE {
   release
                                     SEQUENCE {
   setup
       lwa-Config-r13
                                     LWA-Config-r13
LWA-Config-r13 ::= SEQUENCE {
   lwa-MobilityConfig-r13
                                 WLAN-MobilityConfig-r13
                                                           OPTIONAL,
                                                                       -- Need ON
   lwa-WT-Counter-r13
                                INTEGER (0..65535)
                                                          OPTIONAL, -- Need ON
   [[ wt-MAC-Address-r14 OCTET STRING (SIZE (6)) OPTIONAL
                                                               -- Need ON
   ]]
```

-- ASN1STOP

LWA-Configuration field descriptions

Iwa-MobilityConfig

Indicates the parameters used for WLAN mobility.

Iwa-WT-Counter

Indicates the parameter used by UE for WLAN authentication.

wt-MAC-Address

Indicates the WT MAC address of the WT handling the LWA operation for the UE. The UE uses this MAC address in uplink transmissions to enable routing of LWA uplink data from the AP to the WT. E-UTRAN configures the field only if *ul-LWA-Config-r14* is configured for at least one LWA bearer.

LWIP-Configuration

The IE LWIP-Configuration is used to add, modify or release DRBs that are using LWIP Tunnel.

```
-- ASN1START
LWIP-Configuration-r13 ::=
                                   CHOICE {
   release
                                      NULL,
                                       SEQUENCE {
    setup
        lwip-Config-r13
                                       LWIP-Config-r13
LWIP-Config-r13 ::= SEQUENCE {
                                  WLAN-MobilityConfig-r13 OPTIONAL, OPTIONAL,
    lwip-MobilityConfig-r13
                                                                          -- Need ON
    tunnelConfigLWIP-r13
                                 TunnelConfigLWIP-r13
                                                                          -- Need ON
-- ASN1STOP
```

LWIP-Configuration field descriptions

Iwip-MobilityConfig

Indicates the WLAN mobility set for LWIP.

tunnelConfigLWIP

Indicates the parameters used for establishing the LWIP tunnel.

– MAC-MainConfig

The IE *MAC-MainConfig* is used to specify the MAC main configuration for signalling and data radio bearers. All MAC main configuration parameters can be configured independently per Cell Group (i.e. MCG or SCG), unless explicitly specified otherwise.

MAC-MainConfig information element

```
-- ASN1START
                                   SEOUENCE {
MAC-MainConfig ::=
    ul-SCH-Config
                                       SEQUENCE {
                                           ENUMERATED {
       maxHARO-Tx
                                              n1, n2, n3, n4, n5, n6, n7, n8,
                                               n10, n12, n16, n20, n24, n28,
                                                                  OPTIONAL,
                                               spare2, spare1}
                                                                               -- Need ON
       periodicBSR-Timer
                                           PeriodicBSR-Timer-r12 OPTIONAL, -- Need ON
        retxBSR-Timer
                                           RetxBSR-Timer-r12,
       ttiBundling
                                           BOOLEAN
                                                                  OPTIONAL, -- Need ON
    drx-Config
                                       DRX-Config
                                                                   OPTIONAL,
                                                                              -- Need ON
    timeAlignmentTimerDedicated
                                       TimeAlignmentTimer,
    phr-Config
                                       CHOICE {
        release
                                           NULL.
                                           SEQUENCE {
           periodicPHR-Timer
                                               ENUMERATED {sf10, sf20, sf50, sf100, sf200,
                                                           sf500, sf1000, infinity},
```

```
ENUMERATED {sf0, sf10, sf20, sf50, sf100,
            prohibitPHR-Timer
                                                  sf200, sf500, sf1000},
ENUMERATED {dB1, dB3, dB6, infinity}
            dl-PathlossChange
    }
                                                                       OPTIONAL, -- Need ON
                                             INTEGER (0..7)
                                                                       OPTIONAL -- Need ON
    [[ sr-ProhibitTimer-r9
    ]],
    [[ mac-MainConfig-v1020
                                            SEQUENCE {
           sCellDeactivationTimer-r10
                                            ENUMERATED {
                                                  rf2, rf4, rf8, rf16, rf32, rf64, rf128,
                                                  spare OPTIONAL, -- Need OP
ENUMERATED {setup} OPTIONAL, -- Need OR
ENUMERATED {setup} OPTIONAL -- Need OR
            extendedBSR-Sizes-r10
            extendedPHR-r10
        }
                                                                       OPTIONAL -- Need ON
    ]],
    [[ stag-ToReleaseList-rl1 STAG-ToReleaseList-rl1 OPTIONAL, -- Need ON stag-ToAddModList-rl1 STAG-ToAddModList-rl1 OPTIONAL, -- Need ON drx-Config-vl130 DRX-Config-vl130 OPTIONAL -- Need ON
    ]],
    [[ e-HARQ-Pattern-r12
                                             BOOLEAN
                                                                       OPTIONAL, -- Need ON
                                             CHOICE {
        dualConnectivityPHR
           release
                                                  NULL,
                                                  SEQUENCE {
            setup
               phr-ModeOtherCG-r12
                                                    ENUMERATED {real, virtual}
                                                                  OPTIONAL, -- Need ON
        logicalChannelSR-Config-r12 CHOICE {
           release
                                                  NULL,
                                                  SEQUENCE {
                logicalChannelSR-ProhibitTimer-r12 ENUMERATED {sf20, sf40, sf64, sf128, sf512,
sf1024, sf2560, spare1}
           }
        }
                                                                       OPTIONAL
                                                                                        -- Need ON
                                             BOOLEAN OPTIONAL, -- Need OF CHOICE {
    ]],
[[ drx-Config-v1310
                                                                                      -- Need ON
        extendedPHR2-r13
                                                                        -- Need ON
        eDRX-Config-CycleStartOffset-r13
           release
                                              NULL,
           setup
                                              CHOICE {
            sf5120
                                                      INTEGER(0..1),
            sf10240
                                                      INTEGER(0..3)
        }
                                                OPTIONAL -- Need ON
    [[ drx-Config-r13
                                              CHOICE {
                                                  NULL,
           release
            setup
                                                  DRX-Config-r13
       }
                                                                     OPTIONAL -- Need ON
    ]],
    [[ skipUplinkTx-r14
                                              CHOICE {
                                              NULL,
           release
                                                  SEQUENCE {
            setup
               tup
skipUplinkTxSPS-r14
skipUplinkTxDynamic-r14
                                                 ENUMERATED {true} OPTIONAL, -- Need OR ENUMERATED {true} OPTIONAL -- Need OR
                                                                     OPTIONAL, -- Need ON
        dataInactivityTimerConfig-r14 CHOICE {
           release
                                                 NULL,
                                                  SEQUENCE {
            setup
                dataInactivityTimer-r14
                                                     DataInactivityTimer-r14
        }
                                                           OPTIONAL -- Need ON
    1],
    [[ rai-Activation-r14
                                            ENUMERATED {true}
                                                                         OPTIONAL
                                                                                        -- Need OR
}
MAC-MainConfigSCell-r11 ::= SEQUENCE {
                                        STAG-Id-r11 OPTIONAL, -- Need OP
    stag-Id-r11
}
DRX-Config ::=
                                     CHOICE {
  release
   setup
                                          SEQUENCE {
    onDurationTimer
                                            ENUMERATED {
```

```
psf1, psf2, psf3, psf4, psf5, psf6,
                                                  psf8, psf10, psf20, psf30, psf40, psf50, psf60, psf80, psf100,
                                                   psf200},
        drx-InactivityTimer
                                              ENUMERATED {
                                                  psf1, psf2, psf3, psf4, psf5, psf6,
                                                  psf8, psf10, psf20, psf30, psf40, psf50, psf60, psf80, psf100,
                                                   psf200, psf300, psf500, psf750,
                                                   psf1280, psf1920, psf2560, psf0-v1020,
                                                   spare9, spare8, spare7, spare6,
                                                   spare5, spare4, spare3, spare2,
                                                  spare1},
                                              ENUMERATED {
        drx-RetransmissionTimer
                                                  psf1, psf2, psf4, psf6, psf8, psf16,
                                                   psf24, psf33},
        longDRX-CycleStartOffset CHOICE {
            sf10
                                              INTEGER(0..9),
                                              INTEGER(0..19),
            sf20
            sf32
                                              INTEGER(0..31),
            sf40
                                              INTEGER(0..39),
            sf64
                                              INTEGER(0..63),
            sf80
                                              INTEGER(0..79)
            sf128
                                              INTEGER(0..127),
                                              INTEGER(0..159),
            sf160
                                              INTEGER(0..255),
            sf256
            sf320
                                              INTEGER(0..319),
            sf512
                                              INTEGER(0..511),
            sf640
                                              INTEGER(0..639),
                                              INTEGER(0..1023),
            sf1024
            sf1280
                                              INTEGER(0..1279),
            sf2048
                                              INTEGER(0..2047),
            sf2560
                                              INTEGER(0..2559)
        shortDRX
                                            SEQUENCE {
            shortDRX-Cycle
                                                  ENUMERATED {
                                                      sf2, sf5, sf8, sf10, sf16, sf20,
                                                       sf32, sf40, sf64, sf80, sf128, sf160,
                                                       sf256, sf320, sf512, sf640},
            drxShortCycleTimer
                                                 INTEGER (1..16)
             OPTIONAL
}
    -Config-v1130 ::= SEQ
drx-RetransmissionTimer-v1130
longDRX-CycleStartOffset-v1130
DRX-Config-v1130 ::=
                                        SEQUENCE {
                                              ENUMERATED {psf0-v1130} OPTIONAL,
                                                                                     --Need OR
                                              CHOICE {
        sf60-v1130
                                                  INTEGER(0..59),
        sf70-v1130
                                                  INTEGER(0..69)
                                                                        OPTIONAL,
                                                                                    --Need OR
    shortDRX-Cycle-v1130
                                              ENUMERATED {sf4-v1130} OPTIONAL
                                                                                     --Need OR
DRX-Config-v1310 ::=
                                         SEOUENCE {
                                     SEQUENCE
    longDRX-CycleStartOffset-v1310
        sf60-v1310
                                                  INTEGER(0..59)
                                                                        OPTIONAL
                                                                                     --Need OR
DRX-Config-r13 ::=
                                      SEQUENCE {
    onDurationTimer-v1310
                                              ENUMERATED {psf300, psf400, psf500, psf600,
                                                       psf800, psf1000, psf1200, psf1600}
                                                           OPTIONAL, --Need OR
    drx-RetransmissionTimer-v1310
                                              ENUMERATED {psf40, psf64, psf80, psf96, psf112,
                                              psf128, psf160, psf320}
OPTIONAL, --Need OR
ENUMERATED {psf0, psf1, psf2, psf4, psf6, psf8, psf16,
   drx-ULRetransmissionTimer-r13
                                                           psf24, psf33, psf40, psf64, psf80, psf96,
                                                           psf112, psf128, psf160, psf320}
                                                           OPTIONAL
                                                                      --Need OR
PeriodicBSR-Timer-r12 ::=
                                              ENUMERATED {
                                                  sf5, sf10, sf16, sf20, sf32, sf40, sf64, sf80,
                                                   sf128, sf160, sf320, sf640, sf1280, sf2560,
                                                   infinity, spare1}
RetxBSR-Timer-r12 ::=
                                                   ENUMERATED {
                                                   sf320, sf640, sf1280, sf2560, sf5120,
```

MAC-MainConfig field descriptions

dl-PathlossChange

DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

drx-Config

Used to configure DRX as specified in TS 36.321 [6]. E-UTRAN configures the values in *DRX-Config-v1130* only if the UE indicates support for IDC indication. E-UTRAN configures *drx-Config-v1130*, *drx-Config-v1310* and *drx-Config-r13* only if *drx-Config* (without suffix) is configured. E-UTRAN configures *drx-Config-r13* only if UE supports CE or if the UE is configured with uplink of an LAA SCell.

drx-InactivityTimer

Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

drx-RetransmissionTimer

Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on. In case *drx-RetransmissionTimer-v1130* or *drx-RetransmissionTimer-v1310* is signalled, the UE shall ignore *drx-RetransmissionTimer* (i.e. without suffix).

drx-ULRetransmissionTimer

Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

drxShortCycleTimer

Timer for DRX in TS 36.321 [6]. Value in multiples of shortDRX-Cycle. A value of 1 corresponds to shortDRX-Cycle, a value of 2 corresponds to 2 * shortDRX-Cycle and so on.

dualConnectivityPHR

Indicates if power headroom shall be reported using Dual Connectivity Power Headroom Report MAC Control Element defined in TS 36.321 [6] (value *setup*). If PHR functionality and dual connectivity are configured, E-UTRAN always configures the value *setup* for this field and configures *phr-Config* and *dualConnectivityPHR* for both CGs.

e-HARQ-Pattern

TRUE indicates that enhanced HARQ pattern for TTI bundling is enabled for FDD. E-UTRAN enables this field only when *ttiBundling* is set to *TRUE*.

eDRX-Config-CycleStartOffset

Indicates *longDRX-Cycle* and *drxStartOffset* in TS 36.321 [6]. The value of *longDRX-Cycle* is in number of subframes. The value of *drxStartOffset*, in number of subframes, is indicated by the value of *eDRX-Config-CycleStartOffset* multiplied by 2560 plus the offset value configured in *longDRX-CycleStartOffset*. E-UTRAN only configures value *setup* when the value in *longDRX-CycleStartOffset* is sf2560.

extendedBSR-Sizes

If value setup is configured, the BSR index indicates extended BSR size levels as defined in TS 36.321 [6, Table 6.1.3.1-2].

extendedPHR

Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value setup). E-UTRAN always configures the value setup if more than one and up to eight Serving Cell(s) with uplink is configured and none of the serving cells with uplink configured has a servingCellIndex higher than seven and if PUCCH on SCell is not configured and if dual connectivity is not configured. E-UTRAN configures extendedPHR only if phr-Config is configured. The UE shall release extendedPHR if phr-Config is released.

extendedPHR2

Indicates if power headroom shall be reported using the Extended Power Headeroom Report MAC Control Element defined in TS 36.321 [6] (value *setup*). E-UTRAN always configures the value *setup* if any of the serving cells with uplink configured has a *servingCellIndex* higher than seven in case dual connectivity is not configured or if PUCCH SCell (with any number of serving cells with uplink configured) is configured. E-UTRAN configures *extendedPHR2* only if *phr-Config* is configured. The UE shall release *extendedPHR2* if *phr-Config* is released.

logicalChannelSR-ProhibitTimer

Timer used to delay the transmission of an SR for logical channels enabled by *logicalChannelSR-Prohibit*. Value sf20 corresponds to 20 subframes, sf40 corresponds to 40 subframes, and so on. See TS 36.321 [6].

IongDRX-CycleStartOffset

longDRX-Cycle and drxStartOffset in TS 36.321 [6] unless eDRX-Config-CycleStartOffset is configured. The value of longDRX-Cycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. If shortDRX-Cycle is configured, the value of longDRX-Cycle shall be a multiple of the shortDRX-Cycle value. The value of drxStartOffset value is in number of sub-frames. In case longDRX-CycleStartOffset-v1130 is signalled, the UE shall ignore longDRX-CycleStartOffset (i.e. without suffix). In case longDRX-CycleStartOffset-v1310 is signalled, the UE shall ignore longDRX-CycleStartOffset (i.e. without suffix).

maxHARQ-Tx

Maximum number of transmissions for UL HARQ in TS 36.321 [6].

MAC-MainConfig field descriptions

onDurationTimer

Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on. In case *onDurationTimer-v1310* is signalled, the UE shall ignore *onDurationTimer* (i.e. without suffix).

periodicBSR-Timer

Timer for BSR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on.

periodicPHR-Timer

Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.

phr-ModeOtherCG

Indicates the mode (i.e. *real* or *virtual*) used for the PHR of the activated cells that are part of the other Cell Group (i.e. MCG or SCG), when DC is configured.

prohibitPHR-Timer

Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes and behaviour as specified in 7.3.2 applies, sf100 corresponds to 100 subframes and so on.

rai-Activation

Activation of release assistance indication (RAI) in TS 36.321 [6] for BL UEs.

retxBSR-Timer

Timer for BSR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf640 corresponds to 640 sub-frames, sf1280 corresponds to 1280 sub-frames and so on.

sCellDeactivationTimer

SCell deactivation timer in TS 36.321 [6]. Value in number of radio frames. Value rf4 corresponds to 4 radio frames, value rf8 corresponds to 8 radio frames and so on. E-UTRAN only configures the field if the UE is configured with one or more SCells other than the PSCell and PUCCH SCell. If the field is absent, the UE shall delete any existing value for this field and assume the value to be set to *infinity*. The same value applies for each SCell of a Cell Group (i.e. MCG or SCG) (although the associated functionality is performed independently for each SCell). Field *sCellDeactivationTimer* does not apply for the PUCCH SCell.

shortDRX-Cycle

Short DRX cycle in TS 36.321 [6]. Value in number of sub-frames. Value sf2 corresponds to 2 sub-frames, sf5 corresponds to 5 subframes and so on. In case *shortDRX-Cycle-v1130* is signalled, the UE shall ignore *shortDRX-Cycle* (i.e. without suffix). Short DRX cycle is not configured for UEs in CE.

skipUplinkTxDynamic

If configured, the UE skips UL transmissions for an uplink grant other than a configured uplink grant if no data is available for transmission in the UE buffer as described in TS 36.321 [6].

skipUplinkTxSPS

If configured, the UE skips UL transmissions for a configured uplink grant if no data is available for transmission in the UE buffer as described in TS 36.321 [6]. E-UTRAN always configures *skipUplinkTxSPS* when *semiPersistSchedIntervalUL* is shorter than sf10.

sr-ProhibitTimer

Timer for SR transmission on PUCCH in TS 36.321 [6]. Value in number of SR period(s) of shortest SR period of any serving cell with PUCCH. Value 0 means that behaviour as specified in 7.3.2 applies. Value 1 corresponds to one SR period, Value 2 corresponds to 2*SR periods and so on. SR period is defined in TS 36.213 [23, table 10.1.5-1].

stag-Id

Indicates the TAG of an SCell, see TS 36.321 [6]. Uniquely identifies the TAG within the scope of a Cell Group (i.e. MCG or SCG). If the field is not configured for an SCell (e.g. absent in *MAC-MainConfigSCell*), the SCell is part of the PTAG.

stag-ToAddModList, stag-ToReleaseList

Used to configure one or more STAGs. E-UTRAN ensures that a STAG contains at least one SCell with configured uplink. If, due to SCell release a reconfiguration would result in an 'empty' TAG, E-UTRAN includes release of the concerned TAG.

timeAlignmentTimerSTAG

Indicates the value of the time alignment timer for an STAG, see TS 36.321 [6].

ttiBundlina

TRUE indicates that TTI bundling TS 36.321 [6] is enabled while FALSE indicates that TTI bundling is disabled. TTI bundling can be enabled for FDD and for TDD for configurations 0, 1 and 6 and additionally for configurations 2 and 3 when *symPUSCH-UpPTS-r14* is configured. The functionality is performed independently per Cell Group (i.e. MCG or SCG), but E-UTRAN does not configure TTI bundling for the SCG. For a TDD PCell, E-UTRAN does not simultaneously enable TTI bundling and semi-persistent scheduling in this release of specification. Furthermore, for a Cell Group, E-UTRAN does not simultaneously configure TTI bundling and SCells with configured uplink, and E-UTRAN does not simultaneously configure TTI bundling and elMTA.

P-C-AndCBSR

The IE *P-C-AndCBSR* is used to specify the power control and codebook subset restriction configuration.

P-C-AndCBSR information elements

```
-- ASN1START
P-C-AndCBSR-r11 ::= SEQUENCE {
   p-C-r11
                                INTEGER (-8..15),
    codebookSubsetRestriction-r11
                                  BIT STRING
P-C-AndCBSR-r13 ::= SEQUENCE {
    p-C-r13
                                INTEGER (-8..15),
    cbsr-Selection-r13
                               CHOICE {
       nonPrecoded-r13
                                   SEQUENCE {
           codebookSubsetRestriction1-r13
                                                       BIT STRING,
           codebookSubsetRestriction2-r13
                                                       BIT STRING
        beamformedK1a-r13
           codebookSubsetRestriction3-r13
                                                       BIT STRING
       beamformedKN-r13
                                   SEOUENCE {
            codebookSubsetRestriction-r13
                                                       BIT STRING
    },
P-C-AndCBSR-Pair-r13a ::= SEQUENCE (SIZE (1..2)) OF P-C-AndCBSR-r11
P-C-AndCBSR-Pair-r13 ::=
                           SEQUENCE (SIZE (1..2)) OF P-C-AndCBSR-r13
-- ASN1STOP
```

P-C-AndCBSR field descriptions

cbsr-Selection

Indicates which codebook subset restriction parameter(s) are to be used. E-UTRAN applies values nonPrecoded when eMIMO-Type is set to nonPrecoded. E-UTRAN applies value beamformedK1a when eMIMO-Type is set to beamformed, alternativeCodebookEnabledBeamformed is set to TRUE and csi-RS-ConfigNZPIdListExt is not configured. E-UTRAN applies value beamformedKN when csi-RS-ConfigNZPIdListExt is configured. E-UTRAN applies value beamformedKN when eMIMO-Type is set to beamformed, csi-RS-ConfigNZPIdListExt is not configured and alternativeCodebookEnabledBeamformed is set to FALSE.

codebookSubsetRestriction

Parameter: codebookSubsetRestriction, see TS 36.213 [23] and TS 36.211 [21]. The number of bits in the *codebookSubsetRestriction* for applicable transmission modes is defined in TS 36.213 [23].

codebookSubsetRestriction1

Parameter: codebookSubsetRestriction1, see TS 36.213 [23, Table 7.2-1d]. The number of bits in the *codebookSubsetRestriction1* for applicable transmission modes is defined in TS 36.213 [23].

codebookSubsetRestriction2

Parameter: codebookSubsetRestriction2, see TS 36.213 [23, Table 7.2-1e]. The number of bits in the *codebookSubsetRestriction2* for applicable transmission modes is defined in TS 36.213 [23].

codebookSubsetRestriction3

Parameter: codebookSubsetRestriction3, see TS 36.213 [23, Table 7.2-1f]. The UE shall ignore codebookSubsetRestriction-r10 if codebookSubsetRestriction3-r13 is configured. The number of bits in the codebookSubsetRestriction3 for applicable transmission modes is defined in TS 36.213 [23].

р-С

Parameter: P_c , see TS 36.213 [23, 7.2.5].

P-C-AndCBSR-Pair

E-UTRAN includes a single entry if the UE is configured with TM9. If the UE is configured with TM10 and E-UTRAN includes 2 entries, this indicates that the subframe patterns configured for CSI (CQI/PMI/PTI/RI/CRI) reporting (i.e. as defined by field *csi-MeasSubframeSet1* and *csi-MeasSubframeSet2*, or as defined by *csi-MeasSubframeSets-r12*) are to be used for this CSI process, while including a single entry indicates that the subframe patterns are not to be used for this CSI process. For a UE configured with TM10, E-UTRAN does not include 2 entries with *csi-MeasSubframeSet1* and *csi-MeasSubframeSet2* for CSI processes concerning a secondary frequency. Furthermore, E-UTRAN includes 2 entries when configuring both *cgi-pmi-ConfigIndex* and *cgi-pmi-ConfigIndex2*.

– PDCCH-ConfigSCell

The IE PDCCH-ConfigSCell specifies PDCCH monitoring parameters that E-UTRAN may configure for a serving cell.

PDCCH-ConfigSCell information element

```
-- ASN1START
PDCCH-ConfigSCell-r13 ::=
                                  SEQUENCE {
    skipMonitoringDCI-format0-1A-r13
                                         ENUMERATED {true}
                                                                              OPTIONAL
                                                                                           -- Need OR
PDCCH-ConfigLAA-r14 ::=
                              SEQUENCE {
    maxNumberOfSchedSubframes-FormatOB-r14 ENUMERATED {sf2, sf3, sf4} OPTIONAL,
                                                                                               -- Need OR
    \verb|maxNumberOfSchedSubframes-Format4B-r14| & \verb|ENUMERATED| & $\texttt{sf2}$, $\texttt{sf3}$, $\texttt{sf4}$ & OPTIONAL, \\
                                                                                               -- Need OR
                                                                              OPTIONAL,
                                                                                                -- Need OR
    skipMonitoringDCI-Format0A-r14
                                                    ENUMERATED {true}
                                                    ENUMERATED {true}
                                                                                                -- Need OR
    skipMonitoringDCI-Format4A-r14
                                                                              OPTIONAL,
    pdcch-CandidateReductions-Format0A-r14
                                  PDCCH-CandidateReductions-r13
                                                                              OPTIONAL.
                                                                                                -- Need ON
    pdcch-CandidateReductions-Format4A-r14
                                  PDCCH-CandidateReductionsLAA-UL-r14
                                                                              OPTIONAL,
                                                                                                -- Need ON
    pdcch-CandidateReductions-Format0B-r14
                                  PDCCH-CandidateReductionsLAA-UL-r14
                                                                              OPTIONAL,
                                                                                                -- Need ON
    pdcch-CandidateReductions-Format4B-r14
                                  PDCCH-CandidateReductionsLAA-UL-r14
                                                                              OPTIONAL
                                                                                               -- Need ON
PDCCH-CandidateReductionValue-r13 ::= ENUMERATED {n0, n33, n66, n100}
PDCCH-CandidateReductionValue-r14 ::= ENUMERATED {n0, n50, n100, n150}
PDCCH-CandidateReductions-r13 ::= CHOICE {
    release
                                      NULL,
    setup
                                       SEQUENCE {
        {\tt pdcch-candidateReductionAL1-r13} \qquad {\tt PDCCH-CandidateReductionValue-r13},
        pdcch-candidateReductionAL2-r13
                                               PDCCH-CandidateReductionValue-r13,
                                              PDCCH-CandidateReductionValue-r13,
        pdcch-candidateReductionAL3-r13
        pdcch-candidateReductionAL4-r13 PDCCH-CandidateReductionValue-r13, pdcch-candidateReductionAL5-r13 PDCCH-CandidateReductionValue-r13
        pdcch-candidateReductionAL5-r13
                                               PDCCH-CandidateReductionValue-r13
PDCCH-CandidateReductionsLAA-UL-r14 ::= CHOICE {
    release
                                       NULL,
                                       SEOUENCE {
        \verb|pdcch-candidateReductionAL1-r14| & \verb|PDCCH-CandidateReductionValue-r13|, \\
        pdcch-candidateReductionAL2-r14
                                               PDCCH-CandidateReductionValue-r13,
        {\tt pdcch-candidateReductionAL3-r14} \qquad {\tt PDCCH-CandidateReductionValue-r14},
        pdcch-candidateReductionAL4-r14
                                               PDCCH-CandidateReductionValue-r14,
                                            PDCCH-CandidateReductionValue-r14
        pdcch-candidateReductionAL5-r14
-- ASN1STOP
```

PDCCH-ConfigSCell field descriptions

maxNumberOfSchedSubframes-Format0B

Indicates maximum number of schedulable subframes for DCI format 0B as specified in TS 36.213 [23]. Value sf2 corresponds to 2 subframes, value sf3 corresponds to 3 subframes and so on.

maxNumberOfSchedSubframes-Format4B

Indicates maximum number of schedulable subframes for DCI format 4B as specified in TS 36.213 [23]. Value sf2 corresponds to 2 subframes, value sf3 corresponds to 3 subframes and so on.

skipMonitoringDCI-format0-1A

Indicates whether the UE is configured to omit monitoring DCI fromat 0/1A, see TS 36.213 [23, 9.1.1].

skipMonitoringDCI-Format0A

Indicates whether the UE is configured to omit monitoring DCI fromat 0A as specified in TS 36.213 [23].

skipMonitoringDCI-Format4A

Indicates whether the UE is configured to omit monitoring DCI fromat 4A as specified in TS 36.213 [23].

pdcch-candidateReductionALx

Indicates reduced (E)PDCCH monitoring requirements on UE specific search space of the x-th aggregation level, see TS 36.213 [23, 9.1.1]. Value n0 corresponds to 0%, value n33 corresponds to 33% and so on.

pdcch-CandidateReductions-Formatx

Indicates number of blind detections on UE specific search space for each aggregation layer as specified in TS 36.213 [23]. The field can only be present when the UE is configured with uplink of an LAA SCell. If *pdcch*-

CandidateReductions-Formatx is not configured, pdcch-CandidateReductions-r13 applies to the corresponding DCIs (if configured).

PDCP-Config

The IE *PDCP-Config* is used to set the configurable PDCP parameters for data radio bearers.

PDCP-Config information element

```
-- ASN1START
PDCP-Config ::=
                                      SEOUENCE {
    discardTimer
                                          ENUMERATED {
                                              ms50, ms100, ms150, ms300, ms500,
                                              ms750, ms1500, infinity
                                                                    OPTIONAL,
                                                                                         -- Cond Setup
    rlc-AM
                                          SEQUENCE {
        statusReportRequired
                                              BOOLEAN
                                                                    OPTIONAL,
                                                                                         -- Cond Rlc-AM
                                          SEOUENCE {
    rlc-UM
        pdcp-SN-Size
                                              ENUMERATED {len7bits, len12bits}
                                                                    OPTIONAL,
                                                                                         -- Cond Rlc-UM
    headerCompression
                                          CHOICE {
        notUsed
                                              NULL,
                                              SEQUENCE {
        rohc
            maxCID
                                                   INTEGER (1..16383)
                                                                                    DEFAULT 15,
            profiles
                                                   SEQUENCE {
                profile0x0001
                                                       BOOLEAN,
                 profile0x0002
                                                       BOOLEAN.
                 profile0x0003
                                                       BOOLEAN
                profile0x0004
                                                       BOOLEAN,
                 profile0x0006
                                                       BOOLEAN.
                 profile0x0101
                                                       BOOLEAN,
                 profile0x0102
                                                       BOOLEAN,
                 profile0x0103
                                                       BOOLEAN
                 profile0x0104
                                                       BOOLEAN
            },
        }
    },
                                         ENUMERATED {enabled}
                                                                    OPTIONAL
    [[ rn-IntegrityProtection-r10
                                                                                 -- Cond RN
        pdcp-SN-Size-v1130
                                          ENUMERATED {len15bits} OPTIONAL
                                                                                 -- Cond Rlc-AM2
    [[ ul-DataSplitDRB-ViaSCG-r12
                                          BOOLEAN
                                                       OPTIONAL,
                                                                    -- Need ON
        t-Reordering-r12
                                          ENUMERATED {
                                          ms0, ms20, ms40, ms60, ms80, ms100, ms120, ms140,
                                          ms160, ms180, ms200, ms220, ms240, ms260, ms280, ms300,
                                          ms500, ms750, spare14, spare13, spare12, spare11, spare10, spare9, spare8, spare7, spare6, spare5, spare4, spare3,
                                          spare2, spare1}
                                                                            OPTIONAL
                                                                                         -- Cond SetupS
    ]],
```

```
CHOICE {
    [[ ul-DataSplitThreshold-r13
           release
                                        ENUMERATED {
            setup
                                        b0, b100, b200, b400, b800, b1600, b3200, b6400, b12800,
                                        b25600, b51200, b102400, b204800, b409600, b819200,
                                        spare1}
                                                                       OPTIONAL, -- Need ON
       pdcp-SN-Size-v1310
                                       ENUMERATED {len18bits} OPTIONAL, -- Cond Rlc-AM3
                                        CHOICE {
        statusFeedback-r13
           release
                                        NULL,
                                       SEQUENCE {
            setup
               statusPDU-TypeForPolling-r13
                                                   ENUMERATED {type1, type2}
                                                                                   OPTIONAL. --
Need ON
                statusPDU-Periodicity-Type1-r13
                                                  ENUMERATED {
                                        ms5, ms10, ms20, ms30, ms40, ms50, ms60, ms70, ms80, ms90,
                                        \verb|ms100, ms150, ms200, ms300, ms500, ms1000, ms2000, ms5000,\\
                                        ms10000, ms20000, ms50000}
                                                                    OPTIONAL, -- Need ON
                statusPDU-Periodicity-Type2-r13 ENUMERATED {
                                        ms5, ms10, ms20, ms30, ms40, ms50, ms60, ms70, ms80, ms90,
                                        ms100, ms150, ms200, ms300, ms500, ms1000, ms2000, ms5000,
                                        ms10000, ms20000, ms50000} OPTIONAL,
               statusPDU-Periodicity-Offset-r13 ENUMERATED {
    ms1, ms2, ms5, ms10, ms25, ms100, ms250, ms500,
                                       ms2500, ms5000, ms25000} OPTIONAL -- Need ON
           }
        }
                                                                                   -- Need ON
                                                                        OPTIONAL
    ]],
    [[ ul-LWA-Config-r14
                                   CHOICE {
           release
                                      NULL,
               SEQUENCE {
ul-LWA-DRB-ViaWLAN-r14
ul-LWA-DRB-ViaWLAN-r14
            setup
                                       BOOLEAN,
                ul-LWA-DataSplitThreshold-r14 ENUMERATED {
                                       b0, b100, b200, b400, b800, b1600, b3200, b6400,
                                       b12800, b25600, b51200, b102400, b204800, b409600,
                                        b819200 }
                                                          OPTIONAL
                                                                      -- Need OR
            }
                                                                OPTIONAL,
       uplinkOnlyHeaderCompression-r14
                                        CHOICE {
           notUsed-r14
                                               NULL,
           rohc-r14
                                                    SEQUENCE {
               maxCID-r14
                                                       INTEGER (1..16383)
                                                                              DEFAULT 15,
                                                        SEQUENCE {
               profiles-r14
                   profile0x0006-r14
                                                            BOOLEAN
                },
               . . .
           }
        }
                                                            OPTIONAL -- Need ON
   ]]
-- ASN1STOP
```

PDCP-Config field descriptions

discardTimer

Indicates the discard timer value specified in TS 36.323 [8]. Value in milliseconds. Value ms50 means 50 ms, ms100 means 100 ms and so on.

headerCompression

E-UTRAN does not reconfigure header compression for an MCG DRB except for upon handover and upon the first reconfiguration after RRC connection re-establishment. E-UTRAN does not reconfigure header compression for a SCG DRB except for upon SCG change involving PDCP re-establishment. For split and LWA DRBs E-UTRAN configures only *notUsed*.

If headerCompression is configured, the UE shall apply the configured ROHC profile(s) in both uplink and downlink.

maxCID

Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8]. The total value of MAX_CIDs across all bearers for the UE should be less than or equal to the value of *maxNumberROHC-ContextSessions* parameter as indicated by the UE. E-UTRAN configures the same value for *maxCID* in both *headerCompression* and *uplinkOnlyHeaderCompression*.

pdcp-SN-Size

Indicates the PDCP Sequence Number length in bits. For RLC UM: value *len7bits* means that the 7-bit PDCP SN format is used and *len12bits* means that the 12-bit PDCP SN format is used. For RLC AM: value *len15bits* means that the 15-bit PDCP SN format is used, value *len18bits* means that the 18-bit PDCP SN format is used, otherwise if the field is not included upon setup of the PCDP entity 12-bit PDCP SN format is used, as specified in TS 36.323 [8].

profiles

The profiles used by both compressor and decompressor in both UE and E-UTRAN. The field indicates which of the ROHC profiles specified in TS 36.323 [8] are supported, i.e. value *true* indicates that the profile is supported. Profile 0x0000 shall always be supported when the use of ROHC is configured. If support of two ROHC profile identifiers with the same 8 LSB's is signalled, only the profile corresponding to the highest value shall be applied. E-UTRAN does not configure ROHC while *t-Reordering* is configured (i.e. for split DRBs, for LWA bearers or upon reconfiguration from split or LWA to MCG DRB).

statusFeedback

Indicates whether the UE shall send PDCP Status Report periodically or by E-UTRAN polling as specified in TS 36.323 [8]. E-UTRAN configures this field only for LWA DRB.

statusPDU-TypeForPolling

Indicates the PDCP Control PDU option when it is triggered by E-UTRAN polling. Value *type1* indicates using the legacy PDCP Control PDU for PDCP status reporting and value *type2* indicates using the LWA specific PDCP Control PDU for LWA status reporting as specified in TS 36.323 [8].

statusPDU-Periodicity-Type1

Indicates the value of the PDCP Status reporting periodicity for *type1* Status PDU, as specified in TS 36.323 [8]. Value in milliseconds. Value ms5 means 5 ms, ms10 means 10 ms and so on.

statusPDU-Periodicity-Type2

Indicates the value of the PDCP Status reporting periodicity for *type2* Status PDU, as specified in TS 36.323 [8]. Value in milliseconds. Value ms5 means 5 ms, ms10 means 10 ms and so on.

statusPDU-Periodicity-Offset

Indicates the value of the offset for *type2* Status PDU periodicity, as specified in TS 36.323 [8]. Value in milliseconds. Value ms1 means 1 ms, ms2 means 2 ms and so on.

t-Reordering

Indicates the value of the reordering timer, as specified in TS 36.323 [8]. Value in milliseconds. Value ms0 means 0 ms and behaviour as specified in 7.3.2 applies, ms20 means 20 ms and so on.

rn-IntegrityProtection

Indicates that integrity protection or verification shall be applied for all subsequent packets received and sent by the RN on the DRB.

statusReportRequired

Indicates whether or not the UE shall send a PDCP Status Report upon re-establishment of the PDCP entity and upon PDCP data recovery as specified in TS 36.323 [8].

ul-DataSplitDRB-ViaSCG

Indicates whether the UE shall send PDCP PDUs via SCG as specified in TS 36.323 [8]. E-UTRAN only configures the field (i.e. indicates value *TRUE*) for split DRBs.

ul-DataSplitThreshold

Indicates the threshold value for uplink data split operation specified in TS 36.323 [8]. Value b100 means 100 Bytes, b200 means 200 Bytes and so on. E-UTRAN only configures this field for split DRBs.

ul-LWA-DRB-ViaWLAN

Indicates whether the UE shall send PDCP PDUs via the LWAAP entity as specified in TS 36.323 [8]. E-UTRAN only configures this field (i.e. indicates value *TRUE*) for LWA DRBs.

ul-LWA-DataSplitThreshold

Indicates the threshold value for uplink data split operation as specified in TS 36.323 [8]. Value b0 means 0 Bytes, b100 means 100 Bytes and so on. E-UTRAN only configures this field for LWA DRBs.

PDCP-Config field descriptions

uplinkOnlyHeaderCompression

Indicates the ROHC configuration that the UE shall apply uplink-only ROHC operations, see TS 36.323 [8]. E-UTRAN only configures this field when *headerCompression* is not configured.

E-UTRAN does not reconfigure header compression for an MCG DRB except for upon handover and upon the first reconfiguration after RRC connection re-establishment. E-UTRAN does not reconfigure header compression for a SCG DRB except for upon SCG change involving PDCP re-establishment. For split and LWA DRBs E-UTRAN configures only *notUsed*.

Conditional presence	Explanation
RIc-AM	The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC AM. The field is optional, need ON, in case of reconfiguration of a PDCP entity at handover, at the first reconfiguration after RRC re-establishment or at SCG change involving PDCP re-establishment or PDCP data recovery for a radio bearer configured with RLC AM. Otherwise the field is not present.
RIc-AM2	The field is optionally present, need OP, upon setup of a PDCP entity for a radio bearer configured with RLC AM. Otherwise the field is not present.
RIc-AM3	The field is optionally present, need OP, upon setup of a PDCP entity for a radio bearer configured with RLC AM, if <i>pdcp-SN-Size-v1130</i> is absent. Otherwise the field is not present.
RIc-UM	The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC UM. It is optionally present, Need ON, upon handover within E-UTRA, upon the first reconfiguration after re-establishment and upon SCG change involving PDCP re-establishment. Otherwise the field is not present.
RN	The field is optionally present when signalled to the RN, need OR. Otherwise the field is not present.
Setup	The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON.
SetupS	The field is mandatory present in case of setup of or reconfiguration to a split DRB or LWA DRB. The field is optionally present upon reconfiguration of a split DRB or LWA DRB or upon DRB type change from split to MCG DRB or from LWA to LTE only, need ON. Otherwise the field is not present.

– PDSCH-Config

The IE *PDSCH-ConfigCommon* and the IE *PDSCH-ConfigDedicated* are used to specify the common and the UE specific PDSCH configuration respectively.

PDSCH-Config information element

```
-- ASN1START
PDSCH-ConfigCommon ::=
                              SEQUENCE {
    referenceSignalPower
                                          INTEGER (-60..50),
                                          INTEGER (0..3)
PDSCH-ConfigCommon-v1310 ::= SEQUENCE {
    pdsch-maxNumRepetitionCEmodeA-r13 ENUMERATED {
                                              r16, r32 }
                                                                            OPTIONAL,
                                                                                          -- Need OR
    pdsch-maxNumRepetitionCEmodeB-r13
                                          ENUMERATED {
                                              r192, r256, r384, r512, r768, r1024,
                                               r1536, r2048}
                                                                                 OPTIONAL
                                                                                              -- Need OR
}
PDSCH-ConfigDedicated::=
                                  SEQUENCE {
                                           ENUMERATED {
                                               dB-6, dB-4dot77, dB-3, dB-1dot77,
                                               dB0, dB1, dB2, dB3}
PDSCH-ConfigDedicated-v1130 ::=
                                      SEQUENCE {
                                          DMRS-Config-rll OPTIONAL, -- Need ON ENUMERATED {typeA, typeB} OPTIONAL, -- Need OR
    dmrs-ConfigPDSCH-r11
                                          DMRS-Config-r11
    qcl-Operation
    \verb|re-MappingQCLConfigToRe| lease List-r11 & \verb|RE-MappingQCLConfigToRe| lease List-r11 & \verb|OPTIONAL|, \\
Need ON
```

```
re-MappingQCLConfigToAddModList-r11 RE-MappingQCLConfigToAddModList-r11 OPTIONAL
Need ON
}
PDSCH-ConfigDedicated-v1280 ::=
                                   SEQUENCE {
    tbsIndexAlt-r12
                                      ENUMERATED {a26, a33}
                                                                         OPTIONAL
PDSCH-ConfigDedicated-v1310 ::= SEQUENCE {
   dmrs-ConfigPDSCH-v1310
                                     DMRS-Config-v1310
                                                                          OPTIONAL
                                                                                       -- Need ON
PDSCH-ConfigDedicated-v1430 ::= SEQUENCE {
   ce-PDSCH-MaxBandwidth-r14
ce-PDSCH-TenProcesses-r14
ce-HARQ-AckBundling-r14
                                   ENUMERATED {bw5, bw20}
                                                                          OPTIONAL,
                                                                                      -- Need OP
                                       ENUMERATED {on}
                                                                           OPTIONAL,
                                                                                      -- Need OR
                                                                          OPTIONAL,
                                      ENUMERATED {on}
                                                                                      -- Need OR
                                      ENUMERATED {range1, range2}
                                                                          OPTIONAL,
    ce-SchedulingEnhancement-r14
                                                                                      -- Need OR
    tbsIndexAlt2-r14
                                           ENUMERATED {b33}
                                                                          OPTIONAL
                                                                                      -- Need OR
}
PDSCH-ConfigDedicatedSCell-v1430 ::=
                                           SEQUENCE {
                                           ENUMERATED {b33}
                                                                          OPTIONAL
    tbsIndexAlt2-r14
                                                                                      -- Need OR
RE-MappingQCLConfigToAddModList-r11 ::= SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-
MappingQCL-Config-r11
RE-MappingQCLConfigToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-
MappingQCL-ConfigId-r11
PDSCH-RE-MappingQCL-Config-r11 ::=
                                      SEQUENCE {
   pdsch-RE-MappingQCL-ConfigId-rll PDSCH-RE-MappingQCL-ConfigId-rll,
    optionalSetOfFields-r11
                                      SEQUENCE {
                                           ENUMERATED {n1, n2, n4, spare1},
        crs-PortsCount-r11
                                           INTEGER (0..5),
        crs-FreqShift-r11
        mbsfn-SubframeConfigList-r11
                                           CHOICE {
           release
                                              NULL,
                                               SEQUENCE {
           setup
               subframeConfigList
                                                  MBSFN-SubframeConfigList
                                                                          OPTIONAL,
                                         ENUMERATED {reserved, n1, n2, n3, n4, assigned}
       pdsch-Start-r11
                                                                          OPTIONAL, -- Need OP
   qcl-CSI-RS-ConfigNZPId-r11
                                      CSI-RS-ConfigZPId-r11,
                                     CSI-RS-ConfigNZPId-r11
                                                                         OPTIONAL, -- Need OR
    [[ mbsfn-SubframeConfigList-v1430 CHOICE {
           release
                                      NULL,
           setup
                                       SEQUENCE {
               subframeConfigList-v1430 MBSFN-SubframeConfigList-v1430
                                                                           OPTIONAL
                                                                                      -- Need OP
    11
-- ASN1STOP
```

PDSCH-Config field descriptions

ce-HARQ-AckBundling

Activation of PDSCH HARQ-ACK bundling in half duplex FDD in CE mode A, see TS 36.212 [22] and TS 36.213 [23].

ce-PDSCH-MaxBandwidth

Maximum PDSCH channel bandwidth in CE mode A and B, see TS 36.212 [22] and TS 36.213 [23]. Value bw5 corresponds to 5 MHz, and value bw20 corresponds to 20 MHz. If this field is absent, the UE shall release any existing value and set the maximum PDSCH channel bandwidth in CE mode A and B to 1.4 MHz. Parameter: transmission bandwidth configuration, see TS 36.101 [42, table 5.6-1]. The max bandwidth can by configured to 5MHz for BL UEs and 5MHz or 20MHz for UEs in CE.

ce-PDSCH-TenProcesses

Configuration of 10 (instead of 8) DL HARQ processes in FDD in CE mode A, see TS 36.212 [22] and TS 36.213 [23].

ce-SchedulingEnhancement

Activation of dynamic HARQ-ACK delay for PDSCH in CE mode A controlled by the DCI, see TS 36.212 [22] and TS 36.213 [23]. Value range1 corresponds to the first range of HARQ-ACK delays, and value range2 corresponds to second range of HARQ-ACK delays.

mbsfn-SubframeConfigList

Indicates the MBSFN configuration for the CSI-RS resources. If optionalSetOfFields is absent, the field is released.

optionalSetOfFields

If absent, the UE releases the configuration provided previously, if any, and applies the values from the serving cell configured on the same frequency.

p-a

Parameter: P_A , see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

p-k

Parameter: P_R , see TS 36.213 [23, Table 5.2-1].

pdsch-maxNumRepetitionCEmodeA

Maximum value to indicate the set of PDSCH repetition numbers for CE mode A, see TS 36.211 [21] and TS 36.213 [23].

pdsch-maxNumRepetitionCEmodeB

Maximum value to indicate the set of PDSCH repetition numbers for CE mode B, see TS 36.211 [21] and TS 36.213 [23].

pdsch-Start

The starting OFDM symbol of PDSCH for the concerned serving cell, see TS 36.213 [23. 7.1.6.4]. Values 1, 2, 3 are applicable when *dl-Bandwidth* for the concerned serving cell is greater than 10 resource blocks, values 2, 3, 4 are applicable when *dl-Bandwidth* for the concerned serving cell is less than or equal to 10 resource blocks, see TS 36.211 [21, Table 6.7-1]. Value *n1* corresponds to 1, value *n2* corresponds to 2 and so on.

qcI-CSI-RS-ConfigNZPId

Indicates the CSI-RS resource that is quasi co-located with the PDSCH antenna ports, see TS 36.213 [23, 7.1.9]. E-UTRAN configures this field if and only if the UE is configured with *qcl-Operation* set to *typeB*.

qcl-Operation

Indicates the quasi co-location behaviour to be used by the UE, type A and type B, as described in TS 36.213 [23, 7.1.10].

referenceSignalPower

Parameter: Reference-signal power, which provides the downlink reference-signal EPRE, see TS 36.213 [23, 5.2]. The actual value in dBm.

$re-\textit{MappingQCLC} on fig To Add ModList, \ re-\textit{MappingQCLC} on fig To Release List$

For a serving frequency E-UTRAN configures at least one *PDSCH-RE-MappingQCL-Config* when transmission mode 10 is configured for the serving cell on this carrier frequency. Otherwise it does not configure this field.

tbsIndexAlt

Indicates the applicability of the alternative TBS index for the I_{TBS} 26 and 33 (see TS 36.213 [23, Table 7.1.7.2.1-1]) to all subframes scheduled by DCI format 2C or 2D. Value a26 refers to the alternative TBS index I_{TBS} 26A, and value a33 refers to the alternative TBS index I_{TBS} 33A. If this field is not configured, the UE shall use I_{TBS} 26 specified in Table 7.1.7.2.1-1 in TS 36.213 [23] for all subframes instead. If neither this field nor tbsIndexAlt2 configures an alternative TBS index for I_{TBS} 33, the UE shall use I_{TBS} 33 specified in Table 7.1.7.2.1-1 in TS 36.213 [23] for all subframes instead.

tbsIndexAlt2

Indicates the applicability of the alternative TBS index for the $h_{\rm BS}$ 33 (see TS 36.213 [23, Table 7.1.7.2.1-1]) to all subframes. Value b33 refers to the alternative TBS index $h_{\rm BS}$ 33B. If neither this field nor tbsIndexAlt configures an alternative TBS index for $h_{\rm BS}$ 33, the UE shall use $h_{\rm BS}$ 33 specified in Table 7.1.7.2.1-1 in TS 36.213 [23] for all subframes instead.

PDSCH-RE-MappingQCL-Configld

The IE *PDSCH-RE-MappingQCL-ConfigId* is used to identify a set of PDSCH parameters related to resource element mapping and quasi co-location, as configured by the IE *PDSCH-RE-MappingQCL-Config*. The identity is unique within the scope of a carrier frequency.

PDSCH-RE-MappingQCL-ConfigId information elements

```
-- ASN1START

PDSCH-RE-MappingQCL-ConfigId-r11 ::= INTEGER (1..maxRE-MapQCL-r11)

-- ASN1STOP
```

PerCC-GapIndicationList

The IE *PerCC-GapIndicationList* is used to specify the UE measurement gap preference.

PerCC-GapIndication information elements

```
-- ASN1START
PerCC-GapIndicationList-r14 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF PerCC-GapIndication-r14

PerCC-GapIndication-r14 ::= SEQUENCE {
    servCellId-r14 ServCellIndex-r13,
    gapIndication-r14 ENUMERATED {gap, ncsg, nogap-noNcsg}
}

-- ASN1STOP
```

PerCC-GapIndication field descriptions

servCellId

This field identifies the serving cell for which the measurement gap perference is provided.

gapIndication

This field is used to indicate the measurement gap preference per component carrier (serving cell) by the UE. Value gap indicates that a measurement gap is needed for the associated servCellId, value nogap-noNcsg indicates that neither a measurement gap nor a ncsg is needed for the associated servCellId, value ncsg indicates that ncsg is needed for the associated servCellId. The UE shall indicate the per CC measurement gap preference consistently for the same CA and measurement configuration during the same RRC connection.

PHICH-Config

The IE *PHICH-Config* is used to specify the PHICH configuration.

PHICH-Config information element

```
-- ASN1START

PHICH-Config ::= SEQUENCE {
    phich-Duration ENUMERATED {normal, extended}, phich-Resource ENUMERATED {oneSixth, half, one, two}
}

-- ASN1STOP
```

PHICH-Config field descriptions

phich-Duration

Parameter: PHICH-Duration, see TS 36.211 [21, Table 6.9.3-1].

phich-Resource

Parameter: Ng, see TS 36.211 [21, 6.9]. Value oneSixth corresponds to 1/6, half corresponds to 1/2 and so on.

PhysicalConfigDedicated

The IE *PhysicalConfigDedicated* is used to specify the UE specific physical channel configuration.

PhysicalConfigDedicated information element

```
-- ASN1START
```

```
PhysicalConfigDedicated ::=
                                SEQUENCE {
                                        PDSCH-ConfigDedicated
    pdsch-ConfigDedicated
                                                                         OPTIONAL,
                                                                                         -- Need ON
                                                                                         -- Need ON
    pucch-ConfigDedicated
                                        PUCCH-ConfigDedicated
                                                                         OPTIONAL,
                                                                         OPTIONAL,
    pusch-ConfigDedicated
                                        PUSCH-ConfigDedicated
                                                                                         -- Need ON
    uplinkPowerControlDedicated
                                        UplinkPowerControlDedicated
                                                                         OPTIONAL,
                                                                                         -- Need ON
    tpc-PDCCH-ConfigPUCCH
                                        TPC-PDCCH-Config
                                                                                         -- Need ON
                                                                         OPTIONAL,
    tpc-PDCCH-ConfigPUSCH
                                        TPC-PDCCH-Config
                                                                         OPTIONAL,
                                                                                         -- Need ON
    cqi-ReportConfig
                                        CQI-ReportConfig
                                                                                         -- Cond CQI-
                                                                         OPTIONAL,
r8
    {\tt soundingRS-UL-ConfigDedicated}
                                        SoundingRS-UL-ConfigDedicated
                                                                         OPTIONAL,
                                                                                         -- Need ON
                                        CHOICE {
    antennaInfo
        explicitValue
                                            AntennaInfoDedicated.
        default.Value
                                            NITIT.T.
                                                                         OPTIONAL,
                                                                                     -- Cond AI-r8
    schedulingRequestConfig
                                       SchedulingRequestConfig
                                                                         OPTIONAL,
                                                                                         -- Need ON
    [[ cqi-ReportConfig-v920
                                            COI-ReportConfig-v920
                                                                         OPTIONAL.
                                                                                         -- Cond COI-
r8
                                            AntennaInfoDedicated-v920
                                                                         OPTIONAL
        antennaInfo-v920
                                                                                         -- Cond AI-
r8
    11,
       antennaInfo-r10
                                        CHOICE {
            explicitValue-r10
                                            AntennaInfoDedicated-r10,
            defaultValue
                                            NULL
                                                                         OPTIONAL.
                                                                                     -- Cond AI-r10
                                                                         OPTIONAL,
        antennaInfoUL-r10
                                        AntennaInfoUL-r10
                                                                                         -- Need ON
                                                                                         -- Need ON
        cif-Presence-r10
                                        BOOLEAN
                                                                         OPTIONAL,
        cqi-ReportConfig-r10
                                        CQI-ReportConfig-r10
                                                                         OPTIONAL,
                                                                                     -- Cond CQI-r10
        csi-RS-Config-r10
                                        CSI-RS-Config-r10
                                                                         OPTIONAL,
                                                                                         -- Need ON
                                                                         OPTIONAL,
        pucch-ConfigDedicated-v1020
                                       PUCCH-ConfigDedicated-v1020
                                                                                         -- Need ON
        pusch-ConfigDedicated-v1020
                                                                         OPTIONAL,
                                       PUSCH-ConfigDedicated-v1020
                                                                                         -- Need ON
        schedulingRequestConfig-v1020 SchedulingRequestConfig-v1020
                                                                         OPTIONAL,
                                                                                         -- Need ON
        soundingRS-UL-ConfigDedicated-v1020
                                SoundingRS-UL-ConfigDedicated-v1020
                                                                                         -- Need ON
                                                                         OPTIONAL,
        soundingRS-UL-ConfigDedicatedAperiodic-r10
                            SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL,
                                                                                         -- Need ON
        uplinkPowerControlDedicated-v1020
                                    UplinkPowerControlDedicated-v1020
                                                                        OPTIONAL
                                                                                         -- Need ON
                                                    CHOICE {
    [[ additionalSpectrumEmissionCA-r10
            release
                                                    NULL.
                                                    SEQUENCE {
            setup
                additionalSpectrumEmissionPCell-r10
                                                        AdditionalSpectrumEmission
        }
                    OPTIONAL
                              -- Need ON
        \operatorname{\mathsf{--}} DL configuration as well as configuration applicable for DL and UL
        csi-RS-ConfigNZPToReleaseList-r11
                                    CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL,
                                                                                         -- Need ON
        csi-RS-ConfigNZPToAddModList-r11
                                    CSI-RS-ConfigNZPToAddModList-r11
                                                                         OPTIONAL,
                                                                                         -- Need ON
        csi-RS-ConfigZPToReleaseList-r11
                                    CSI-RS-ConfigZPToReleaseList-r11
                                                                         OPTIONAL,
                                                                                         -- Need ON
        csi-RS-ConfigZPToAddModList-r11 CSI-RS-ConfigZPToAddModList-r11 OPTIONAL,
                                                                                         -- Need ON
                                                                         OPTIONAL,
                                                                                         -- Need ON
        epdcch-Config-rll
                                       EPDCCH-Config-r11
                                        PDSCH-ConfigDedicated-v1130
                                                                         OPTIONAL,
                                                                                         -- Need ON
        pdsch-ConfigDedicated-v1130
    -- UL configuration
       cqi-ReportConfig-v1130
                                        CQI-ReportConfig-v1130
                                                                         OPTIONAL,
                                                                                         -- Need ON
                                                                         OPTIONAL,
        pucch-ConfigDedicated-v1130
                                        PUCCH-ConfigDedicated-v1130
                                                                                         -- Need ON
        pusch-ConfigDedicated-v1130
                                                                                         -- Need ON
                                        PUSCH-ConfigDedicated-v1130
                                                                         OPTIONAL.
        {\tt uplinkPowerControlDedicated-v1130}
                                    UplinkPowerControlDedicated-v1130
                                                                         OPTIONAL
                                                                                         -- Need ON
    [[ antennaInfo-v1250
                                        AntennaInfoDedicated-v1250
                                                                         OPTIONAL,
                                                                                     -- Cond AI-r10
        eimta-MainConfig-r12
                                        EIMTA-MainConfig-r12
                                                                         OPTIONAL,
                                                                                         -- Need ON
                                                                         OPTIONAL,
                                                                                         -- Need ON
        eimta-MainConfigPCell-r12
                                        EIMTA-MainConfigServCell-r12
        pucch-ConfigDedicated-v1250
                                        PUCCH-ConfigDedicated-v1250
                                                                         OPTIONAL,
                                                                                         -- Need ON
        cqi-ReportConfigPCell-v1250
                                        CQI-ReportConfig-v1250
                                                                         OPTIONAL,
                                                                                         -- Need ON
        uplinkPowerControlDedicated-v1250
                                    UplinkPowerControlDedicated-v1250
                                                                         OPTIONAL,
                                                                                         -- Need ON
        pusch-ConfigDedicated-v1250
                                        PUSCH-ConfigDedicated-v1250
                                                                         OPTIONAL,
                                                                                         -- Need ON
        csi-RS-Config-v1250
                                            CSI-RS-Config-v1250
                                                                         OPTIONAL
                                                                                         -- Need ON
    ]],
    [[ pdsch-ConfigDedicated-v1280
                                            PDSCH-ConfigDedicated-v1280 OPTIONAL
                                                                                         -- Need ON
    ]],
    [[ pdsch-ConfigDedicated-v1310
                                            PDSCH-ConfigDedicated-v1310 OPTIONAL,
                                                                                         -- Need ON
        pucch-ConfigDedicated-r13
                                            PUCCH-ConfigDedicated-r13 OPTIONAL,
                                                                                         -- Need ON
        pusch-ConfigDedicated-r13
                                                                                         -- Need ON
                                            PUSCH-ConfigDedicated-r13 OPTIONAL,
```

```
pdcch-CandidateReductions-r13
                                                                    PDCCH-CandidateReductions-r13 OPTIONAL,
                                                                                                                                                        -- Need ON
                                                                                 CQI-ReportConfig-v1310 OPTIONAL,
                                                                                                                                                       -- Need ON
             cgi-ReportConfig-v1310
              soundingRS-UL-ConfigDedicated-v1310
                                                      SoundingRS-UL-ConfigDedicated-v1310
                                                                                                                           OPTIONAL,
                                                                                                                                                       -- Need ON
              soundingRS-UL-ConfigDedicatedUpPTsExt-r13
                                         SoundingRS-UL-ConfigDedicatedUpPTsExt-r13
                                                                                                                           OPTIONAL,
                                                                                                                                                       -- Need ON
              soundingRS-UL-ConfigDedicatedAperiodic-v1310
                                         SoundingRS-UL-ConfigDedicatedAperiodic-v1310
                                                                                                                           OPTIONAL,
                                                                                                                                                       -- Need ON
              soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13
                        SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13
                                                                                                                           OPTIONAL,
                                                                                                                                                       -- Need ON
                                                                     CSI-RS-Config-v1310
              csi-RS-Config-v1310
                                                                                                                           OPTIONAL,
                                                                                                                                                       -- Need ON
                                                              CHOICE {
              ce-Mode-r13
                   release
                                                                     NULL,
                    setup
                                                                     ENUMERATED {ce-ModeA,ce-ModeB}
                                                                                                                            OPTIONAL, -- Need ON
              csi-RS-ConfigNZPToAddModListExt-r13 CSI-RS-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need
ON
              Need ON
      ]],
       [[ cqi-ReportConfig-v1320
                                                                                 CQI-ReportConfig-v1320 OPTIONAL
                                                                                                                                                      -- Need ON
       ]],
       [ [
            typeA-SRS-TPC-PDCCH-Group-r14 CHOICE {
                    release
                                                                           NULL.
                                                                            SEQUENCE (SIZE (1..32)) OF SRS-TPC-PDCCH-Config-r14
                    setup
                                                                                                                         OPTIONAL,
                                                                                                                                                     -- Need ON
              must-Config-r14
                                                                                  CHOICE {
                   release
                                                                                  NULL,
                                                                                  SEQUENCE {
                    setup
                                                                                  ENUMERATED {11, 13},
                          k-max-r14
                          p-a-must-r14
                                                                                  ENUMERATED {
                                                                                         dB-6, dB-4dot77, dB-3, dB-1dot77,
                                                                                         dB0, dB1, dB2, dB3} OPTIONAL
                                                                                                                                                       -- Need ON
                    }
                                                                                                                   OPTIONAL, -- Need ON OPTIONAL, -- Need
             pusch-EnhancementsConfig-r14 PUSCH-EnhancementsConfig-r14
ON
             ce-pdsch-pusch-EnhancementConfig-r14 ENUMERATED {on} OPTIONAL, -- Need OR antennaInfo-v1430 AntennaInfoDedicated-v1430 OPTIONAL, -- Need ON pucch-ConfigDedicated-v1430 PUCCH-ConfigDedicated-v1430 OPTIONAL, -- Need ON pdsch-ConfigDedicated-v1430 PDSCH-ConfigDedicated-v1430 OPTIONAL, -- Need ON pusch-ConfigDedicated-v1430 PUSCH-ConfigDedicated-v1430 OPTIONAL, -- Need ON
             ce-pdsch-pusch-EnhancementConfig-r14
                                                                                                                                                       -- Need ON
              soundingRS-UL-PeriodicConfigDedicatedList-r14 SEQUENCE (SIZE (1..2)) OF
SoundingRS-UL-ConfigDedicated OPTIONAL, -- Cond PeriodicSRSPCell
             soundingRS-UL-PeriodicConfigDedicatedUpPTsExtList-r14 SEQUENCE (SIZE (1..4)) OF
SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL, -- Cond PeriodicSRSExt soundingRS-UL-AperiodicConfigDedicatedList-r14 SEQUENCE (SIZE (1..2)) OF SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL, -- Cond AperiodicSRS
             soundingRS-UL-ConfigDedicatedApUpPTsExtList-r14 SEQUENCE (SIZE (1..4)) OF SoundingRS-UL-
ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL, -- Cond AperiodicSRSExt csi-RS-Config-v1430 CSI-RS-Config-v1430 OPTIONAL, -- Need ON csi-RS-ConfigZP-ApList-r14 CSI-RS-ConfigZP-ApList-r14 OPTIONAL, -- Need ON cqi-ReportConfig-v1430 CQI-ReportConfig-v1430 OPTIONAL, -- Need ON conj-Operiod ConfigZP-ApList-r14 OPTIONAL, -- Need ON conj-Operiod Conj-Oper
                                                                                  CQI-ReportConfig-v1430 OPTIONAL, -- Need ON BOOLEAN OPTIONAL -- Need ON
             semiOpenLoop-r14
      ]]
PhysicalConfigDedicated-v1370 ::= SEQUENCE {
      pucch-ConfigDedicated-v1370 PUCCH-ConfigDedicated-v1370 OPTIONAL
                                                                                                                                                     -- Need ON
PhysicalConfigDedicatedSCell-r10 ::= SEQUENCE {
       -- DL configuration as well as configuration applicable for DL and UL
      nonUL-Configuration-r10
                                                                          SEQUENCE {
             antennaInfo-r10
                                                                           AntennaInfoDedicated-r10 OPTIONAL,
             crossCarrierSchedulingConfig-r10
                                                CrossCarrierSchedulingConfig-r10 OPTIONAL, CSI-RS-Config-r10 OPTIONAL,
                                                                                                                                                       -- Need ON
                                                                                                                                                      -- Need ON
             csi-RS-Config-r10
                                                                                  PDSCH-ConfigDedicated OPTIONAL
                                                                                                                                                      -- Need ON
             pdsch-ConfigDedicated-r10
                                                                                                                                             -- Cond SCellAdd
       }
                                                                                                                           OPTIONAL,
       -- UL configuration
                                                                        SEQUENCE {
       ul-Configuration-r10
                                                                               AntennaInfoUL-r10 OPTIONAL, -- Need ON
             antennaInfoUL-r10
             pusch-ConfigDedicatedSCell-r10
                                                      PUSCH-ConfigDedicatedSCell-r10
                                                                                                                 OPTIONAL, -- Cond PUSCH-SCell1
             uplinkPowerControlDedicatedSCell-r10
```

```
UplinkPowerControlDedicatedSCell-r10
                                                                 OPTIONAL,
                                                                                 -- Need ON
       cqi-ReportConfigSCell-r10
                                        CQI-ReportConfigSCell-r10 OPTIONAL,
                                                                                 -- Need ON
       soundingRS-UL-ConfigDedicated-r10
                                     SoundingRS-UL-ConfigDedicated OPTIONAL,
                                                                                 -- Need ON
       soundingRS-UL-ConfigDedicated-v1020
                                 SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL,
       soundingRS-UL-ConfigDedicatedAperiodic-r10
                         SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL
                                                                              -- Need ON
   }
                                                                  OPTIONAL,
                                                                             -- Cond CommonUL
   [[ -- DL configuration as well as configuration applicable for DL and UL
       csi-RS-ConfigNZPToReleaseList-r11
                                 CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL,
                                                                                 -- Need ON
       csi-RS-ConfigNZPToAddModList-r11
                                 CSI-RS-ConfigNZPToAddModList-r11
                                                                  OPTIONAL,
       csi-RS-ConfigZPToReleaseList-r11
                                 CSI-RS-ConfigZPToReleaseList-r11 OPTIONAL,
                                                                                 -- Need ON
       csi-RS-ConfigZPToAddModList-r11
                                    CSI-RS-ConfigZPToAddModList-r11 OPTIONAL,
                                                                                 -- Need ON
       epdcch-Config-r11
                                        EPDCCH-Config-r11
                                                                  OPTIONAL,
                                                                                 -- Need ON
       pdsch-ConfigDedicated-v1130
                                        PDSCH-ConfigDedicated-v1130 OPTIONAL,
                                                                                 -- Need ON
   -- UL configuration
       cqi-ReportConfig-v1130
                                      CQI-ReportConfig-v1130
                                                              OPTIONAL,
       pusch-ConfigDedicated-v1130
                                 PUSCH-ConfigDedicated-v1130 OPTIONAL, -- Cond PUSCH-SCell1
       uplinkPowerControlDedicatedSCell-v1130
                                UplinkPowerControlDedicated-v1130 OPTIONAL
                                                                                 -- Need ON
   ]],
   [[ antennaInfo-v1250
                                        AntennaInfoDedicated-v1250 OPTIONAL,
                                                                                 -- Need ON
       eimta-MainConfigSCell-r12
       cqi-ReportConfigSCell-v1250 COI-ReportConfig. v1252
                                                                                 -- Need ON
                                                                OPTIONAL,
                                                                                 -- Need ON
       uplinkPowerControlDedicatedSCell-v1250
                                UplinkPowerControlDedicated-v1250 OPTIONAL,
                                                                                 -- Need ON
       csi-RS-Config-v1250
                                        CSI-RS-Config-v1250
                                                                  OPTIONAL
                                                                                 -- Need ON
                                        PDSCH-ConfigDedicated-v1280 OPTIONAL
   [[ pdsch-ConfigDedicated-v1280
                                                                                 -- Need ON
   ]],
                                        ENUMERATED {true} OPTIONAL, -- Cond PUCCH-SCell1
     pucch-Cell-r13
   ] ]
                                        CHOICE {
       pucch-SCell
          release
                                            NULL.
                                            SEQUENCE {
           setup
              pucch-ConfigDedicated-r13
                                        PUCCH-ConfigDedicated-r13 OPTIONAL,
                                                                                 -- Need ON
              schedulingRequestConfig-r13
                                 SchedulingRequestConfigSCell-r13 OPTIONAL,
                                                                                 -- Need ON
              tpc-PDCCH-ConfigPUCCH-SCell-r13
                                        TPC-PDCCH-ConfigSCell-r13 OPTIONAL,
                                                                                 -- Need ON
              pusch-ConfigDedicated-r13
                                    PUSCH-ConfigDedicated-r13 OPTIONAL, -- Cond PUSCH-SCell
              uplinkPowerControlDedicated-r13
                            UplinkPowerControlDedicatedSCell-v1310 OPTIONAL
                                                                              -- Need ON
          }
                                                                  OPTIONAL,
                                                                             -- Need ON
       crossCarrierSchedulingConfig-r13
                     CrossCarrierSchedulingConfig-r13
                                                       OPTIONAL, -- Cond Cross-Carrier-Config
       pdcch-ConfigSCell-r13
                             PDCCH-ConfigSCell-r13
                                                                  OPTIONAL, -- Need ON
       cqi-ReportConfig-v1310
                                        CQI-ReportConfig-v1310
                                                                  OPTIONAL,
                                                                                 -- Need ON
       pdsch-ConfigDedicated-v1310
                                        PDSCH-ConfigDedicated-v1310 OPTIONAL,
                                                                                 -- Need ON
       soundingRS-UL-ConfigDedicated-v1310
                             SoundingRS-UL-ConfigDedicated-v1310
                                                                 OPTIONAL,
                                                                                 -- Need ON
       soundingRS-UL-ConfigDedicatedUpPTsExt-r13
                         SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL,
                                                                                 -- Need ON
       soundingRS-UL-ConfigDedicatedAperiodic-v1310
                     SoundingRS-UL-ConfigDedicatedAperiodic-v1310 OPTIONAL,
                                                                                 -- Need ON
       soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13
                  SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL,
                                                                                 -- Need ON
                                CSI-RS-Config-v1310 OPTIONAL,
       csi-RS-Config-v1310
                                                                                 -- Need ON
                                        LAA-SCellConfiguration-r13 OPTIONAL,
       laa-SCellConfiguration-r13
                                                                                 -- Need ON
       csi-RS-ConfigNZPToAddModListExt-r13 CSI-RS-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need
ON
       Need ON
   ]],
   [[ cqi-ReportConfig-v1320
                                        CQI-ReportConfig-v1320 OPTIONAL -- Need ON
   11,
   [[ laa-SCellConfiguration-v1430
                                        LAA-SCellConfiguration-v1430
                                                                  OPTIONAL, -- Need ON
```

```
typeB-SRS-TPC-PDCCH-Config-r14 SRS-TPC-PDCCH-Config-r14 OPTIONAL, -- Need ON
                                                      UplinkPUSCH-LessPowerControlDedicated-
       uplinkPUSCH-LessPowerControlDedicated-v1430
v1430 OPTIONAL,
                  -- Need ON
        soundingRS-UL-PeriodicConfigDedicatedList-r14
                                                                      SEQUENCE (SIZE (1..2)) OF
                                                                   -- Cond PeriodicSRS
SoundingRS-UL-ConfigDedicated
                                                   OPTIONAL,
        soundingRS-UL-PeriodicConfigDedicatedUpPTsExtList-r14
                                                                              SEQUENCE (SIZE
(1..4)) OF SoundingRS-UL-ConfigDedicatedUpPTsExt-r13
                                                                                          -- Cond
                                                                            OPTIONAL,
PeriodicSRSExt
       sounding RS-UL-Aperio dic Config Dedicated List-r14\\
                                                                      SEQUENCE (SIZE (1..2)) OF
                                               OPTIONAL,
                                                               -- Cond AperiodicSRS
SoundingRS-AperiodicSet-r14
        soundingRS-UL-ConfigDedicatedApUpPTsExtList-r14
                                                                      SEQUENCE (SIZE (1..4)) OF
                                               OPTIONAL,
                                                               -- Cond AperiodicSRSExt
SoundingRS-AperiodicSetUpPTsExt-r14
        must-Config-r14
                                               CHOICE {
           release
                                               NULL,
                                               SEQUENCE {
           setup
                                               ENUMERATED {11, 13},
               k-max-r14
               p-a-must-r14
                                               ENUMERATED
                                                   dB-6, dB-4dot77, dB-3, dB-1dot77,
                                                   dB0, dB1, dB2, dB3} OPTIONAL
                                                                                       -- Need ON
                                                                   OPTIONAL,
                                                                                  -- Need ON
                                              PUSCH-ConfigDedicatedSCell-v1430 OPTIONAL,
       pusch-ConfigDedicated-v1430
Need ON
                                               CSI-RS-Config-v1430 OPTIONAL, --
CSI-RS-ConfigZP-ApList-r14 OPTIONAL,
       csi-RS-Config-v1430
                                                                                      -- Need ON
        csi-RS-ConfigZP-ApList-r14
                                                                                         -- Need
ON
       cqi-ReportConfig-v1430
                                               CQI-ReportConfig-v1430 OPTIONAL, -- Need ON
                                                                          OPTIONAL, -- Need ON
       semiOpenLoop-r14
                                               BOOLEAN
       pdsch-ConfigDedicatedSCell-v1430
                                              PDSCH-ConfigDedicatedSCell-v1430
    -- Need ON
    ]]
}
PhysicalConfigDedicatedSCell-v1370 ::= SEQUENCE {
   pucch-SCell-v1370
                                   CHOICE {
       release
                                      NULL
                                       SEQUENCE {
       setup
           pucch-ConfigDedicated-v1370
                                          PUCCH-ConfigDedicated-v1370
                                                                         OPTIONAL
                                                                                      -- Need ON
    }
}
LAA-SCellConfiguration-r13 ::=
                                       SEQUENCE {
    subframeStartPosition-r13
                                           ENUMERATED {s0, s07},
    laa-SCellSubframeConfig-r13
                                           BIT STRING (SIZE(8))
LAA-SCellConfiguration-v1430 ::= SEQUENCE {
    crossCarrierSchedulingConfig-UL-r14 CHOICE {
       release
                                               NULL,
                                               SEQUENCE {
        setup
           crossCarrierSchedulingConfigLAA-UL-r14
                                                      CrossCarrierSchedulingConfigLAA-UL-r14
                                                      OPTIONAL, -- Cond Cross-Carrier-ConfigUL
    lbt-Config-r14
                                                                    OPTIONAL,
                                                                                      -- Need ON
                                               LBT-Config-r14
                                                                                      -- Need ON
    pdcch-ConfigLAA-r14
                                               PDCCH-ConfigLAA-r14
                                                                      OPTIONAL,
    absenceOfAnyOtherTechnology-r14
                                          ENUMERATED {true}
                                                                 OPTIONAL,
                                                                                  -- Need OR
    soundingRS-UL-ConfigDedicatedAperiodic-v1430
                       SoundingRS-UL-ConfigDedicatedAperiodic-v1430 OPTIONAL
                                                                                      -- Need ON
}
LBT-Config-r14 ::=
                       CHOICE {
   maxEnergyDetectionThreshold-r14
                                               INTEGER(-85..-52),
    energyDetectionThresholdOffset-r14
                                              INTEGER(-13..20)
CSI-RS-ConfigNZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZP-
CSI-RS-ConfigNZPToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-
ConfigNZP-r11
CSI-RS-ConfigNZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-
ConfigNZPId-r11
CSI-RS-ConfigNZPToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-
ConfigNZPId-v1310
```

```
CSI-RS-ConfigZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZP-r11
CSI-RS-ConfigZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZPId-
SoundingRS-AperiodicSet-r14 ::= SEQUENCE{
   srs-CC-SetIndexList-r14
                               SEQUENCE (SIZE (1..4)) OF SRS-CC-SetIndex-r14
                                                           OPTIONAL, -- Cond SRS-Trigger-TypeA
   soundingRS-UL-ConfigDedicatedAperiodic-r14
                                               SoundingRS-UL-ConfigDedicatedAperiodic-r10
}
SoundingRS-AperiodicSetUpPTsExt-r14 ::= SEQUENCE{
   srs-CC-SetIndexList-r14
                               SEQUENCE (SIZE (1..4)) OF SRS-CC-SetIndex-r14
                                                           OPTIONAL, -- Cond SRS-Trigger-TypeA
    soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r14
                                           SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13
}
-- ASN1STOP
```

PhysicalConfigDedicated field descriptions

absenceOfAnyOtherTechnology

Presence of this field indicates absence on a long term basis (e.g. by level of regulation) of any other technology sharing the carrier; absence of this field indicates the potential presence of any other technology sharing the carrier, as specified in TS 36.213 [23].

additionalSpectrumEmissionPCell

E-UTRAN does not configure this field in this release of the specification.

antennalnfo

A choice is used to indicate whether the *antennalnfo* is signalled explicitly or set to the default antenna configuration as specified in section 9.2.4.

ce-Mode

Indicates the CE mode as specified in TS 36.213 [23].

ce-pdsch-pusch-Enhancement-Config

Activation of new numbers of repetitions for PUSCH and modulation restrictions for PDSCH/PUSCH in CE mode A, see TS 36.212 [22] and TS 36.213 [23].

csi-RS-Config

For a serving frequency E-UTRAN does not configure *csi-RS-Config* (includes *zeroTxPowerCSI-RS*) when transmission mode 10 is configured for the serving cell on this carrier frequency.

csi-RS-ConfigNZPToAddModList

For a serving frequency E-UTRAN configures one or more *CSI-RS-ConfigNZP* only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency. For a serving frequency, EUTRAN configures a maximum number of *CSI-RS-ConfigNZP* in accordance with transmission mode (including CSI processes), eMIMO (including class) and associated UE capabilities (e.g. k-Max, n-MaxList).

csi-RS-ConfigZP-ApList

The aperiodic ZP CSI-RS for PDSCH rate matching. The field *subframeConfig* is applicable to semi-persistent CSI RS reporting. In other cases, the UE shall ignore field *subframeConfig*.

csi-RS-ConfigZPToAddModList

For a serving frequency E-UTRAN configures one or more *CSI-RS-ConfigZP* only when transmission mode 10 is configured for the serving cell on this carrier frequency.

eimta-MainConfigPCell, eimta-MainConfigSCell

If E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for one serving cell in a frequency band, E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for all serving cells residing on the frequency band. E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell only if eimta-MainConfig is configured.

energyDetectionThresholdOffset

Indicates the offset to the default maximum energy detection threshold value. Unit in dB. Value -13 corresponds to -13dB, value -12 corresponds to -12dB, and so on (i.e. in steps of 1dB) as specified in TS 36.213 [23].

epdcch-Config

indicates the *EPDCCH-Config* for the cell. E-UTRAN does not configure *EPDCCH-Config* for an SCell that is configured with value *other* for *schedulingCellInfo* in *CrossCarrierSchedulingConfig*.

k-max

Indicates the maximum number of interfering spatial layers signaled in the assistance information for MUST. Value I1 corresponds to 1 layer, Value I3 corresponds to 3 layers.

laa-SCellSubframeConfig

A bit-map indicating LAA SCell subframe configuration, "1" denotes that the corresponding subframe is allocated as MBSFN subframe. The bitmap is interpreted as follows:

Starting from the first/leftmost bit in the bitmap, the allocation applies to subframes #1, #2, #3, #4, #6, #7, #8, and #9.

maxEnergyDetectionThreshold

Indicates the absolute maximum energy detection threshold value. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm) as specified in TS 36.213 [23]. If the field is not configured, the UE shall use a default maximum energy detection threshold value as specified in TS 36.213 [23].

p-a-must

Parameter: P_A , see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

pdsch-ConfigDedicated-v1130

For a serving frequency E-UTRAN configures *pdsch-ConfigDedicated-v1130* only when transmission mode 10 is configured for the serving cell on this carrier frequency.

pdsch-ConfigDedicated-v1280

For a serving frequency E-UTRAN configures *pdsch-ConfigDedicated-v1280* only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency.

pucch-Cell

If present, PUCCH feedback of this SCell is sent on the PUCCH SCell. If absent, PUCCH feedback of this SCell is sent on PCell or PSCell, or if the cell concerns the PUCCH SCell, on the concerned cell. If this field is not modified upon change of PUCCH SCell, the UE shall always send the PUCCH feedback of the concerned SCell using the configured PUCCH SCell.

pucch-ConfigDedicated-r13

E-UTRAN configures pucch-ConfigDedicated-r13 only if pucch-ConfigDedicated is not configured.

pucch-ConfigDedicated-v1370

E-UTRAN only configures pucch-ConfigDedicated-v1370 if pucch-ConfigDedicated-r13 is configured.

PhysicalConfigDedicated field descriptions

pucch-SCell

If present, the concerned SCell is the PUCCH SCell. E-UTRAN only configures this field upon SCell addition i.e. this field is only released when the SCell is released.

pusch-ConfigDedicated-r13

E-UTRAN configures pusch-ConfigDedicated-r13 only if pusch-ConfigDedicated is not configured.

pusch-ConfigDedicated-v1250

E-UTRAN configures pusch-ConfigDedicated-v1250 only if tpc-SubframeSet is configured.

pusch-EnhancementsConfig

Indicates that the UE shall transmit in the PUSCH enhancement mode if *pusch-EnhancementsConfig* is set to *setup*, see TS 36.211 [21] and TS 36.213 [23].

semiOpenLoop

Value TRUE indicates that semi-open-loop transmission is used for deriving CSI reporting and corresponding PDSCH transmission (DMRS).

soundingRS-UL-PeriodicConfigDedicatedList

Indicates periodic soundingRS configuration except for the extension sounding symbols of the UpPTs subframe.

soundingRS-UL-PeriodicConfigDedicatedUpPTsExtList

Indicates periodic soundingRS configuration in extension sounding symbols of the UpPTs subframe.

soundingRS-UL-AperiodicConfigDedicatedList

Indicates aperiodic soundingRS configuration except for the extension sounding symbols of the UpPTs subframe.

soundingRS-UL-DedicatedApUpPTsExtList

Indicates aperiodic soundingRS configuration in extension sounding symbols of the UpPTs subframe.

srs-CC-SetIndexList

Indicates the srs-CC-SetIndex list which the soundingRS-UL-ConfigDedicatedAperiodic and soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt belongs to.

subframeStartPosition

Indicates possible starting positions of transmission in the first subframe of the DL transmission burst, see TS 36.211 [21]. Value *s0* means the starting position is subframe boundary, *s07* means the starting position is either subframe boundary or slot boundary.

tpc-PDCCH-ConfigPUCCH

PDCCH configuration for power control of PUCCH using format 3/3A, see TS 36.212 [22].

tpc-PDCCH-ConfigPUSCH

PDCCH configuration for power control of PUSCH using format 3/3A, see TS 36.212 [22].

typeA-SRS-TPC-PDCCH-Group

Indicates Type A trigger configuration for SRS transmission on a PUSCH-less SCell. E-UTRAN configures the UE with either *typeA-SRS-TPC-PDCCH-Group* or *typeB-SRS-TPC-PDCCH-Group*, if any.

uplinkPowerControlDedicated

E-UTRAN configures *uplinkPowerControlDedicated-v1130* only if *uplinkPowerControlDedicated* (without suffix) is configured.

uplinkPowerControlDedicatedSCell

E-UTRAN configures *uplinkPowerControlDedicatedSCell-v1130* only if *uplinkPowerControlDedicatedSCell-r10* is configured for this serving cell.

Conditional presence	Explanation	
AI-r8	The field is optionally present, need ON, if <i>antennalnfoDedicated-r10</i> is absent. Otherwise the field is not present	
AI-r10	The field is optionally present, need ON, if antennalnfoDedicated is absent. Otherwise the	
	field is not present	
AperiodicSRS	If soundingRS-UL-ConfigDedicatedAperiodic-r10 is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field.	
AperiodicSRSExt	If soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 is absent, the field is optional,	
•	Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field.	
CommonUL	The field is mandatory present if <i>ul-Configuration</i> of <i>RadioResourceConfigCommonSCell- r10</i> is present; otherwise it is optional, need ON.	
CQI-r8	The field is optionally present, need ON, if cqi-ReportConfig-r10 is absent. Otherwise the field is not present	
CQI-r10	The field is optionally present, need ON, if <i>cqi-ReportConfig</i> is absent. Otherwise the field is not present	
Cross-Carrier-Config	The field is optionally present, need ON, if crossCarrierSchedulingConfig-r10 is absent. Otherwise the field is not present	
Cross-Carrier-ConfigUL	The field is optionally present, need ON, if crossCarrierSchedulingConfig-r10 and crossCarrierSchedulingConfig-r13 are absent or schedulingCellInfo is set to 'own'. Otherwise the field is not present.	
PeriodicSRS	If soundingRS-UL-ConfigDedicated-r10 is absent, the field is optional, Need ON.	
	Otherwise the field is not present and the UE shall delete any existing value for this field.	
PeriodicSRSPCell	If soundingRS-UL-ConfigDedicated is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field.	
PeriodicSRSExt	If soundingRS-UL-ConfigDedicatedUpPTsExt-r13 is absent, the field is optional, Need ON. Otherwise the field is not present and the UE shall delete any existing value for this field.	
PUCCH-SCell1	The field is optionally present, need OR, for SCell not configured with <i>pucch-configDedicated-r13</i> . Otherwise it is not present.	
PUSCH-SCell	The field is optionally present, need ON, if <i>pusch-ConfigDedicatedSCell-r10</i> and <i>pusch-ConfigDedicated-v1130</i> are absent. Otherwise the field is not present	
PUSCH-SCell1	The field is optionally present, need ON, for SCell not configured with <i>pucch-configDedicated-r13</i> . Otherwise it is not present.	
SCellAdd	The field is mandatory present if <i>cellIdentification</i> is present; otherwise it is optional, need ON.	
SRS-Trigger-TypeA	The field is mandatory present if <i>typeA-SRS-TPC-PDCCH-Group-r14</i> is present. Otherwise the field is not present and the UE shall delete any existing value for this field.	

NOTE 1: During handover, the UE performs a MAC reset, which involves reverting to the default CQI/ SRS/ SR configuration in accordance with subclause 5.3.13 and TS 36.321 [6, 5.9 & 5.2]. Hence, for these parts of the dedicated radio resource configuration, the default configuration (rather than the configuration used in the source PCell) is used as the basis for the delta signalling that is included in the message used to perform handover.

NOTE 2: Since delta signalling is not supported for the common SCell configuration, E-UTRAN can only add or release the uplink of an SCell by releasing and adding the concerned SCell.

The IE *P-Max* is used to limit the UE's uplink transmission power on a carrier frequency and is used to calculate the parameter *Pcompensation* defined in TS 36.304 [4]. Corresponds to parameter P_{EMAX} or P_{EMAX,c} in TS 36.101 [42]. The UE transmit power on one serving cell shall not exceed the configured maximum UE output power of the serving cell determined by this value as specified in TS 36.101 [42, 6.2.5 or 6.2.5A] or, when transmitting sidelink discovery announcements within the coverage of the concerned cell, as specified in TS 36.101 [42, 6.2.5D].

P-Max information element

ASN1START			
P-Max ::=	INTEGER (-3033)		
ASN1STOP			

PRACH-Config

The IE *PRACH-ConfigSIB* and IE *PRACH-Config* are used to specify the PRACH configuration in the system information and in the mobility control information, respectively.

PRACH-Config information elements

```
-- ASN1START
PRACH-ConfigSIB ::=
   rootSequenceIndex
                               SEQUENCE {
                                       INTEGER (0..837),
                                       PRACH-ConfigInfo
PRACH-ConfigSIB-v1310 ::=
                              SEQUENCE {
   rsrp-ThresholdsPrachInfoList-r13
                                         RSRP-ThresholdsPrachInfoList-r13,
    mpdcch-startSF-CSS-RA-r13
                                       CHOICE {
       fdd-r13
                                         ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8,
                                           ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare}
       tdd-r13
                                                                          OPTIONAL, -- Cond MP
    prach-HoppingOffset-r13
                                       INTEGER (0..94)
                                                                          OPTIONAL,
                                                                                      -- Need OR
   prach-ParametersListCE-r13
                                     PRACH-ParametersListCE-r13
}
PRACH-Config ::=
                                   SEQUENCE {
   rootSequenceIndex
                                       INTEGER (0..837),
   prach-ConfigInfo
                                       PRACH-ConfigInfo
                                                                         OPTIONAL
                                                                                      -- Need ON
PRACH-Config-v1310 ::=
   rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsPrachInfoList-r13
                                                                                 OPTIONAL.
Cond MP
   mpdcch-startSF-CSS-RA-r13
                                      CHOICE {
        fdd-r13
                                           ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8,
        tdd-r13
                                           ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare}
                                                                          OPTIONAL,
                                                                                     -- Cond MP
   }
prach-HoppingOffset-r13
prach-ParametersListCE-r13
                                     INTEGER (0..94)
                                                                          OPTIONAL,
                                                                                      -- Need OR
                                      PRACH-ParametersListCE-r13
                                                                          OPTIONAL,
    initial-CE-level-r13
                                          INTEGER (0..3) OPTIONAL
                                                                          -- Need OR
}
   rootSequenceIndexHighSpeed-r14
zeroCorrelation
PRACH-Config-v1430 ::=
                                               INTEGER (0..837),
   rootSequenceIndexHighSpeed-r14 INTEGER (0..837) zeroCorrelationZoneConfigHighSpeed-r14 INTEGER (0..12),
   prach-ConfigIndexHighSpeed-r14
                                              INTEGER (0..63),
   prach-FreqOffsetHighSpeed-r14
                                               INTEGER (0..94)
}
PRACH-ConfigSCell-r10 ::=
                                     SEQUENCE {
   prach-ConfigIndex-r10
                                          INTEGER (0..63)
   Ln-configInfo ::=
prach-ConfigIndex
highSpeedFlag
                                   SEQUENCE {
PRACH-ConfigInfo ::=
                                      INTEGER (0..63),
                                       BOOLEAN,
    zeroCorrelationZoneConfig
                                       INTEGER (0..15),
                                       INTEGER (0..94)
    prach-FreqOffset
PRACH-ParametersListCE-r13 ::= SEQUENCE (SIZE(1..maxCE-Level-r13)) OF PRACH-ParametersCE-r13
   CH-ParametersCE-r13 ::=
prach-ConfigIndex-r13
prach-FregOffset-r13
PRACH-ParametersCE-r13 ::=
                                  SEQUENCE {
                                          INTEGER (0..63),
    prach-FreqOffset-r13
                                            INTEGER (0..94),
   prach-StartingSubframe-r13
                                           ENUMERATED {sf2, sf4, sf8, sf16, sf32, sf64, sf128,
                                                      sf256}
                                                                          OPTIONAL,
                                                                                      -- Need OP
   maxNumPreambleAttemptCE-r13
                              ENUMERATED {n3, n4, n5, n6, n7, n8, n10} OPTIONAL,
   INTEGER (1..maxAvailNarrowBands-r13),
    mpdcch-NumRepetition-RA-r13
                                          ENUMERATED {r1, r2, r4, r8, r16,
                                                      r32, r64, r128, r256},
   prach-HoppingConfig-r13
                                           ENUMERATED {on,off}
}
```

RSRP-ThresholdsPrachInfoList-r13 ::= SEQUENCE (SIZE(1..3)) OF RSRP-Range
-- ASN1STOP

PRACH-Config field descriptions

initial-CE-level

Indicates initial PRACH CE level at random access, see TS 36.321 [6]. If not configured, UE selects PRACH CE level based on measured RSRP level, see TS 36.321 [6].

highSpeedFlag

Parameter: High-speed-flag, see TS 36.211 [21, 5.7.2]. TRUE corresponds to Restricted set and FALSE to Unrestricted set.

maxNumPreambleAttemptCE

Maximum number of preamble transmission attempts per CE level. See TS 36.321 [6].

If the field is absent, the UE shall use the default value n3.

mpdcch-NarrowbandsToMonitor

Narrowbands to monitor for MPDCCH for RAR, see TS 36.213 [23, 6.2]. Field values (1...maxAvailNarrowBands-r13) correspond to narrowband indices (0..[maxAvailNarrowBands-r13-1]) as specified in TS 36.211 [21].

mpdcch-NumRepetition-RA

Maximum number of repetitions for MPDCCH common search space (CSS) for RAR, Msg3 and Msg4, see TS 36.211 [21].

mpdcch-startSF-CSS-RA

Starting subframe configuration for MPDCCH common search space (CSS), including RAR, Msg3 retransmission, PDSCH with contention resolution and PDSCH with CCCH MAC SDU, see TS 36.211 [21] and TS 36.213 [23]. Value v1 corresponds to 1, value v1dot5 corresponds to 1.5, and so on.

numRepetitionPerPreambleAttempt

Number of PRACH repetitions per attempt for each CE level, See TS 36.211 [21].

prach-ConfigIndex

Parameter: prach-ConfigurationIndex, see TS 36.211 [21, 5.7.1].

prach-ConfigIndexHighSpeed

Parameter: prach-ConfigurationIndexHighSpeed, see TS 36.211 [21, 5.7.1]. If this field is present, the UE shall ignore prach-ConfigIndex.

prach-FreqOffset

Parameter: prach-FrequencyOffset, see TS 36.211 [21, 5.7.1]. For TDD the value range is dependent on the value of prach-ConfigIndex.

prach-FreqOffsetHighSpeed

Parameter: prach-FrequencyOffsetHighSpeed, see TS 36.211 [21, 5.7.1]. For TDD the value range is dependent on the value of prach-ConfigIndexHighSpeed. If this field is present, the UE shall ignore prach-FreqOffset.

prach-HoppingConfig

Coverage level specific frequency hopping configuration for PRACH.

prach-HoppingOffset

Parameter: PRACH frequency hopping offset, expressed as a number of resource blocks, see TS 36.211 [21, 5.7.1]

prach-ParametersListCE

Configures PRACH parameters for each CE level. The first entry in the list is the PRACH parameters of CE level 0, the second entry in the list is the PRACH parameters of CE level 1, and so on.

prach-StartingSubframe

PRACH starting subframe periodicity, expressed in number of subframes available for preamble transmission (PRACH opportunities), see TS 36.211 [21]. Value sf2 corresponds to 2 subframes, sf4 corresponds to 4 subframes and so on. EUTRAN configures the PRACH starting subframe periodicity larger than or equal to the number of PRACH repetitions per attempt for each CE level (numRepetitionPerPreambleAttempt).

If the field is absent, the value is determined implicitly in TS 36.211 [21, 5.7.1].

rootSequenceIndex

Parameter: RACH_ROOT_SEQUENCE, see TS 36.211 [21, 5.7.1].

rootSequenceIndexHighSpeed

The field indicates starting logical root sequence index used to derive the 64 random access preambles based on restricted set type B in high speed scenario, see TS 36.211 [21, 5.7.2]. If this field is present, the UE shall generate random access preambles based on restricted set type B and ignore *rootSequenceIndex*.

rsrp-ThresholdsPrachInfoList

The criterion for BL UEs and UEs in CE to select PRACH resource set. Up to 3 RSRP threshold values are signalled to determine the CE level for PRACH, see TS 36.213 [23]. The first element corresponds to RSRP threshold 1, the second element corresponds to RSRP threshold 2 and so on, see TS 36.321 [6]. The UE shall ignore this field if only one CE level, i.e. CE level 0, is configured in *prach-ParametersListCE*. The number of RSRP thresholds present in *rsrp-ThresholdsPrachInfoList* is equal to the number of CE levels configured in *prach-ParametersListCE* minus one.

zeroCorrelationZoneConfig

Parameter: N_{CS} configuration, see TS 36.211 [21, 5.7.2: table 5.7.2-2] for preamble format 0..3 and TS 36.211 [21, 5.7.2: table 5.7.2-3] for preamble format 4.

zeroCorrelationZoneConfigHighSpeed

The field indicates N_{CS} configuration for the restricted set type B in high speed scenario, see TS 36.211 [21, 5.7.2]. If this field is present, the UE shall generate random access preambles based on restricted set type B and ignore zeroCorrelationZoneConfig.

Conditional presence	Explanation	
MP	The field is mandatory present.	

PresenceAntennaPort1

The IE *PresenceAntennaPort1* is used to indicate whether all the neighbouring cells use Antenna Port 1. When set to *TRUE*, the UE may assume that at least two cell-specific antenna ports are used in all neighbouring cells.

PresenceAntennaPort1 information element

```
-- ASN1START

PresenceAntennaPort1 ::= BOOLEAN

-- ASN1STOP
```

PUCCH-Config

The IE *PUCCH-ConfigCommon* and IE *PUCCH-ConfigDedicated* are used to specify the common and the UE specific PUCCH configuration respectively.

PUCCH-Config information elements

```
-- ASN1START
PUCCH-ConfigCommon ::=
                                      SEQUENCE {
                                          ENUMERATED {ds1, ds2, ds3},
    deltaPUCCH-Shift
    nRB-COI
                                          INTEGER (0..98),
                                          INTEGER (0..7)
    nCS-AN
    n1PUCCH-AN
                                          INTEGER (0..2047)
PUCCH-ConfigCommon-v1310 ::=
                                     SEQUENCE {
    nlPUCCH-AN-InfoList-r13
                                              N1PUCCH-AN-InfoList-r13
                                                                                OPTIONAL,
                                                                               OPTIONAL,
    pucch-NumRepetitionCE-Msg4-Level0-r13
                                                                                            -- Need OR
                                             ENUMERATED {n1, n2, n4, n8}
    pucch-NumRepetitionCE-Msg4-Level1-r13 ENUMERATED {n1, n2, n4, n8} pucch-NumRepetitionCE-Msg4-Level2-r13 ENUMERATED {n4, n8, n16, n3
                                                                                OPTIONAL,
                                                                                            -- Need OR
                                                                                OPTIONAL,
                                              ENUMERATED {n4, n8, n16, n32}
                                                                                            -- Need OR
    pucch-NumRepetitionCE-Msg4-Level3-r13 ENUMERATED {n4, n8, n16, n32} OPTIONAL
                                                                                             -- Need OR
}
PUCCH-ConfigCommon-v1430 ::=
                                     SEQUENCE {
    pucch-NumRepetitionCE-Msg4-Level3-r14 ENUMERATED {n64, n128} OPTIONAL
PUCCH-ConfigDedicated ::=
                                     SEOUENCE {
    ackNackRepetition
                                          CHOICE {
        release
        setup
                                              SEQUENCE {
            repetitionFactor
                                                  ENUMERATED {n2, n4, n6, spare1},
            n1PUCCH-AN-Rep
                                                  INTEGER (0..2047)
                                         ENUMERATED {bundling, multiplexing} OPTIONAL
    tdd-AckNackFeedbackMode
                                                                                            -- Cond TDD
PUCCH-ConfigDedicated-v1020 ::=
                                     SEQUENCE {
    pucch-Format-r10
                                          CHOICE {
                                          PUCCH-Format3-Conf-r13,
        format3-r10
        channelSelection-r10
                                              SEQUENCE {
                                                  CHOICE {
            n1PUCCH-AN-CS-r10
                release
                                                      NULL,
                                                      SEQUENCE {
                setup
                     n1PUCCH-AN-CS-List-r10
                                                           SEQUENCE (SIZE (1..2)) OF N1PUCCH-AN-CS-r10
            }
                                                                                OPTIONAL
                                                                                             -- Need ON
                                                                                OPTIONAL,
                                                                                            -- Need OR
    twoAntennaPortActivatedPUCCH-Format1a1b-r10
                                                      ENUMERATED {true}
                                                                                OPTIONAL,
                                                                                            -- Need OR
                                                      ENUMERATED {true}
    simultaneousPUCCH-PUSCH-r10
                                                                                OPTIONAL,
                                                                                            -- Need OR
```

```
INTEGER (0..2047) OPTIONAL -- Need OR
   n1PUCCH-AN-RepP1-r10
PUCCH-ConfigDedicated-v1130 ::= SEQUENCE {
   n1PUCCH-AN-CS-v1130
                                     CHOICE {
                                       NULL,
       release
       setup
                                         SEQUENCE {
           n1PUCCH-AN-CS-ListP1-r11
                                             SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)
                                                                        OPTIONAL, -- Need ON
   nPUCCH-Param-r11
                                      CHOICE {
                                         NULL,
       release
                                         SEQUENCE {
       setup
          nPUCCH-Identity-r11
                                           INTEGER (0..503),
           n1PUCCH-AN-r11
                                             INTEGER (0..2047)
   }
                                                                        OPTIONAL
                                                                                    -- Need ON
}
PUCCH-ConfigDedicated-v1250 ::= SEQUENCE {
  nkaPUCCH-Param-r12
                                  CHOICE {
                                         NULL,
       release
                                          SEQUENCE {
       setup
          nkaPUCCH-AN-r12
                                             INTEGER (0..2047)
}
PUCCH-ConfigDedicated-r13 ::=
                                SEQUENCE {
--Release 8
   ackNackRepetition-r13
                                      CHOICE {
       release
                                        NULL,
                                         SEQUENCE {
                                             ENUMERATED {n2, n4, n6, spare1},
           repetitionFactor-r13
                                         INTEGER (0..2047)
           n1PUCCH-AN-Rep-r13
   tdd-AckNackFeedbackMode-r13 ENUMERATED {bundling, multiplexing} OPTIONAL, -- Cond TDD
--Release 10
   pucch-Format-r13
                                     CHOICE {
                                             SEQUENCE {
       format3-r13
          n3PUCCH-AN-List-r13 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549) OPTIONAL, -- Need ON
                                                     CHOICE {
           twoAntennaPortActivatedPUCCH-Format3-r13
               release
                                                             NULT.
                                                             SEQUENCE {
                  n3PUCCH-AN-ListP1-r13 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)
           }
                                                                       OPTIONAL
                                                                                 -- Need ON
       channelSelection-r13
                                         SEQUENCE {
           n1PUCCH-AN-CS-r13
                                          CHOICE {
              release
                                               NIII.I.
               setup
                                                 SEQUENCE {
                  n1PUCCH-AN-CS-List-r13
                                                    SEQUENCE (SIZE (1..2)) OF N1PUCCH-AN-CS-r10,
                  n1PUCCH-AN-CS-ListP1-r13
                                                    SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)
           }
                                                                        OPTIONAL
                                                                                   -- Need ON
                                         SEQUENCE {
       format4-r13
          format4-resourceConfiguration-r13
                                                     SEQUENCE (SIZE (4)) OF Format4-resource-r13,
           format4-MultiCSI-resourceConfiguration-r13 SEQUENCE (SIZE (1..2)) OF Format4-resource-
r13 OPTIONAL -- Need OR
       format5-r13
                              SEOUENCE {
                                                     SEQUENCE (SIZE (4)) OF Format5-resource-r13,
           format5-resourceConfiguration-r13
           format5-MultiCSI-resourceConfiguration-r13 Format5-resource-r13 OPTIONAL -- Need OR
                                                                        OPTIONAL,
                                                                                    -- Need OR
                                                ENUMERATED {true}
ENUMERATED {true}
                                                                        OPTIONAL,
   twoAntennaPortActivatedPUCCH-Formatlalb-r13
                                                                                   -- Need OR
                                                                                   -- Need OR
   simultaneousPUCCH-PUSCH-r13
                                                                        OPTIONAL,
                                                                                   -- Need OR
   n1PUCCH-AN-RepP1-r13
                                                 INTEGER (0..2047)
                                                                       OPTIONAL,
--Release 11
   nPUCCH-Param-r13
                                      CHOICE {
       release
                                         NULL,
                                          SEQUENCE {
       setup
          nPUCCH-Identity-r13
                                           INTEGER (0..503),
           n1PUCCH-AN-r13
                                             INTEGER (0..2047)
```

```
OPTIONAL, -- Need ON
--Release 12
                                      CHOICE {
   nkaPUCCH-Param-r13
       release
                                          NIII.I.
       setup
                                          SEQUENCE {
           nkaPUCCH-AN-r13
                                              INTEGER (0..2047)
                                                                         OPTIONAL, -- Need ON
--Release 13
   spatialBundlingPUCCH-r13
                                     BOOLEAN,
   spatialBundlingPUCCH-r13 BOOLEAN, spatialBundlingPUSCH-r13 BOOLEAN,
   codebooksizeDetermination-r13 ENUMERATED {dai,cc}
maximumPayloadCoderate-r13 INTEGER (0..7)
pucch-NumRepetitionCE-r13 CHOICE {
                                                                        OPTIONAL,
                                                                                     -- Need OR
                                                                         OPTIONAL,
                                                                                     -- Need OR
       release
                                 NULL,
                                 CHOICE {
       setup
           modeA
                                      SEQUENCE {
              pucch-NumRepetitionCE-format1-r13
                                                                 ENUMERATED {r1, r2, r4, r8},
              pucch-NumRepetitionCE-format2-r13
                                                                 ENUMERATED {r1, r2, r4, r8}
           },
           modeB
                                      SEQUENCE {
              pucch-NumRepetitionCE-format1-r13
                                                                  ENUMERATED {r4, r8, r16, r32},
               pucch-NumRepetitionCE-format2-r13
                                                                  ENUMERATED {r4, r8, r16, r32}
       }
                                                                         OPTIONAL --Need ON
}
PUCCH-ConfigDedicated-v1370 ::=
                                  SECUENCE {
   pucch-Format-v1370
                                   CHOICE {
       release NULL,
       setup PUCCH-Format3-Conf-r13
}
PUCCH-Format3-Conf-r13 ::= SEQUENCE {
   n3PUCCH-AN-List-r13 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549) OPTIONAL, -- Need ON
                                                  CHOICE {
   twoAntennaPortActivatedPUCCH-Format3-r13
       release
                                                      NULL,
       setup
                                                      SEQUENCE {
           n3PUCCH-AN-ListP1-r13 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)
                                                                  OPTIONAL -- Need ON
}
PUCCH-ConfigDedicated-v1430 ::=
                                 SEQUENCE {
  -- Need OR
Format4-resource-r13 ::=
                                      SEOUENCE {
  startingPRB-format4-r13
                                           INTEGER (0..109),
   numberOfPRB-format4-r13
                                          INTEGER (0..7)
Format5-resource-r13
                      ::=
                                     SEQUENCE {
   startingPRB-format5-r13
                                              INTEGER (0..109),
   cdm-index-format5-r13
                                              INTEGER (0..1)
N1PUCCH-AN-CS-r10 ::= SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)
N1PUCCH-AN-InfoList-r13 ::= SEQUENCE (SIZE(1..maxCE-Level-r13)) OF INTEGER (0..2047)
-- ASN1STOP
```

PUCCH-Config field descriptions

ackNackRepetition

Parameter indicates whether ACK/NACK repetition is configured, see TS 36.213 [23, 10.1].

cdm-index-format5

Parameter n_{oc} see TS 36.211 [21, 5.4.2c] for determining PUCCH resource(s) of PUCCH format 5.

codebooksizeDetermination

Parameter indicates whether HARQ codebook size is determined with downlink assignment indicator based solution or number of configured CCs, see TS 36.212 [22, 5.2.2.6, 5.2.3.1 and 5.3.3.1.2] and TS 36.213 [23, 10.1.2.2.3, 10.1.3.2.3, 10.1.3.2.3.1, 10.1.3.2.3.2 and 10.1.3.2.4]..

deltaPUCCH-Shift

Parameter: $\Delta_{\text{shift}}^{\text{PUCCH}}$, see TS 36.211 [21, 5.4.1], where ds1 corresponds to value 1, ds2 corresponds to value 2 etc.

harg-TimingTDD

Parameter indicates for a TDD SCell when aggregated with a TDD PCell of different UL/DL configurations whether deriving the HARQ timing for such a cell is done in the same way as the DL HARQ timing of an FDD SCell with a TDD PCell, see TS 36.213 [23, 10.2].

maximumPayloadCoderate

Maximum payload or code rate for multi P-CSI on each PUCCH resource, see TS 36.213 [23,10.1.1].

n1PUCCH-AN

Parameter: $N_{PUCCH}^{(1)}$, see TS 36.213 [23, 10.1].

n1PUCCH-AN-r11 indicates UE-specific PUCCH AN resource offset, see TS 36.213 [23, 10.1].

n1PUCCH-AN-CS-List

Parameter: $n_{\mathrm{PUCCH},j}^{(1)}$ for antenna port $\,p_0\,$ for PUCCH format 1b with channel selection, see TS 36.213 [23,

10.1.2.2.1, 10.1.3.2.1].

n1PUCCH-AN-CS-ListP1

Parameter: $n_{\text{PUCCH},j}^{(1,\widetilde{p}_1)}$ for antenna port p_1 for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1]. E-

UTRAN configures this field only when pucch-Format is set to channelSelection.

n1PUCCH-AN-Rep, n1PUCCH-AN-RepP1

Parameter: $n_{\text{PUCCH,ANRep}}^{(1,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

n3PUCCH-AN-List, n3PUCCH-AN-ListP1

Parameter: $n_{\text{PIICCH}}^{(3,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

nCS-An

Parameter: $N_{cs}^{(1)}$ see TS 36.211 [21, 5.4].

nkaPUCCH-AN

Parameter: $N_{\text{PUCCH}}^{K_{\Lambda}}$, see TS 36.213 [23, 10.1.3].

nkaPUCCH-AN-r12 indicates PUCCH format 1a/1b starting offset for the subframe set K^A , see TS 36.213 [23, 10.1.3]. E-UTRAN configures nkaPUCCH-AN only if eimta-MainConfig is configured.

nPUCCH-Identity

Parameter: $n_{\mathrm{ID}}^{\mathrm{PUCCH}}$, see TS 36.211 [21, 5.5.1.5].

nRB-CQI

Parameter: $N_{RB}^{(2)}$, see TS 36.211 [21, 5.4].

numberOfPRB-format4

Parameter $n_{PUCCH}^{(4)}$ see TS 36.213 [23, Table 10.1.1-2] for determining PUCCH resource(s) of PUCCH format 4.

n1PUCCH-AN-InfoList

Starting offsets of the PUCCH resource(s) indicated by SIB1-BR. The first entry in the list is the starting offset of the PUCCH resource(s) of CE level 0, the second entry in the list is the starting offset of the PUCCH resource(s) of CE level 1, and so on. If E-UTRAN includes n1PUCCH-AN-InfoList, it includes the same number of entries as in prach-ParametersListCE. See TS 36.213 [23].

pucch-Format

Parameter indicates one of the PUCCH formats for transmission of HARQ-ACK, see TS 36.213 [23, 10.1]. For TDD, if the UE is configured with PCell only, the channelSelection indicates the transmission of HARQ-ACK multiplexing as defined in Tables 10.1.3-5, 10.1.3-6, and 10.1.3-7 in TS 36.213 [23] for PUCCH, and in 7.3 in TS 36.213 [23] for PUSCH. E-UTRAN only configures pucch-Format-v1370 when pucch-Format-r13 is configured and set to format4 or format5.

PUCCH-Config field descriptions

pucch-NumRepetitionCE

Number of PUCCH repetitions for PUCCH format 1/1a and for PUCCH format 2/2a/2b for CE modes A and B, see TS 36.211 [21] and TS 36.213 [23]. The UE shall ignore *pucch-NumRepetitionCE-format2-r13*, if received, for CE mode B in this release of specification. For UE in CE mode B supporting extended PUCCH repetition, if *pucch-NumRepetitionCE-format1-r14* is included then the UE shall ignore *pucch-NumRepetitionCE-format1-r13*.

pucch-NumRepetitionCE-Msg4-Level0, pucch-NumRepetitionCE-Msg4-Level1, pucch-NumRepetitionCE-Msg4-Level2, pucch-NumRepetitionCE-Msg4-Level3

Number of repetitions for PUCCH carrying HARQ response to PDSCH containing Msg4 for PRACH CE levels 0, 1, 2 and 3, see TS 36.211 [21] and TS 36.213 [23]. Value n1 corresponds to 1 repetition, value n2 corresponds to 2 repetitions, and so on. For BL UEs or non-BL UEs in enhanced coverage supporting extended PUCCH repetition, if pucch-NumRepetitionCE-Msg4-Level3-r14 is included then the UE shall ignore pucch-NumRepetitionCE-Msg4-Level3-r13.

repetitionFactor

Parameter N_{ANRep} see TS 36.213 [23, 10.1] where n2 corresponds to repetition factor 2, n4 to 4.

simultaneousPUCCH-PUSCH

Parameter indicates whether simultaneous PUCCH and PUSCH transmissions is configured, see TS 36.213 [23, 10.1 and 5.1.1]. E-UTRAN configures this field for the PCell, only when the *nonContiguousUL-RA-WithinCC-Info* is set to *supported* in the band on which PCell is configured. Likewise, E-UTRAN configures this field for the PSCell, only when the *nonContiguousUL-RA-WithinCC-Info* is set to *supported* in the band on which PSCell is configured. Likewise, E-UTRAN configures this field for the PUCCH SCell, only when the *nonContiguousUL-RA-WithinCC-Info* is set to *supported* in the band on which PUCCH SCell is configured.

spatialBundlingPUCCH

Parameter indicates whether spatial bundling is enabled or not for PUCCH, see TS 36.212 [22, 5.2.3.1].

spatialBundlingPUSCH

Parameter indicates whether spatial bundling is enabled or not for PUSCH, see see TS 36.212 [22, 5.2.2.6].

startingPRB-format4

Parameter $n_{PUCCH}^{(4)}$ see TS 36.211 [21, 5.4.3] for determining PUCCH resource(s) of PUCCH format 4.

startingPRB-format5

Parameter $n_{\mathrm{PUCCH}}^{(5)}$ see TS 36.211 [21, 5.4.3] for determining PUCCH resource(s) of PUCCH format 5.

tdd-AckNackFeedbackMode

Parameter indicates one of the TDD ACK/NACK feedback modes used, see TS 36.213 [23, 7.3 and 10.1.3]. The value bundling corresponds to use of ACK/NACK bundling whereas, the value multiplexing corresponds to ACK/NACK multiplexing as defined in Tables 10.1.3-2, 10.1.3-3, and 10.1.3-4 in TS 36.213 [23]. The same value applies to both ACK/NACK feedback modes on PUCCH as well as on PUSCH.

twoAntennaPortActivatedPUCCH-Format1a1b

Indicates whether two antenna ports are configured for PUCCH format 1a/1b for HARQ-ACK, see TS 36.213 [23, 10.1]. The field also applies for PUCCH format 1a/1b transmission when *format3* is configured, see TS 36.213 [23, 10.1.2.2.2, 10.1.3.2.2].

twoAntennaPortActivatedPUCCH-Format3

Indicates whether two antenna ports are configured for PUCCH format 3 for HARQ-ACK, see TS 36.213 [23, 10.1].

Conditional presence	Explanation
TDD	The field is mandatory present for TDD if the <i>pucch-Format</i> is not present. If the <i>pucch-</i>
	Format is present, the field is not present and the UE shall delete any existing value for
	this field. It is not present for FDD and the UE shall delete any existing value for this field.

PUSCH-Config

The IE *PUSCH-ConfigCommon* is used to specify the common PUSCH configuration and the reference signal configuration for PUSCH and PUCCH. The IE *PUSCH-ConfigDedicated* is used to specify the UE specific PUSCH configuration.

PUSCH-Config information element

```
-- ASN1START

PUSCH-ConfigCommon ::= SEQUENCE {
    pusch-ConfigBasic SEQUENCE {
        n-SB INTEGER (1..4),
        hoppingMode ENUMERATED {interSubFrame, intraAndInterSubFrame},
        pusch-HoppingOffset INTEGER (0..98),
        enable64QAM BOOLEAN
```

```
ul-ReferenceSignalsPUSCH
                              UL-ReferenceSignalsPUSCH
}
PUSCH-ConfigCommon-v1270 ::=
                                  SEQUENCE {
                                          ENUMERATED {true}
   enable64QAM-v1270
PUSCH-ConfigCommon-v1310 ::= SEQUENCE {
   r8, r16, r32 }
                                                                         OPTIONAL,
                                                                                      -- Need OR
   pusch-maxNumRepetitionCEmodeB-r13 ENUMERATED {
                                          r192, r256, r384, r512, r768, r1024,
                                                                          OPTIONAL,
                                          r1536, r2048}
                                                                                      -- Need OR
   pusch-HoppingOffset-v1310
                                  INTEGER (1..maxAvailNarrowBands-r13)
                                                                       OPTIONAL
                                                                                     -- Need OR
}
PUSCH-ConfigDedicated ::=
                                   SEQUENCE {
   betaOffset-ACK-Index
betaOffset-RI-Index
                                      INTEGER (0..15),
                                       INTEGER (0..15),
                                      INTEGER (0..15)
   betaOffset-CQI-Index
PUSCH-ConfigDedicated-v1020 ::= SEQUENCE {
                                    SEQUENCE {
   betaOffsetMC-r10
                                      INTEGER (0..15),
       betaOffset-ACK-Index-MC-r10
       betaOffset-RI-Index-MC-r10
betaOffset-CQI-Index-MC-r10
                                          INTEGER (0..15),
                                         INTEGER (0..15)
                                                                         OPTIONAL.
                                                                                     -- Need OR
                                      ENUMERATED {true}
                                                                          OPTIONAL,
                                                                                     -- Need OR
   groupHoppingDisabled-r10
   groupHoppingDisabled-r10 ENUMERATED {true} dmrs-WithOCC-Activated-r10 ENUMERATED {true}
                                                                         OPTIONAL
                                                                                     -- Need OR
}
PUSCH-ConfigDedicated-v1130 ::= SEQUENCE {
                                   CHOICE {
   pusch-DMRS-r11
       release
                                          SEQUENCE {
       setup
           nPUSCH-Identity-r11
                                              INTEGER (0..509),
           nDMRS-CSH-Identity-r11
                                              INTEGER (0..509)
   }
}
PUSCH-ConfigDedicated-v1250::= SEQUENCE {
   uciOnPUSCH
                                    CHOICE {
       release
                                         NULL,
                                              SEQUENCE {
       setup
           betaOffset-ACK-Index-SubframeSet2-r12 INTEGER (0..15),

CubframeSet2-r12 INTEGER (0..15),
           betaOffset-RI-Index-SubframeSet2-r12 INT
betaOffset-CQI-Index-SubframeSet2-r12 SEQUENCE {
                                                          INTEGER (0..15),
               betaOffset-ACK-Index-MC-SubframeSet2-r12 INTEGER (0..15),
               betaOffset-RI-Index-MC-SubframeSet2-r12
                                                          INTEGER (0..15),
               }
                                                                          OPTIONAL
                                                                                     -- Need OR
PUSCH-ConfigDedicated-r13 ::=
                                     SEQUENCE {
                                          INTEGER (0..15),
   betaOffset-ACK-Index-r13
   betaOffset2-ACK-Index-r13
                                           INTEGER (0..15)
                                                                        OPTIONAL,
                                                                                     -- Need OR
   betaOffset-RI-Index-r13
                                          INTEGER (0..15),
   betaOffset-CQI-Index-r13
                                          INTEGER (0..15),
   betaOffsetMC-r13
                                          SEQUENCE {
                                          INTEGER (0..15),
       betaOffset-ACK-Index-MC-r13
       betaOffset2-ACK-Index-MC-r13
                                              INTEGER (0..15)
                                                                          OPTIONAL,
                                                                                      -- Need OR
       betaOffset-RI-Index-MC-r13
                                              INTEGER (0..15),
                                             INTEGER (0..15)
       betaOffset-CQI-Index-MC-r13
                                                                         OPTIONAL,
                                                                                     -- Need OR
                                                                          OPTIONAL,
   groupHoppingDisabled-r13
                                         ENUMERATED {true}
                                                                                     -- Need OR
   dmrs-WithOCC-Activated-r13
                                           ENUMERATED {true}
                                                                                     -- Need OR
                                                                         OPTIONAL,
   pusch-DMRS-r11
                                          CHOICE {
                                              NULL,
       release
       setup
                                              SEQUENCE {
                                               INTEGER (0..509),
           nPUSCH-Identity-r13
           nDMRS-CSH-Identity-r13
                                                  INTEGER (0..509)
```

```
OPTIONAL, -- Need ON
    uciOnPUSCH
                                            CHOICE {
       release
                                                NULL,
                                                SEQUENCE {
        setup
            betaOffset-ACK-Index-SubframeSet2-r13
                                                            INTEGER (0..15),
            betaOffset2-ACK-Index-SubframeSet2-r13
                                                            INTEGER (0..15) OPTIONAL,
                                                                                        -- Need OR
            betaOffset-RI-Index-SubframeSet2-r13
                                                            INTEGER (0..15),
            betaOffset-CQI-Index-SubframeSet2-r13
                                                            INTEGER (0..15),
                                                   SEQUENCE {
            betaOffsetMC-r12
                betaOffset-ACK-Index-MC-SubframeSet2-r13 INTEGER (0..15),
                betaOffset2-ACK-Index-MC-SubframeSet2-r13
                                                            INTEGER (0..15) OPTIONAL,
                                                                                        -- Need OR
                                                            INTEGER (0..15),
                betaOffset-RI-Index-MC-SubframeSet2-r13
                betaOffset-CQI-Index-MC-SubframeSet2-r13
                                                           INTEGER (0..15)
                                                                            OPTIONAL
                                                                                        -- Need OR
                                                                            OPTIONAL,
                                                                                        -- Need ON
    pusch-HoppingConfig-r13
                                           ENUMERATED {on}
                                                                            OPTIONAL
                                                                                        -- Need OR
PUSCH-ConfigDedicated-v1430 ::=
                                        SEQUENCE {
   ce-PUSCH-NB-MaxTBS-r14
                                           ENUMERATED {on}
                                                                            OPTIONAL,
                                                                                        -- Need OR
                                            ENUMERATED {bw5}
    ce-PUSCH-MaxBandwidth-r14
                                                                            OPTIONAL,
                                                                                        -- Need OR
    tdd-PUSCH-UpPTS-r14
                                            TDD-PUSCH-UpPTS-r14
                                                                            OPTIONAL,
                                                                                        -- Need ON
    ul-DMRS-IFDMA-r14
                                            BOOLEAN.
    enable2560AM-r14
                                            Enable2560AM-r14
                                                                            OPTIONAL
                                                                                        -- Need ON
}
PUSCH-ConfigDedicatedSCell-r10 ::= SEQUENCE {
    groupHoppingDisabled-r10
                                           ENUMERATED {true}
                                                                           OPTIONAL,
                                                                                        -- Need OR
    dmrs-WithOCC-Activated-r10
                                           ENUMERATED {true}
                                                                            OPTIONAL
                                                                                        -- Need OR
PUSCH-ConfigDedicatedSCell-v1430 ::=
                                                SEQUENCE {
                                           Enable256QAM-r14
                                                                          OPTIONAL
    enable2560AM-r14
                                                                                        -- Need OR
TDD-PUSCH-UpPTS-r14 ::=
                                        CHOICE {
   release
                                            NULL,
                                            SEOUENCE {
    setup
       symPUSCH-UpPTS-r14
                                                ENUMERATED {sym1, sym2, sym3, sym4, sym5, sym6}
                                                                            OPTIONAL, -- Need ON
       dmrs-LessUpPTS-Config-r14
                                                ENUMERATED {true}
                                                                            OPTIONAL
                                                                                        -- Need OR
}
Enable256QAM-r14 ::=
                                        CHOICE {
                                           NULL.
        release
        setup
                                            CHOICE {
                                                SEQUENCE {
            tpc-SubframeSet-Configured-r14
                    subframeSet1-DCI-Format0-r14
                                                                                        BOOLEAN,
                    subframeSet1-DCI-Format4-r14
                                                                                        BOOLEAN,
                    subframeSet 2-DCI-Format 0-r14
                                                                                        BOOLEAN.
                    subframeSet2-DCI-Format4-r14
                                                                                        BOOLEAN
            tpc-SubframeSet-NotConfigured-r14 SEQUENCE {
                   dci-Format0-r14 BOOLEAN,
                   dci-Format4-r14
                                        BOOLEAN
}
PUSCH-EnhancementsConfig-r14 ::=
                                       CHOICE {
   release
                                   NULL,
                                    SEQUENCE {
        pusch-HoppingOffsetPUSCH-Enh-r14
                                                    INTEGER (1..100)
                                                                          OPTIONAL -- Need ON
        interval-ULHoppingPUSCH-Enh-r14
                                                CHOICE {
           interval-FDD-PUSCH-Enh-r14
interval-TDD-PUSCH-Enh-r14
                                                   ENUMERATED {int1, int2, int4, int8}
                                                   ENUMERATED {int1, int5, int10, int20}
                                                                            OPTIONAL
                                                                                        -- Need ON
    }
}
UL-ReferenceSignalsPUSCH ::=
                                    SEQUENCE {
   groupHoppingEnabled
                                       BOOLEAN,
    groupAssignmentPUSCH
                                        INTEGER (0..29),
    sequenceHoppingEnabled
                                       BOOLEAN,
    cyclicShift
                                        INTEGER (0..7)
}
```

-- ASN1STOP

PUSCH-Config field descriptions

betaOffset-ACK-Index, betaOffset2-ACK-Index, betaOffset-ACK-Index-MC, betaOffset2-ACK-Index-MC

Parameter: $I_{\textit{offset}}^{\textit{HARQ-ACK}}$, $I_{\textit{offset},X}^{\textit{HARQ-ACK}}$, $I_{\textit{offset},MC}^{\textit{HARQ-ACK}}$ and $I_{\textit{offset},MC,X}^{\textit{HARQ-ACK}}$, for single- and multiple-codeword respectively,

see TS 36.213 [23, Table 8.6.3-1]. betaOffset-ACK-Index and betaOffset2-ACK-Index are used for single-codeword and betaOffset-ACK-Index-MC and betaOffset2-ACK-Index-MC are used for multiple-codeword. If betaOffset2-ACK-Index is configured; betaOffset-ACK-Index is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index is used. If betaOffset-ACK2-Index-MC is configured; betaOffset-ACK-Index-MC is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC is used. One value applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

betaOffset-ACK-Index-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2

Parameter: $I_{\textit{offset},set2}^{\textit{HARQ-ACK}}$, $I_{\textit{offset},set2,X}^{\textit{HARQ-ACK}}$, $I_{\textit{offset},MC,set2}^{\textit{HARQ-ACK}}$ and $I_{\textit{offset},MC,set2,X}^{\textit{HARQ-ACK}}$ respectively, see TS 36.213 [23, Table 8.6.3-1].

betaOffset-ACK-Index-SubframeSet2 and betaOffset2-ACK-Index-SubframeSet2 are used for single-codeword, betaOffset-ACK-Index-MC-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2 are used for multiple-codeword. If betaOffset2-ACK-Index-SubframeSet2 is configured; betaOffset-ACK-Index-SubframeSet2 is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-SubframeSet2 is used. If betaOffset2-ACK-Index-MC-SubframeSet2 is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC-SubframeSet2 is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC-SubframeSet2 is used. One value applies for subframe set 2 of all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).

betaOffset-CQI-Index, betaOffset-CQI-Index-MC

Parameter: $I_{offset}^{\it CQI}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-3]. One value applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

betaOffset-CQI-Index-SubframeSet2, betaOffset-CQI-Index-MC-SubframeSet2

Parameter: I_{offset}^{CQI} , for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-3]. One value

applies for subframe set 2 of all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).

betaOffset-RI-Index, betaOffset-RI-Index-MC

Parameter: I_{offset}^{RI} , for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value

applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

betaOffset-RI-Index-SubframeSet2, betaOffset-RI-Index-MC-SubframeSet2

Parameter: $I_{offset}^{\it RI}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value

applies for subframe set 2 of all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).

ce-PUSCH-MaxBandwidth

Maximum PUSCH channel bandwidth in CE mode A, see TS 36.212 [22] and TS 36.213 [23]. Value bw5 corresponds to 5 MHz. If this field is not configured, the maximum PUSCH channel bandwidth in CE mode A set to 1.4 MHz. The maximum PUSCH channel bandwidth in CE mode B is 1.4 MHz regardless of the setting of this parameter. Parameter: transmission bandwidth configuration, see TS 36.101 [42, table 5.6-1].

ce-PUSCH-NB-MaxTBS

Activation of 2984 bits maximum PUSCH TBS in 1.4 MHz in CE mode A, see TS 36.212 [22] and TS 36.213 [23].

cyclicShift

Parameters: cyclicShift, see TS 36.211 [21, Table 5.5.2.1.1-2].

dmrs-LessUpPTS-Config

Indicates the UE not to transmit DMRS for PUSCH in UpPTS, see TS36.211 [21, 5.5.2.1.2].

PUSCH-Config field descriptions

dmrs-WithOCC-Activated

Parameter: Activate-DMRS-with OCC, see TS 36.211 [21, 5.5.2.1].

enable256QAM

See TS 36.213 [23, 8.6.1]. If *enable256QAM* is included and if uplink power control subframe sets are configured by *tpc-SubframeSet*, the field indicates (if set to TRUE) per uplink power control subframe set and DCI format 0 and 4 that 256QAM is allowed for UE UL categories 16 to 20 indicated in *ue-CategoryUL-v1430*, while FALSE indicates that 256 QAM is not allowed. If *enable256QAM* is included and if uplink power control subframe sets are not configured by *tpc-SubframeSet*, the field indicates (if set to TRUE) per uplink power control subframe set and DCI format 0 and 4 that 256QAM is allowed for UE UL categories 16 to 20 indicated in *ue-CategoryUL-v1430*, while FALSE indicates that 256 QAM is not allowed.

enable64QAM

See TS 36.213 [23, 8.6.1]. If *enable64QAM* (without suffix) is set to TRUE, it indicates that 64QAM is allowed for UE categories 5 and 8 indicated in *ue-Category* and UL categories indicated in *ue-CategoryUL* which support UL 64QAM and can fallback to category 5 or 8, see TS 36.306 [5, Table 4.1A-2 and Table 4.1A-6], while FALSE indicates that 64QAM is not allowed. If *enable64QAM-v1270* is set to TRUE, it indicates that 64QAM is allowed for UL categories indicated in *ue-CategoryUL* which support UL 64QAM but cannot fallback category 5 or 8, see TS 36.306 [5, Table 4.1A-2 and Table 4.1A-6]. E-UTRAN configures *enable64QAM-v1270* only when *enable64QAM* (without suffix) is set to TRUE.

interval-ULHoppingPUSCH-Enh

Number of consecutive absolute subframes over which PUSCH stays at the same PRBs before hopping to other PRBs. For *interval-FDD-PUSCH-Enh*, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For *interval-TDD-PUSCH-Enh*, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on. See TS 36.211 [21, 5.3.4].

groupAssignmentPUSCH

Parameter: △SS See TS 36.211 [21, 5.5.1.3].

groupHoppingDisabled

Parameter: Disable-sequence-group-hopping, see TS 36.211 [21, 5.5.1.3].

groupHoppingEnabled

Parameter: Group-hopping-enabled, see TS 36.211 [21, 5.5.1.3].

hoppingMode

Parameter: Hopping-mode, see TS 36.211 [21, 5.3.4].

nDMRS-CSH-Identity

Parameter: $N_{\mathrm{ID}}^{\mathrm{csh_DMRS}}$, see TS 36.211 [21, 5.5.2.1.1].

nPUSCH-Identity

Parameter: $n_{\rm ID}^{\rm PUSCH}$, see TS 36.211 [21, 5.5.1.5].

n-SB

Parameter: N_{sb} see TS 36.211 [21, 5.3.4].

pusch-HoppingConfig

For BL UEs and UEs in CE, frequency hopping activation/deactivation for unicast PUSCH, see TS 36.211 [21]

pusch-hoppingOffset

Except for BL UEs and UEs in CE, parameter: $N_{\rm RB}^{\rm HO}$, see TS 36.211 [21, 5.3.4]. For BL UEs and UEs in CE, the pusch-hoppingOffset-v1310 indicates the parameter $f_{\rm NB,hop}^{\rm PUSCH}$, see TS 36.211 [21, 5.3.4]. In case pusch-

hoppingOffset-v1310 is signalled, the BL UEs and UEs in CE shall ignore pusch-hoppingOffset (i.e. without suffix).

pusch-HoppingOffsetPUSCH-Enh

Indicates the frequency domain hopping offset between PRBs for PUSCH in frequency hopping, see TS 36.211 [21, 5.3.4]. Value 1 corresponds to 1 PRB, value 2 corresponds to 2 PRBs, and so on.

pusch-maxNumRepetitionCEmodeA

Maximum value to indicate the set of PUSCH repetition numbers for CE mode A, see TS 36.211 [21] and TS 36.213 [23]. E-UTRAN does not configure value r8. If the field is not configured, the UE shall apply the default value as defined in TS 36.213 [23, 8.0].

pusch-maxNumRepetitionCEmodeB

Maximum value to indicate the set of PUSCH repetition numbers for CE mode B, see TS 36.211 [21] and TS 36.213 [23].

sequenceHoppingEnabled

Parameter: Sequence-hopping-enabled, see TS 36.211 [21, 5.5.1.4].

symPUSCH-UpPTS

Indicates the number of data symbols that configured for PUSCH transmission in UpPTS. Values *sym2*, *sym4*, *sym5* and *sym6* can be used for normal cyclic prefix and values *sym1*, *sym2*, *sym3*, *sym4* and *sym5* can be used for extended cyclic prefix, see TS 36.213 [23, 8.6.2] and TS 36.211 [21, 5.3.4].

ul-DMRS-IFDMA

Value TRUE indicates that the UE is configured with enhanced UL DMRS.

ul-ReferenceSignalsPUSCH

Used to specify parameters needed for the transmission on PUSCH (or PUCCH).

RACH-ConfigCommon

The IE RACH-ConfigCommon is used to specify the generic random access parameters.

RACH-ConfigCommon information element

```
-- ASN1START
RACH-ConfigCommon ::=
                           SEQUENCE {
    preambleInfo
                                         SEOUENCE {
                                             ENUMERATED {
        numberOfRA-Preambles
                                                n4, n8, n12, n16, n20, n24, n28, n32, n36, n40, n44, n48, n52, n56,
                                                 n60, n64},
        preamblesGroupAConfig
                                             SEQUENCE {
                                                ENUMERATED {
            sizeOfRA-PreamblesGroupA
                                                     n4, n8, n12, n16, n20, n24, n28,
                                                     n32, n36, n40, n44, n48, n52, n56,
                                                     n60},
            messageSizeGroupA
                                                     ENUMERATED {b56, b144, b208, b256},
            messagePowerOffsetGroupB
                                                 ENUMERATED {
                                                     minusinfinity, dB0, dB5, dB8, dB10, dB12,
                                                     dB15, dB18},
                    OPTIONAL
                                                                                  -- Need OP
                                     PowerRampingParameters,
    powerRampingParameters
    ra-SupervisionInfo
                                        SEQUENCE {
       preambleTransMax
                                          PreambleTransMax,
        ra-ResponseWindowSize
                                             ENUMERATED {
                                                 sf2, sf3, sf4, sf5, sf6, sf7,
                                                 sf8, sf10},
        mac-ContentionResolutionTimer
                                             ENUMERATED
                                                 sf8, sf16, sf24, sf32, sf40, sf48,
                                                 sf56, sf64}
    maxHARQ-Msg3Tx
                                        INTEGER (1..8),
    ...,
[[ preambleTransMax-CE-r13 PreambleTransMax OPTIONAL,
    rach-CE-LevelInfoList-r13 RACH-CE-LevelInfoList-r13 OPTIONAL
                                                                             OPTIONAL,
                                                                                          -- Need OR
                                                                                          -- Need OR
    ]]
}
                               SEQUENCE {
RACH-ConfigCommon-v1250 ::=
        connEstFailCount-r12

SEQUENCE {
    txFailParams-r12
                                                 ENUMERATED {n1, n2, n3, n4},
                                                 ENUMERATED {s30, s60, s120, s240,
        connEstFailOffsetValidity-r12
                                                         s300, s420, s600, s900},
        connEstFailOffset-r12
                                                 INTEGER (0..15)
                                                                     OPTIONAL
                                                                                  -- Need OP
}
RACH-ConfigCommonSCell-r11 ::=
powerRampingParameters-r11
                                    SEQUENCE {
                                   PowerRampingParameters,
    ra-SupervisionInfo-r11
                                            SEQUENCE {
        preambleTransMax-r11
                                                 PreambleTransMax
    },
    . . .
}
RACH-CE-LevelInfoList-r13 ::= SEQUENCE (SIZE (1..maxCE-Level-r13)) OF RACH-CE-LevelInfo-r13
RACH-CE-LevelInfo-r13 ::=
                                 SEOUENCE {
    preambleMappingInfo-r13
                                        SEQUENCE {
                                             INTEGER(0..63),
       firstPreamble-r13
        lastPreamble-r13
                                             INTEGER(0..63)
    ra-ResponseWindowSize-r13
                                        ENUMERATED {sf20, sf50, sf80, sf120, sf180,
                                                     sf240, sf320, sf400},
    mac-ContentionResolutionTimer-r13 ENUMERATED {sf80, sf100, sf120,
                                                     sf160, sf200, sf240, sf480, sf960},
                                         ENUMERATED {on,off},
    rar-HoppingConfig-r13
```

RACH-ConfigCommon field descriptions

connEstFailCount

Number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset.

connEstFailOffset

Parameter "Qoffset_{temp}" in TS 36.304 [4]. If the field is not present the value of infinity shall be used for "Qoffset_{temp}".

connEstFailOffsetValidity

Amount of time that the UE applies *connEstFailOffset* before removing the offset from evaluation of the cell. Value s30 corresponds to 30 seconds, s60 corresponds to 60 seconds, and so on.

mac-ContentionResolutionTimer

Timer for contention resolution in TS 36.321 [6]. Value in subframes. Value sf8 corresponds to 8 subframes, sf16 corresponds to 16 subframes and so on.

maxHARQ-Msg3Tx

Maximum number of Msg3 HARQ transmissions in TS 36.321 [6], used for contention based random access. Value is an integer.

messagePowerOffsetGroupB

Threshold for preamble selection in TS 36.321 [6]. Value in dB. Value minusinfinity corresponds to –infinity. Value dB0 corresponds to 0 dB, dB5 corresponds to 5 dB and so on.

messageSizeGroupA

Threshold for preamble selection in TS 36.321 [6]. Value in bits. Value b56 corresponds to 56 bits, b144 corresponds to 144 bits and so on.

numberOfRA-Preambles

Number of non-dedicated random access preambles in TS 36.321 [6]. Value is an integer. Value n4 corresponds to 4, n8 corresponds to 8 and so on.

powerRampingStep

Power ramping factor in TS 36.321 [6]. Value in dB. Value dB0 corresponds to 0 dB, dB2 corresponds to 2 dB and so on.

preambleInitialReceivedTargetPower

Initial preamble power in TS 36.321 [6]. Value in dBm. Value dBm-120 corresponds to -120 dBm, dBm-118 corresponds to -118 dBm and so on.

preambleMappingInfo

Provides the mapping of premables to groups for each CE level, as specified in TS 36.321 [6]. When random access preambles group B is used, *firstPreamble-r13* is set to 0 and *lastPreamble-r13* is set to *numberOfRA-Preambles-1*.

preamblesGroupAConfig

Provides the configuration for preamble grouping in TS 36.321 [6]. If the field is not signalled, the size of the random access preambles group A [6] is equal to *numberOfRA-Preambles*.

preambleTransMax, preambleTransMax-CE

Maximum number of preamble transmission in TS 36.321 [6]. Value is an integer. Value n3 corresponds to 3, n4 corresponds to 4 and so on.

rach-CE-LevelInfoList

Provides RACH information each coverage level. The first entry in the list contains RACH information of CE level 0, the second entry in the list contains RACH information of CE level 1, and so on. If E-UTRAN includes *rach-CE-LevelInfoList*, it includes the same number of entries as in *prach-ParametersListCE*.

ra-ResponseWindowSize

Duration of the RA response window in TS 36.321 [6]. Value in subframes. Value sf2 corresponds to 2 subframes, sf3 corresponds to 3 subframes and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

rar-HoppingConfig

Frequency hopping activation/deactivation for RAR/Msg3/Msg4 for a CE level, see TS 36.211 [21].

sizeOfRA-PreamblesGroupA

Size of the random access preambles group A in TS 36.321 [6]. Value is an integer. Value n4 corresponds to 4, n8 corresponds to 8 and so on.

RACH-ConfigDedicated

The IE RACH-ConfigDedicated is used to specify the dedicated random access parameters.

RACH-ConfigDedicated information element

```
-- ASN1START

RACH-ConfigDedicated ::= SEQUENCE {
    ra-PreambleIndex INTEGER (0..63),
    ra-PRACH-MaskIndex INTEGER (0..15)
}

-- ASN1STOP
```

RACH-ConfigDedicated field descriptions ra-PRACH-MaskIndex Explicitly signalled PRACH Mask Index for RA Resource selection in TS 36.321 [6]. ra-PreambleIndex Explicitly signalled Random Access Preamble for RA Resource selection in TS 36.321 [6].

RadioResourceConfigCommon

The IE *RadioResourceConfigCommonSIB* and IE *RadioResourceConfigCommon* are used to specify common radio resource configurations in the system information and in the mobility control information, respectively, e.g., the random access parameters and the static physical layer parameters.

RadioResourceConfigCommon information element

```
-- ASN1START
RadioResourceConfigCommonSIB ::=
                                   SEQUENCE {
                                       RACH-ConfigCommon,
    rach-ConfigCommon
   bcch-Config
                                       BCCH-Config,
                                       PCCH-Config,
    pcch-Config
    prach-Config
                                       PRACH-ConfigSIB,
   pdsch-ConfigCommon
                                      PDSCH-ConfigCommon,
    pusch-ConfigCommon
                                       PUSCH-ConfigCommon,
    pucch-ConfigCommon
                                      PUCCH-ConfigCommon,
    soundingRS-UL-ConfigCommon
                                     SoundingRS-UL-ConfigCommon,
    uplinkPowerControlCommon
                                       UplinkPowerControlCommon,
    ul-CyclicPrefixLength
                                      UL-CyclicPrefixLength,
    [[ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020
                                                                         OPTIONAL
                                                                                      -- Need OR
    ]],
    [ [
       rach-ConfigCommon-v1250
                                       RACH-ConfigCommon-v1250
                                                                          OPTIONAL
                                                                                      -- Need OR
    11,
    [[ pusch-ConfigCommon-v1270
                                       PUSCH-ConfigCommon-v1270
                                                                          OPTIONAL
                                                                                      -- Need OR
    11.
    [[ bcch-Config-v1310
                                       BCCH-Config-v1310
                                                                          OPTIONAL,
                                                                                      -- Need OR
       pcch-Config-v1310
                                       PCCH-Config-v1310
                                                                          OPTIONAL,
                                                                                      -- Need OR
        freqHoppingParameters-r13
                                       FreqHoppingParameters-r13
                                                                          OPTIONAL,
                                                                                      -- Need OR
       pdsch-ConfigCommon-v1310
                                      PDSCH-ConfigCommon-v1310
                                                                          OPTIONAL,
                                                                                      -- Need OR
        pusch-ConfigCommon-v1310
                                       PUSCH-ConfigCommon-v1310
                                                                          OPTIONAL,
                                                                                      -- Need OR
                                                                          OPTIONAL,
                                                                                      -- Need OR
       prach-ConfigCommon-v1310
                                      PRACH-ConfigSIB-v1310
       pucch-ConfigCommon-v1310
                                      PUCCH-ConfigCommon-v1310
                                                                          OPTIONAL
                                                                                      -- Need OR
    11.
    [[ highSpeedConfig-r14
                                     HighSpeedConfig-r14
                                                                          OPTIONAL,
                                                                                      -- Need OR
       prach-Config-v1430
                                       PRACH-Config-v1430
                                                                          OPTIONAL,
                                                                                      -- Need OR
                                     PUCCH-ConfigCommon-v1430
       pucch-ConfigCommon-v1430
                                                                                      -- Need OR
                                                                          OPTIONAL
    11
RadioResourceConfigCommon ::=
                                   SEQUENCE {
                                      RACH-ConfigCommon
   rach-ConfigCommon
                                                                          OPTIONAL.
                                                                                      -- Need ON
    prach-Config
                                       PRACH-Config,
    pdsch-ConfigCommon
                                       PDSCH-ConfigCommon
                                                                          OPTIONAL,
                                                                                      -- Need ON
    pusch-ConfigCommon
                                      PUSCH-ConfigCommon,
    phich-Config
                                       PHICH-Config
                                                                          OPTIONAL,
                                                                                      -- Need ON
                                                                          OPTIONAL,
                                                                                      -- Need ON
    pucch-ConfigCommon
                                       PUCCH-ConfigCommon
    soundingRS-UL-ConfigCommon
                                       SoundingRS-UL-ConfigCommon
                                                                          OPTIONAL,
                                                                                      -- Need ON
```

```
uplinkPowerControlCommon
                                                                  UplinkPowerControlCommon
                                                                                                                               OPTIONAL,
                                                                                                                                                   -- Need ON
                                                                                                                                                   -- Need ON
      antennaInfoCommon
                                                                  AntennaInfoCommon
                                                                                                                               OPTIONAL,
                                                                                                                                                   -- Need OP
      p-Max
                                                                  P-Max
                                                                                                                               OPTIONAL,
      tdd-Config
                                                                  TDD-Config
                                                                                                                               OPTIONAL,
                                                                                                                                                   -- Cond TDD
      ul-CyclicPrefixLength
                                                                  UL-CyclicPrefixLength,
      [[ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020
                                                                                                                              OPTIONAL
                                                                                                                                                   -- Need ON
      11,
      [[ tdd-Config-v1130
                                                                  TDD-Config-v1130
                                                                                                                               OPTIONAL
                                                                                                                                                   -- Cond TDD3
      [[ pusch-ConfigCommon-v1270
                                                                PUSCH-ConfigCommon-v1270
                                                                                                                              OPTIONAL
                                                                                                                                                   -- Need OR
      ]],
      [ [
             prach-Config-v1310
                                                                 PRACH-Config-v1310
                                                                                                                              OPTIONAL,
                                                                                                                                                   -- Need ON
             freqHoppingParameters-r13
                                                                  FreqHoppingParameters-r13
                                                                                                                               OPTIONAL,
                                                                                                                                                   -- Need ON
                                                               PDSCH-ConfigCommon-v1310
             pdsch-ConfigCommon-v1310
                                                                                                                              OPTIONAL,
                                                                                                                                                   -- Need ON
                                                          PUCCH-ConfigCommon-v1310
                                                                                                                              OPTIONAL,
             pucch-ConfigCommon-v1310
                                                                                                                                                   -- Need ON
                                                                                                                              OPTIONAL,
             pusch-ConfigCommon-v1310
                                                                  PUSCH-ConfigCommon-v1310
                                                                                                                                                   -- Need ON
             uplinkPowerControlCommon-v1310 UplinkPowerControlCommon-v1310
                                                                                                                                                   -- Need ON
                                                                                                                            OPTIONAL
       ]],
      [[ highSpeedConfig-r14
                                                              PRACH-Config-v1430
                                                                 HighSpeedConfig-r14
                                                                                                                              OPTIONAL,
                                                                                                                                                   -- Need OR
                                                                                                                              OPTIONAL,
             prach-Config-v1430
                                                                                                                                                   -- Need OR
             pucch-ConfigCommon-v1430
                                                                  PUCCH-ConfigCommon-v1430
                                                                                                                               OPTIONAL,
                                                                                                                                                   -- Need OR
                                                                                                                                                   -- Cond TDD3
             tdd-Config-v1430
                                                                  TDD-Config-v1430
                                                                                                                              OPTIONAL
      ]]
}
RadioResourceConfigCommonPSCell-r12 ::= SEQUENCE {
      basicFields-r12
pucch-ConfigCommon-r12
rach-ConfigCommon-r12
                                                                 RadioResourceConfigCommonSCell-r10,
                                                                  PUCCH-ConfigCommon,
                                                                  RACH-ConfigCommon,
      \verb"uplinkPowerControlCommonPSCell-r12" UplinkPowerControlCommonPSCell-r12", and the property of the property 
       [[ uplinkPowerControlCommonPSCell-v1310
                                                           UplinkPowerControlCommon-v1310
                                                                                                                    OPTIONAL
                                                                                                                                            -- Need ON
}
{\tt RadioResourceConfigCommonPSCell-v12f0} ::= {\tt SEQUENCE} \ \{ \\
      basicFields-v12f0
                                                                 RadioResourceConfigCommonSCell-v1010
RadioResourceConfigCommonPSCell-v1440 ::= SEQUENCE {
      basicFields-v1440
                                                                  RadioResourceConfigCommonSCell-v1440
RadioResourceConfigCommonSCell-r10 ::= SEQUENCE {
       -- DL configuration as well as configuration applicable for DL and UL
      nonUL-Configuration-r10
                                                                        SEQUENCE {
             -- 1: Cell characteristics
             dl-Bandwidth-r10
                                                                                ENUMERATED {n6, n15, n25, n50, n75, n100},
              -- 2: Physical configuration, general
             mbsfn-SubframeConfigList-r10
                                                                                AntennaInfoCommon,
                                                                                MBSFN-SubframeConfigList OPTIONAL, -- Need OR
              -- 3: Physical configuration, control
             phich-Config-r10
                                                                                PHICH-Config,
               -- 4: Physical configuration, physical channels
             pdsch-ConfigCommon-r10
                                                                               PDSCH-ConfigCommon,
                                                                                TDD-Config
             tdd-Config-r10
                                                                                                                               OPTIONAL
                                                                                                                                                   -- Cond
TDDSCell
      },
        -- UL configuration
      ul-Configuration-r10
                                                               SEQUENCE {
             ul-FregInfo-r10
                                                                         SEQUENCE {
                                                                               ARFCN-ValueEUTRA
                   ul-CarrierFreg-r10
                                                                                                                              OPTIONAL.
                                                                                                                                                   -- Need OP
                                                                                ENUMERATED {n6, n15,
                   ul-Bandwidth-r10
                                                                                     n25, n50, n75, n100} OPTIONAL,
                                                                                                                                                   -- Need OP
                   additionalSpectrumEmissionSCell-r10
                                                                                     AdditionalSpectrumEmission
             p-Max-r10
                                                                                                                               OPTIONAL,
                                                                         P-Max
                                                                                                                                                   -- Need OP
             uplinkPowerControlCommonSCell-r10
                                                                              UplinkPowerControlCommonSCell-r10,
              -- A special version of IE UplinkPowerControlCommon may be introduced
              -- 3: Physical configuration, control
             \begin{tabular}{ll} sounding RS-UL-Config Common-r10 & Sounding RS-UL-Config Common, \\ ul-Cyclic Prefix Length-r10 & UL-Cyclic Prefix Length, \\ \end{tabular}
              -- 4: Physical configuration, physical channels
             prach-ConfigSCell-r10
                                                                               PRACH-ConfigSCell-r10
                                                                                                                            OPTIONAL, -- Cond TDD-
OR-NoR11
```

```
pusch-ConfigCommon-r10 PUSCH-ConfigCommon
                                                                        OPTIONAL,
                                                                                    -- Need OR
   [[ ul-CarrierFreq-v1090
                                         ARFCN-ValueEUTRA-v9e0
                                                                        OPTIONAL
                                                                                    -- Need OP
    ]],
   [[ rach-ConfigCommonSCell-r11
                                        RACH-ConfigCommonSCell-r11
                                                                       OPTIONAL,
ULSCell
       prach-ConfigSCell-r11
                                         PRACH-Config
                                                                        OPTIONAL,
                                                                                    -- Cond UL
       tdd-Config-v1130
                                         TDD-Config-v1130
                                                                        OPTIONAL,
                                                                                    -- Cond TDD2
       uplinkPowerControlCommonSCell-v1130
                            UplinkPowerControlCommonSCell-v1130
                                                                        OPTIONAL
                                                                                    -- Cond UL
   [[ pusch-ConfigCommon-v1270 PUSCH-ConfigCommon-v1270 ]],
                                                                        OPTIONAL -- Need OR
    ]],
    [ [
       pucch-ConfigCommon-r13
                                         PUCCH-ConfigCommon
                                                                OPTIONAL,
                                                                            -- Cond UL
       uplinkPowerControlCommonSCell-v1310
                             UplinkPowerControlCommonSCell-v1310 OPTIONAL -- Cond UL
   [[ highSpeedConfigSCell-r14 HighSpeedConfigSCell-r14
                                                                        OPTIONAL,
                                                                                   -- Need OR
       prach-Config-v1430
                                     PRACH-Config-v1430
                                                                        OPTIONAL,
                                                                                    -- Cond UL
   ul-Configuration-r14
                                     SEOUENCE {
                                          SEQUENCE {
       ul-FreqInfo-r14
          ul-CarrierFreq-r14
                                             ARFCN-ValueEUTRA-r9
                                                                       OPTIONAL,
                                                                                    -- Need OP
          ul-Bandwidth-r14
                                             ENUMERATED {n6, n15,
                                               n25, n50, n75, n100} OPTIONAL,
                                                                                    -- Need OP
           additionalSpectrumEmissionSCell-r14
                                                 AdditionalSpectrumEmission
       p-Max-r14
                                          P-Max
                                                                        OPTIONAL,
                                                                                    -- Need OP
       soundingRS-UL-ConfigCommon-r14
ul-CyclicPrefixLength-r14
prach-ConfigSCell-r14
                                         SoundingRS-UL-ConfigCommon,
                                         UL-CyclicPrefixLength,
                                             PRACH-ConfigSCell-r10
       prach-ConfigSCell-r14
                                                                       OPTIONAL,
                                                                                   -- Cond TDD-
OR-NoR11
       uplinkPowerControlCommonPUSCH-LessCell-v1430
   UplinkPowerControlCommonPUSCH-LessCell-v1430 OPTIONAL
                                                             -- Need OR
                                                                OPTIONAL, -- Cond ULSRS
}
   harq-ReferenceConfig-r14
                                             ENUMERATED {sa2,sa4,sa5} OPTIONAL, -- Need
OR
                                                                   OPTIONAL
   soundingRS-FlexibleTiming-r14
                                             ENUMERATED {true}
                                                                                        -- Need
OR
   ]],
    [[
       mbsfn-SubframeConfigList-v1430 MBSFN-SubframeConfigList-v1430
                                                                           OPTIONAL-- Need ON
   11
}
RadioResourceConfigCommonSCell-v1010 ::= SEQUENCE {
    -- UL configuration
   ul-Configuration-v1010
                                     SEQUENCE {
       additionalSpectrumEmissionSCell-v1010
                                                 AdditionalSpectrumEmission-v1010
}
RadioResourceConfigCommonSCell-v1440 ::= SEQUENCE {
   ul-Configuration-v1440 SEQUENCE {
       ul-FreqInfo-v1440
                                             SEQUENCE {
           additionalSpectrumEmissionSCell-v1440 AdditionalSpectrumEmission-v1010
}
BCCH-Config ::=
                                  SEOUENCE {
   modificationPeriodCoeff
                                     ENUMERATED {n2, n4, n8, n16}
BCCH-Config-v1310 ::=
                                  SEQUENCE {
   modificationPeriodCoeff-v1310
                                   ENUMERATED {n64}
FreqHoppingParameters-r13 ::=
                                 SEQUENCE {
   dummy ENUMERATED {nb2, nb4} dummy2 CHOICE {
                                                    OPTIONAL.
       interval-FDD-r13
                                             ENUMERATED {int1, int2, int4, int8},
       interval-TDD-r13
                                              ENUMERATED {int1, int5, int10, int20}
                                                                        OPTIONAL,
   dummv3
                  CHOICE {
       interval-FDD-r13
                                              ENUMERATED {int2, int4, int8, int16},
                                              ENUMERATED { int5, int10, int20, int40}
       interval-TDD-r13
                                                                         OPTIONAL,
   interval-ULHoppingConfigCommonModeA-r13 CHOICE {
```

```
ENUMERATED {int1, int2, int4, int8},
ENUMERATED {int1, int5, int10, int20}
        interval-FDD-r13
        interval-TDD-r13
                                                                            OPTIONAL,
                                                                                        -- Cond MP-A
    interval-ULHoppingConfigCommonModeB-r13\ CHOICE\ \{
                                                ENUMERATED {int2, int4, int8, int16}
       interval-FDD-r13
        interval-TDD-r13
                                                ENUMERATED { int5, int10, int20, int40}
                                                                            OPTIONAL, -- Cond MP-B
                      INTEGER (1..maxAvailNarrowBands-r13)
                                                                       OPTIONAL
    dummv4
}
PCCH-Config ::=
                                   SEQUENCE {
   defaultPagingCycle
                                        ENUMERATED {
                                           rf32, rf64, rf128, rf256},
                                        ENUMERATED {
                                           fourT, twoT, oneT, halfT, quarterT, oneEighthT,
                                            oneSixteenthT, oneThirtySecondT}
   paging-narrowBands-r13

modech-Number
PCCH-Config-v1310 ::=
                                       INTEGER (1..maxAvailNarrowBands-r13),
                                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},
   mpdcch-NumRepetition-Paging-r13
                                       ENUMERATED {one64thT, one128thT, one256thT}
   nB-v1310
                                                                            OPTIONAL
                                  ENUMERATED {len1, len2}
UL-CyclicPrefixLength ::=
HighSpeedConfig-r14 ::=
                               SEQUENCE {
   highSpeedEnhancedMeasFlag-r14
                                           ENUMERATED {true}
                                                                           OPTIONAL,
                                                                                        -- Need OR
   highSpeedEnhancedDemodulationFlag-r14 ENUMERATED {true}
                                                                           OPTIONAL
                                                                                        -- Need OR
HighSpeedConfigSCell-r14 ::= SEQUENCE {
   highSpeedEnhancedDemodulationFlag-r14 ENUMERATED {true}
                                                                           OPTIONAL
                                                                                        -- Need OR
-- ASN1STOP
```

RadioResourceConfigCommon field descriptions

additionalSpectrumEmissionSCell

The UE requirements related to additionalSpectrumEmissionSCell are defined in TS 36.101 [42]. E-UTRAN configures the same value in additionalSpectrumEmissionSCell for all SCell(s) of the same band with UL configured. The additionalSpectrumEmissionSCell is applicable for all serving cells (including PCell) of the same band with UL configured.

defaultPagingCycle

Default paging cycle, used to derive 'T' in TS 36.304 [4]. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on.

dummy

This field is not used in the specification. If received it shall be ignored by the UE.

harq-ReferenceConfig

Indicates UL/ DL configuration used as the DL HARQ reference configuration for this serving cell. Value sa2 corresponds to Configuration2, sa4 to Configuration4 etc, as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

highSpeedEnhancedMeasFlag

If the field is present, the UE shall apply the high speed measurement enhancements as specified in TS 36.133 [16].

highSpeedEnhancedDemodulationFlag

If the field is present, the UE shall apply the advanced receiver in SFN scenario as specified in TS 36.101 [6].

interval-DLHoppingConfigCommonModeX

Number of consecutive absolute subframes over which MPDCCH or PDSCH for CE mode X stays at the same narrowband before hopping to another narrowband. For interval-FDD, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For interval-TDD, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on.

interval-ULHoppingConfigCommonModeX

Number of consecutive absolute subframes over which PUCCH or PUSCH for CE mode X stays at the same narrowband before hopping to another narrowband. For interval-FDD, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For interval-TDD, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on.

modificationPeriodCoeff

Actual modification period, expressed in number of radio frames= modificationPeriodCoeff* defaultPagingCycle. n2 corresponds to value 2, n4 corresponds to value 4, n8 corresponds to value 8, n16 corresponds to value 16, and n64 corresponds to value 64.

mpdcch-NumRepetition-Paging

Maximum number of repetitions for MPDCCH common search space (CSS) for paging, see TS 36.211 [21].

mpdcch-pdsch-HoppingOffset

Parameter: $f_{NB,hop}^{DL}$, see TS 36.211 [21, 6.4.1].

mpdcch-pdsch-HoppingNB

The number of narrowbands for MPDCCH/PDSCH frequency hopping. Value nb2 corresponds to 2 narrowbands and value nb4 corresponds to 4 narrowbands.

nΒ

Parameter: nB is used as one of parameters to derive the Paging Frame and Paging Occasion according to TS 36.304 [4]. Value in multiples of 'T' as defined in TS 36.304 [4]. A value of fourT corresponds to 4 * T, a value of twoT corresponds to 2 * T and so on. In case nB-v1310 is signalled, the UE shall ignore nB (i.e. without suffix). EUTRAN configures nB-v1310 only in the BR version of SI message.

paging-narrowBands

Number of narrowbands used for paging, see TS 36.304 [4], TS 36.212 [22] and TS 36.213 [23].

p-Max

Pmax to be used in the target cell. If absent the UE applies the maximum power according to the UE capability.

prach-ConfigSCell

Indicates a PRACH configuration for an SCell. The field is not applicable for an LAA SCell in this release.

rach-ConfigCommonSCell

Indicates a RACH configuration for an SCell. The field is not applicable for an LAA SCell in this release.

soundingRS-FlexibleTiming

Indicates the SRS flexible timing (if configured) for aperiodic SRS triggered by DL grant. If the SRS transmission is collided with ACK/NACK, postpone once to the next configured SRS transmission opportunity.

ul-Bandwidth

Parameter: transmission bandwidth configuration, N_{RB} , in uplink, see TS 36.101 [42, table 5.6-1]. Value n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on. If for FDD this parameter is absent, the uplink bandwidth is equal to the downlink bandwidth. For TDD this parameter is absent and it is equal to the downlink bandwidth.

ul-CarrierFreq

For FDD: If absent, the (default) value determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1] applies.

For TDD: This parameter is absent and it is equal to the downlink frequency.

RadioResourceConfigCommon field descriptions

additionalSpectrumEmissionSCell

The UE requirements related to additional Spectrum Emission SCell are defined in TS 36.101 [42]. E-UTRAN configures the same value in additional Spectrum Emission SCell for all SCell(s) of the same band with UL configured. The additional Spectrum Emission SCell is applicable for all serving cells (including PCell) of the same band with UL configured.

ul-CyclicPrefixLength

Parameter: Uplink cyclic prefix length see TS 36.211 [21, 5.2.1] where len1 corresponds to normal cyclic prefix and len2 corresponds to extended cyclic prefix.

Conditional presence	Explanation
MP-A	The field is mandatory present for CE mode A. Otherwise the field is optional, Need OR.
MP-B	The field is mandatory present for CE mode B. Otherwise the field is optional, Need OR.
TDD	The field is optional for TDD, Need ON; it is not present for FDD and the UE shall delete
	any existing value for this field.
TDD2	If tdd-Config-r10 is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.
TDD3	If <i>tdd-Config</i> is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.
TDD-OR-NoR11	If prach-ConfigSCell-r11 is absent, the field is optional for TDD, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.
TDDSCell	This field is mandatory present for TDD; it is not present for FDD and LAA SCell, and the UE shall delete any existing value for this field.
UL	If the SCell is part of the STAG or concerns the PSCell or PUCCH SCell and if <i>ul-Configuration</i> is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.
ULSCell	For the PSCell (IE is included in <i>RadioResourceConfigCommonPSCell</i>) the field is absent. Otherwise, if the SCell is part of the STAG and if <i>ul-Configuration</i> is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.
ULSRS	If <i>ul-Configuration-r10</i> is absent, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.

RadioResourceConfigDedicated

The IE *RadioResourceConfigDedicated* is used to setup/modify/release RBs, to modify the MAC main configuration, to modify the SPS configuration and to modify dedicated physical configuration.

RadioResourceConfigDedicated information element

```
-- ASN1START
RadioResourceConfigDedicated ::=
                                        SEQUENCE {
    srb-ToAddModList
                                        SRB-ToAddModList
                                                                    OPTIONAL,
                                                                                    -- Cond HO-Conn
                                                                                    -- Cond HO-
    drb-ToAddModList
                                        DRB-ToAddModList
                                                                   OPTIONAL,
toEUTRA
   drb-ToReleaseList
                                        DRB-ToReleaseList
                                                                    OPTIONAL,
                                                                                    -- Need ON
   mac-MainConfig
                                        CHOICE {
           explicitValue
                                           MAC-MainConfig,
           defaultValue
                                           NULL
                                                                                    -- Cond HO-
           OPTIONAL,
toEUTRA2
   sps-Config
                                       SPS-Config
                                                                   OPTIONAL,
                                                                                    -- Need ON
                                                                   OPTIONAL,
    physicalConfigDedicated
                                       PhysicalConfigDedicated
                                                                                    -- Need ON
    [[ rlf-TimersAndConstants-r9
                                       RLF-TimersAndConstants-r9
                                                                           OPTIONAL
                                                                                        -- Need ON
    ]],
                                                                            OPTIONAL
    ] ]
       measSubframePatternPCell-r10
                                       MeasSubframePatternPCell-r10
                                                                                        -- Need ON
    [[
       neighCellsCRS-Info-r11
                                        NeighCellsCRS-Info-r11
                                                                            OPTIONAL
                                                                                        -- Need ON
    11,
       naics-Info-r12
                                   NATCS-AssistanceInfo-r12
                                                                       OPTIONAL
                                                                                   -- Need ON
    11
    1]
    [[ neighCellsCRS-Info-r13
                                        NeighCellsCRS-Info-r13
                                                                            OPTIONAL,
                                                                                        -- Cond
CRSIM
       rlf-TimersAndConstants-r13
                                       RLF-TimersAndConstants-r13
                                                                            OPTIONAL
                                                                                        -- Need ON
    [[ sps-Config-v1430
                                        SPS-Config-v1430
                                                                            OPTIONAL
                                                                                       -- Cond SPS
```

```
]]
RadioResourceConfigDedicated-v1370 ::= SEQUENCE {
    physicalConfigDedicated-v1370 PhysicalConfigDedicated-v1370
                                                                         OPTIONAL -- Need ON
RadioResourceConfigDedicatedPSCell-r12 ::= SEQUENCE {
    -- UE specific configuration extensions applicable for an PSCell
    physicalConfigDedicatedPSCell-r12 PhysicalConfigDedicated sps-Config-r12 SPS-Config
                                                                       OPTIONAL,
                                                                       OPTIONAL,
                                                                                   -- Need ON
    naics-Info-r12
                                          NAICS-AssistanceInfo-r12 OPTIONAL,
                                                                                   -- Need ON
                                                                      OPTIONAL
    [[ neighCellsCRS-InfoPSCell-r13 NeighCellsCRS-Info-r13
                                                                                   -- Need ON
                                      SPS-Config-v1430
                                                                                   -- Cond SPS2
    [[ sps-Config-v1430
                                                                       OPTIONAL
    11
}
RadioResourceConfigDedicatedPSCell-v1370 ::=
                                                   SEQUENCE {
   physicalConfigDedicatedPSCell-v1370 PhysicalConfigDedicated-v1370 OPTIONAL -- Need ON
RadioResourceConfigDedicatedSCG-r12 ::= SEQUENCE {
   drb-ToAddModListSCG-r12 DRB-ToAddModListSCG-r12 OPTIONAL, mac-MainConfigSCG-r12 MAC-MainConfig OPTIONAL, rlf-TimersAndConstantsSCG-r12 RLF-TimersAndConstantsSCG-r12 OPTIONAL,
                                                                                   -- Need ON
                                                                                   -- Need ON
                                                                                  -- Need ON
}
RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {
    -- UE specific configuration extensions applicable for an SCell
   physicalConfigDedicatedSCell-r10 PhysicalConfigDedicatedSCell-r10 OPTIONAL, -- Need
ON
    ...,
[[ mac-MainConfigSCell-r11
                                     MAC-MainConfigSCell-r11
                                                                      OPTIONAL -- Cond SCellAdd
    ]],
                          NAICS-AssistanceInfo-r12 OPTIONAL -- Need ON
    [[ naics-Info-r12
    ]],
    [[ neighCellsCRS-InfoSCell-r13
                                         NeighCellsCRS-Info-r13
                                                                     OPTIONAL -- Need ON
    11,
    [[ physicalConfiqDedicatedSCell-v1370 PhysicalConfiqDedicatedSCell-v1370 OPTIONAL -- Need
ON
    ]]
}
SRB-ToAddModList ::=
                                  SEQUENCE (SIZE (1..2)) OF SRB-ToAddMod
SRB-ToAddMod ::= SEQUENCE {
   srb-Identity
                                      INTEGER (1..2),
                                       CHOICE {
    RLC-Config,
   rlc-Config
        explicitValue
       defaultValue
                                          NULL
           OPTIONAL,
                                                                                   -- Cond Setup
                                    CHOICE {
    logicalChannelConfig
                                         LogicalChannelConfig,
       explicitValue
       defaultValue
                                           NULL
          OPTIONAL,
                                                                                   -- Cond Setup
}
DRB-ToAddModList ::=
                                   SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod
DRB-ToAddModListSCG-r12 ::=
                              SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddModSCG-r12
DRB-ToAddMod ::= SEQUENCE {
    eps-BearerIdentity
                                       INTEGER (0..15)
                                                              OPTIONAL,
                                                                               -- Cond DRB-Setup
                                      DRB-Identity,
    drb-Identity
                                                        OPTIONAL,
OPTIONAL,
    pdcp-Config
                                       PDCP-Config
                                                                               -- Cond PDCP
                                       RLC-Config
                                                                               -- Cond SetupM
    rlc-Config
                                      RLC-Config OPTIONAL,
INTEGER (3..10) OPTIONAL,
    logicalChannelIdentity
                                                                               -- Cond DRB-SetupM
                                       LogicalChannelConfig OPTIONAL,
                                                                               -- Cond SetupM
    logicalChannelConfig
    [[ drb-TypeChange-r12
                                          ENUMERATED {toMCG} OPTIONAL,
                                                                                   -- Need OP
       rlc-Config-v1250
                                           RLC-Config-v1250
                                                                   OPTIONAL
                                                                                   -- Need ON
                                                                   OPTIONAL, -- Need ON OPTIONAL, -- Need ON
    [[ rlc-Config-v1310
                                           RLC-Config-v1310
       drb-TypeLWA-r13
                                        BOOLEAN
```

```
drb-TypeLWIP-r13
                                            ENUMERATED {lwip, lwip-DL-only,
                                                                       OPTIONAL
                                            lwip-UL-only, eutran}
                                                                                        -- Need ON
    ]],
    [[ rlc-Config-v1430
                                           RLC-Config-v1430
                                                                  OPTIONAL,
                                                                                   -- Need ON
        lwip-UL-Aggregation-r14
                                           BOOLEAN
                                                                   OPTIONAL,
                                                                                   -- Cond LWIP
                                                                   OPTIONAL,
                                            BOOLEAN
                                                                                   -- Cond LWIP
        lwip-DL-Aggregation-r14
        lwa-WLAN-AC-r14
                              ENUMERATED {ac-bk, ac-be, ac-vi, ac-vo} OPTIONAL
                                                                                   -- Cond UL-LWA
    11
}
DRB-ToAddModSCG-r12 ::= SEQUENCE {
    drb-Identity-r12
                                        DRB-Identity.
    drb-Type-r12
                                        CHOICE {
                                           NULL,
        split-r12
        scg-r12
                                            SEOUENCE {
                                               INTEGER (0..15) OPTIONAL, -- Cond DRB-Setup
           eps-BearerIdentity-r12
           pdcp-Config-r12
                                               PDCP-Config
                                                               OPTIONAL
                                                                           -- Cond PDCP-S
                                                               OPTIONAL, -- Cond SetupS2
OPTIONAL, -- Cond SetupS
    rlc-ConfigSCG-r12
                                       RLC-Config
   rlc-Config-v1250
                                         RLC-Config-v1250
                                                                      OPTIONAL, -- Need ON
    logicalChannelIdentitySCG-r12
                                       INTEGER (3..10)
                                                                OPTIONAL, -- Cond DRB-SetupS
    logicalChannelConfigSCG-r12
                                       LogicalChannelConfig
                                                               OPTIONAL,
                                                                           -- Cond SetupS
       rlc-Config-v1430
                                           RLC-Config-v1430
                                                                   OPTIONAL
                                                                                   -- Need ON
    ]]
DRB-ToReleaseList ::=
                                   SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity
                                       CHOICE {
MeasSubframePatternPCell-r10 ::=
   release
                                       NULL,
                                   MeasSubframePattern-r10
    setup
}
NeighCellsCRS-Info-r11 ::=
                                CHOICE {
   release
                                   CRS-AssistanceInfoList-r11
    setup
CRS-AssistanceInfoList-r11 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11
CRS-AssistanceInfo-r11 ::= SEQUENCE {
    physCellId-r11
                                       PhysCellId,
    antennaPortsCount-r11
                                        ENUMERATED {an1, an2, an4, spare1},
    mbsfn-SubframeConfigList-r11
                                       MBSFN-SubframeConfigList,
       mbsfn-SubframeConfigList-v1430 MBSFN-SubframeConfigList-v1430
                                                                          OPTIONAL
                                                                                       -- Need ON
    ]]
}
NeighCellsCRS-Info-r13 ::=
                                CHOICE {
   release
                                   NULL
                                    CRS-AssistanceInfoList-r13
}
CRS-AssistanceInfoList-r13 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r13
CRS-AssistanceInfo-r13 ::= SEQUENCE {
   physCellId-r13
                                        PhysCellId.
    antennaPortsCount-r13
                                       ENUMERATED {an1, an2, an4, spare1},
    mbsfn-SubframeConfigList-r13
                                       MBSFN-SubframeConfigList
                                                                           OPTIONAL,
                                                                                        -- Need ON
       mbsfn-SubframeConfigList-v1430 MBSFN-SubframeConfigList-v1430
                                                                          OPTIONAL
                                                                                       -- Need ON
    11
    11
}
NAICS-AssistanceInfo-r12 ::=
                                   CHOICE {
    release
                                   NULL.
                                    SEQUENCE {
    setup
       neighCellsToReleaseList-r12
                                     NeighCellsToReleaseList-r12
                                                                           OPTIONAL,
                                                                                       -- Need ON
        neighCellsToAddModList-r12
                                                                           OPTIONAL,
                                                                                        -- Need ON
                                       NeighCellsToAddModList-r12
       servCellp-a-r12
                                                                                        -- Need ON
                                       P-a
                                                                           OPTIONAL
NeighCellsToReleaseList-r12 ::=
                                  SEQUENCE (SIZE (1..maxNeighCell-r12)) OF PhysCellId
```

RadioResourceConfigDedicated field descriptions

crs-PortsCount

Parameter represents the number of antenna ports for cell-specific reference signal used by the signaled neighboring cell where n1 corresponds to 1 antenna port, n2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.1].

drb-Identity

In case of DC, the DRB identity is unique within the scope of the UE i.e. an SCG DRB can not use the same value as used for an MCG or split DRB. For a split DRB the same identity is used for the MCG- and SCG parts of the configuration.

drb-ToAddModListSCG

When an SCG is configured, E-UTRAN configures at least one SCG or split DRB.

drb-Type

This field indicates whether the DRB is split or SCG DRB. E-UTRAN does not configure split and SCG DRBs simultaneously for the UE.

drb-TypeChange

Indicates that a split/SCG DRB is reconfigured to an MCG DRB (i.e. E-UTRAN only signals the field in case the DRB type changes).

drb-TypeLWA

Indicates whether a DRB is (re)configured as an LWA DRB or an LWA DRB is reconfigured not to use WLAN resources. NOTE 1

drb-TypeLWIP

Indicates whether a DRB is (re)configured to use LWIP Tunnel in UL and DL (value *lwip*), DL only (value *lwip-DL-only*), UL only (value *lwip-UL-only*) or not to use LWIP Tunnel (value *eutran*).

logicalChannelConfig

For SRBs a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1 or for SRB2 as specified in 9.2.1.2.

logicalChannelIdentity

The logical channel identity for both UL and DL.

Iwa-WLAN-AC

For LWA bearers, indicates the corresponding WLAN access category for uplink. AC-BK (value *ac-bk*) corresponds to Background access category, AC-BE (value *ac-be*) corresponds to Best Effort access category, AC-VI (value *ac-vi*) corresponds to Video access category and AC-VO (value *ac-vo*) corresponds to Voice access category as defined by IEEE 802.11-2012 [67]. If *Iwa-WLAN-AC* is not configured, it is left up to UE to decide which IEEE 802.11 AC value to use when performing transmissions of packets for this DRB over WLAN in the uplink.

Iwip-DL-Aggregation, Iwip-UL-Aggregation

Indicates whether LWIP is configured to utilize LWIP aggregation in DL or UL.

mac-MainConfig

Although the ASN.1 includes a choice that is used to indicate whether the mac-MainConfig is signalled explicitly or set to the default MAC main configuration as specified in 9.2.2, EUTRAN does not apply "defaultValue".

mbsfn-SubframeConfig

Defines the MBSFN subframe configuration used by the signaled neighboring cell. If absent, UE assumes no MBSFN configuration for the neighboring cell.

measSubframePatternPCell

Time domain measurement resource restriction pattern for the PCell measurements (RSRP, RSRQ and the radio link monitoring).

neighCellsCRS-Info, neighCellsCRS-InfoSCell, neighCellsCRS-InfoPSCell

This field contains assistance information used by the UE to mitigate interference from CRS while performing RRM/RLM/CSI measurement or data demodulation or DL control channel demodulation. When the received CRS assistance information is for a cell with CRS non-colliding with that of the CRS of the cell to measure, the UE may use the CRS assistance information to mitigate CRS interference. When the received CRS assistance information is for a cell with CRS colliding with that of the CRS of the cell to measure, the UE may use the CRS assistance information to mitigate CRS interference RRM/RLM (as specified in TS 36.133 [16]) and for CSI (as specified in TS 36.101 [42]) on the subframes indicated by measSubframePatternPCell, measSubframePatternConfigNeigh, csi-MeasSubframeSet1 if configured, and the CSI subframe set 1 if csi-MeasSubframeSets-r12 is configured. The UE may use CRS assistance information to mitigate CRS interference from the cells in the CRS-AssistanceInfoList for the demodulation purpose or DL control channel demodulation as specified in TS 36.101 [42]. EUTRAN does not configure neighCellsCRS-Info-r11 or neighCellsCRS-Info-r13 if eimta-MainConfigPCell-r12 is configured.

neighCellsToAddModList

This field contains assistance information used by the UE to cancel and suppress interference of a neighbouring cell. If this field is present for a neighbouring cell, the UE assumes that the transmission parameters listed in the sub-fields are used by the neighbouring cell. If this field is present for a neighbouring cell, the UE assumes the neighbour cell is subframe and SFN synchronized to the serving cell, has the same system bandwidth, UL/DL and special subframe configuration, and cyclic prefix length as the serving cell.

p-aList

Indicates the restricted subset of power offset for QPSK, 16QAM, and 64QAM PDSCH transmissions for the neighbouring cell by using the parameter P_A , see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

RadioResourceConfigDedicated field descriptions

p-b

Parameter: P_B , indicates the cell-specific ratio used by the signaled neighboring cell, see TS 36.213 [23, Table 5.2-1].

physicalConfigDedicated

The default dedicated physical configuration is specified in 9.2.4.

resAllocGranularity

Indicates the resource allocation and precoding granularity in PRB pair level of the signaled neighboring cell, see TS 36.213 [23, 7.1.6].

rlc-Config

For SRBs a choice is used to indicate whether the RLC configuration is signalled explicitly or set to the values defined in the default RLC configuration for SRB1 in 9.2.1.1 or for SRB2 in 9.2.1.2. RLC AM is the only applicable RLC mode for SRB1 and SRB2. E-UTRAN does not reconfigure the RLC mode of DRBs except when a full configuration option is used, and may reconfigure the RLC SN field size and the AM RLC LI field size only upon handover within E-UTRA or upon the first reconfiguration after RRC connection re-establishment or upon SCG Change for SCG and split DRBs.

servCellp-a

Indicates the power offset for QPSK C-RNTI based PDSCH transmissions used by the serving cell, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

sps-Config

The default SPS configuration is specified in 9.2.3. Except for handover or releasing SPS for MCG, E-UTRAN does not reconfigure *sps-Config* for MCG when there is a configured downlink assignment or a configured uplink grant for MCG (see TS 36.321 [6]). Except for SCG change or releasing SPS for SCG, E-UTRAN does not reconfigure *sps-Config* for SCG when there is a configured downlink assignment or a configured uplink grant for SCG (see TS 36.321 [6]).

srb-Identity

Value 1 is applicable for SRB1 only.

Value 2 is applicable for SRB2 only.

transmissionModeList

Indicates a subset of transmission mode 1, 2, 3, 4, 6, 8, 9, 10, for the signaled neighboring cell for which *NeighCellsInfo* applies. When TM10 is signaled, other signaled transmission parameters in *NeighCellsInfo* are not applicable to up to 8 layer transmission scheme of TM10. E-UTRAN may indicate TM9 when TM10 with QCL type A

and DMRS scrambling with $n_{\rm ID}^{(i)} = N_{\rm ID}^{\rm cell}$ in TS 36.211 [21, 6.10.3.1] is used in the signalled neighbour cell and TM9 or

TM10 with QCL type A and DMRS scrambling with $n_{\rm ID}^{(i)}=N_{\rm ID}^{\rm cell}$ in TS 36.211 [21, 6.10.3.1] is used in the serving cell. UE behaviour with NAICS when TM10 is used is only defined when QCL type A and DMRS scrambling with

 $n_{
m ID}^{(i)}=N_{
m ID}^{
m cell}$ in TS 36.211 [21, 6.10.3.1] is used for the serving cell and all signalled neighbour cells. The first/ leftmost bit is for transmission mode 1, the second bit is for transmission mode 2, and so on.

NOTE 1: It is up to eNB to ensure that the field indicating LWA bearer type is set to FALSE when LWA bearer is no longer used (e.g. during handover or re-establishment where LWA configuration is released).

Conditional presence	Explanation
UL-LWA	The field is optionally present, need ON if <i>ul-LWA-Config-r14</i> is present. Otherwise the
	field is not present.
CRSIM	The field is optionally present, need ON, if neighCellsCRS-Info-r11 is not present;
	otherwise it is not present.
DRB-Setup	The field is mandatory present if the corresponding DRB is being set up; otherwise it is
	not present.
DRB-SetupM	The field is mandatory present upon setup of MCG or split DRB; The field is optionally
	present, Need ON, upon change from SCG to MCG DRB; otherwise it is not present.
DRB-SetupS	The field is mandatory present upon setup of SCG or split DRB, or upon change from
	MCG to split DRB; The field is optionally present, Need ON, upon change from MCG to
	SCG DRB; otherwise it is not present.
HO-Conn	The field is mandatory present in case of handover to E-UTRA or when the fullConfig is
	included in the RRCConnectionReconfiguration message or in case of RRC connection
	establishment (excluding RRConnectionResume); otherwise the field is optionally
	present, need ON. Upon connection establishment/ re-establishment only SRB1 is
	applicable (excluding RRConnectionResume).
HO-toEUTRA	The field is mandatory present in case of handover to E-UTRA or when the fullConfig is
	included in the RRCConnectionReconfiguration message; In case of RRC connection
	establishment (excluding <i>RRConnectionResume</i>); and RRC connection re-establishment
	the field is not present; otherwise the field is optionally present, need ON.
HO-toEUTRA2	The field is mandatory present in case of handover to E-UTRA or when the fullConfig is
	included in the RRCConnectionReconfiguration message; otherwise the field is optionally
	present, need ON.
LWIP	The field is optionally present, Need ON, if drbTypeLWIP-r13 is not set to eutran;
	otherwise it is not present and the UE shall delete any existing value for this field.
PDCP	The field is mandatory present if the corresponding DRB is being setup; the field is
	optionally present, need ON, upon reconfiguration of the corresponding split DRB or LWA
	DRB, upon the corresponding DRB type change from split to MCG bearer, upon the
	corresponding DRB type change from MCG to split bearer or LWA bearer, upon the
	corresponding DRB type change from LWA to LTE only bearer, upon handover within E-
	UTRA and upon the first reconfiguration after re-establishment but in all these cases only
	when fullConfig is not included in the RRCConnectionReconfiguration message;
	otherwise it is not present.
PDCP-S	The field is mandatory present if the corresponding DRB is being setup; the field is
	optionally present, need ON, upon SCG change; otherwise it is not present.
RLC-Setup	This field is optionally present if the corresponding DRB is being setup, need ON;
	otherwise it is not present.
SCellAdd	The field is optionally present, need ON, upon SCell addition; otherwise it is not present.
Setup	The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise
•	the field is optionally present, need ON.
SetupM	The field is mandatory present upon setup of an MCG or split DRB; otherwise the field is
	optionally present, need ON.
SetupS	The field is mandatory present upon setup of an SCG or split DRB, as well as upon
	change from MCG to split DRB; otherwise the field is optionally present, need ON.
SetupS2	The field is mandatory present upon setup of an SCG or split DRB, as well as upon
	change from MCG to split or SCG DRB. For an SCG DRB the field is optionally present,
	need ON. Otherwise the field is not present.
SPS	The field is optionally present, need ON, if sps-Config (without suffix) is not configured;
	otherwise it is not present.
SPS2	The field is optionally present, need ON, if sps-Config-r12 is not configured; otherwise it is
	not present.

- RCLWI-Configuration

The IE RCLWI-Configuration is used to add, modify or release the RCLWI configuration.

```
-- ASN1START

RCLWI-Configuration-r13 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        rclwi-Config-r13 RCLWI-Config-r13
    }
}

RCLWI-Config-r13 ::= SEQUENCE {
```

- RLC-Config

The IE RLC-Config is used to specify the RLC configuration of SRBs and DRBs.

RLC-Config information element

```
-- ASN1START
RLC-Config ::=
                         CHOICE {
                                      SEQUENCE {
                                         UL-AM-RLC,
       ul-AM-RLC
                                          DL-AM-RLC
       dl-AM-RLC
   um-Bi-Directional
                                      SEQUENCE {
                                          UL-UM-RLC,
       ul-UM-RLC
       dl-UM-RLC
                                          DL-UM-RLC
   um-Uni-Directional-UL
                                      SEQUENCE {
       ul-UM-RLC
                                         UL-UM-RLC
   um-Uni-Directional-DL
                                      SEQUENCE {
       dl-UM-RLC
                                          DL-UM-RLC
   },
    . . .
}
RLC-Config-v1250 ::=
                                 SEQUENCE {
   ul-extended-RLC-LI-Field-r12
   dl-extended-RLC-LI-Field-r12
                                          BOOLEAN,
                                          BOOLEAN
}
RLC-Config-v1310 ::=
                                  SEQUENCE {
   ul-extended-RLC-AM-SN-r13
                                              BOOLEAN,
   dl-extended-RLC-AM-SN-r13
                                              BOOLEAN,
                                              PollPDU-v1310 OPTIONAL -- Need OR
   pollPDU-v1310
RLC-Config-v1430 ::=
                                  CHOICE {
   release
                                     NULL,
                                      SEQUENCE {
       pollByte-r14
                                          PollByte-r14
}
UL-AM-RLC ::=
                                  SEQUENCE {
  t-PollRetransmit
                                      T-PollRetransmit,
   pollPDU
                                      PollPDU,
   pollByte
                                      PollByte,
   maxRetxThreshold
                                      ENUMERATED {
                                          t1, t2, t3, t4, t6, t8, t16, t32}
}
DL-AM-RLC ::=
                                  SEQUENCE {
   t-Reordering
                                      T-Reordering,
   t-StatusProhibit
                                      T-StatusProhibit
}
UL-UM-RLC ::=
                                  SEQUENCE {
   sn-FieldLength
                                      SN-FieldLength
DL-UM-RLC ::=
                                  SEQUENCE {
  sn-FieldLength
                                      SN-FieldLength,
  t-Reordering
                                      T-Reordering
```

```
ENUMERATED {size5, size10}
SN-FieldLength ::=
T-PollRetransmit ::=
                                                                                  ENUMERATED {
                                                                                           ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                                                                            ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                                                                            ms75, ms80, ms85, ms90, ms95, ms100, ms105,
                                                                                            {\tt ms110}\,,\ {\tt ms115}\,,\ {\tt ms120}\,,\ {\tt ms125}\,,\ {\tt ms130}\,,\ {\tt ms135}\,,
                                                                                            ms140, ms145, ms150, ms155, ms160, ms165,
                                                                                           ms170, ms175, ms180, ms185, ms190, ms195,
                                                                                            ms230, ms235, ms240, ms245, ms250, ms300,
                                                                                            ms350, ms400, ms450, ms500, ms800-v1310,
                                                                                            ms1000-v1310, ms2000-v1310, ms4000-v1310,
                                                                                             spare5, spare4, spare3, spare2, spare1}
PollPDII ::=
                                                                                  ENUMERATED {
                                                                                          p4, p8, p16, p32, p64, p128, p256, pInfinity}
PollPDU-v1310 ::=
                                                                                  ENUMERATED {
                                                                                          p512, p1024, p2048, p4096, p6144, p8192, p12288, p16384}
PollByte ::=
                                                                                            kB25, kB50, kB75, kB100, kB125, kB250, kB375,
                                                                                            kB500, kB750, kB1000, kB1250, kB1500, kB2000,
                                                                                           kB3000, kBinfinity, spare1}
PollByte-r14 ::=
                                                                                  ENUMERATED {
                                                                                           kB1, kB2, kB5, kB8, kB10, kB15, kB3500, kB4000, kB4500, kB5000, kB5500, kB6000, kB6500, kB6500
                                                                                            kB7000, kB7500, kB8000, kB9000, kB10000, kB11000, kB12000,
                                                                                           kB13000, kB14000, kB15000, kB16000, kB17000, kB18000, kB19000, kB20000, kB25000, kB35000, kB35000, kB40000}
T-Reordering ::=
                                                                                  ENUMERATED {
                                                                                           ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                                                                           ms40, ms45, ms50, ms55, ms60, ms65, ms70, ms75, ms80, ms85, ms90, ms95, ms100, ms110,
                                                                                            ms120, ms130, ms140, ms150, ms160, ms170,
                                                                                            ms180, ms190, ms200, ms1600-v1310}
                                                                                  ENUMERATED {
T-StatusProhibit ::=
                                                                                           ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                                                                            ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                                                                            ms75, ms80, ms85, ms90, ms95, ms100, ms105,
                                                                                            ms110, ms115, ms120, ms125, ms130, ms135,
                                                                                            ms140, ms145, ms150, ms155, ms160, ms165,
                                                                                            ms170, ms175, ms180, ms185, ms190, ms195,
                                                                                           ms200, ms205, ms210, ms215, ms220, ms225,
                                                                                           ms230, ms235, ms240, ms245, ms250, ms300, ms350, ms400, ms450, ms500, ms800-v1310,
                                                                                          ms1000-v1310, ms1200-v1310, ms1600-v1310, ms2000-v1310,
ms2400-v1310, spare2,
                                                                                         spare1}
-- ASN1STOP
```

RLC-Config field descriptions

dl-extended-RLC-LI-Field, ul-extended-RLC-LI-Field

Indicates the RLC LI field size. Value *TRUE* means that 15 bit LI length shall be used, otherwise 11 bit LI length shall be used; see TS 36.322 [7]. E-UTRAN enables this field only when *RLC-Config* (without suffix) is set to *am*.

maxRetxThreshold

Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on.

pollByte

Parameter for RLC AM in TS 36.322 [7]. Value kB25 corresponds to 25 kBytes, kB50 to 50 kBytes and so on. kBInfinity corresponds to an infinite amount of kBytes. In case *pollByte-r14* is signalled, the UE shall ignore pollByte (i.e. without suffix).

polIPDU

Parameter for RLC AM in TS 36.322 [7]. Value p4 corresponds to 4 PDUs, p8 to 8 PDUs and so on. pInfinity corresponds to an infinite number of PDUs. In case *pollPDU-r13* is signalled, the UE shall ignore *pollPDU* (i.e. without suffix). E-UTRAN enables *pollPDU-v1310* field only when *RLC-Config* (without suffix) is set to *am*.

sn-FieldLength

Indicates the UM RLC SN field size, see TS 36.322 [7], in bits. Value size5 means 5 bits, size10 means 10 bits.

t-PollRetransmit

Timer for RLC AM in TS 36.322 [7], in milliseconds. Value ms5 means 5ms, ms10 means 10ms and so on. EUTRAN configures values msX-v1310 (with suffix) only if UE supports CE.

t-Reordering

Timer for reordering in TS 36.322 [7], in milliseconds. Value ms0 means 0ms and behaviour as specified in 7.3.2 applies, ms5 means 5ms and so on.

t-StatusProhibit

Timer for status reporting in TS 36.322 [7], in milliseconds. Value ms0 means 0ms and behaviour as specified in 7.3.2 applies, ms5 means 5ms and so on. EUTRAN configures values msX-v1310 (with suffix) only if UE supports operation in CF

ul-extended-RLC-AM-SN, dl-extended-RLC-AM-SN

Indicates whether or not the UE shall use the extended SN and SO length for AM bearer. Value *TRUE* means that 16 bit SN length and 16 bit SO length shall be used, otherwise 10 bit SN length and 15 bit SO length shall be used; see TS 36.322 [7].

RLF-TimersAndConstants

The IE *RLF-TimersAndConstants* contains UE specific timers and constants applicable for UEs in RRC_CONNECTED.

RLF-TimersAndConstants information element

```
-- ASN1START
RLF-TimersAndConstants-r9 ::=
                                         CHOICE {
                                             NULL,
   release
    setup
                                             SEOUENCE {
        t301-r9
                                             ENUMERATED {
                                                 ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                                 ms2000},
        t.310-r9
                                             ENUMERATED
                                                 ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
                                             ENUMERATED {
        n310-r9
                                                n1, n2, n3, n4, n6, n8, n10, n20},
                                             ENUMERATED {
        t.311-r9
                                                 ms1000, ms3000, ms5000, ms10000, ms15000,
                                                 ms20000, ms30000},
        n311-r9
                                             ENUMERATED {
                                                 n1, n2, n3, n4, n5, n6, n8, n10},
    }
                                        CHOICE {
RLF-TimersAndConstants-r13 ::=
    release
                                             NULL,
    setup
                                             SEQUENCE {
        t301-v1310
                                                 ENUMERATED {
                                                     ms2500, ms3000, ms3500, ms4000, ms5000,
                                                     ms6000, ms8000, ms10000},
        [[ t310-v1330
                                                 ENUMERATED {ms4000, ms6000} OPTIONAL
                                                                                          -- Need ON
```

```
RLF-TimersAndConstantsSCG-r12 ::=
                                            CHOICE {
   release
                                       NULL,
   setup
                                        SEQUENCE {
        t313-r12
                                           ENUMERATED {
                                               ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
       n313-r12
                                            ENUMERATED {
                                             n1, n2, n3, n4, n6, n8, n10, n20},
       n314-r12
                                            ENUMERATED {
                                               n1, n2, n3, n4, n5, n6, n8, n10},
-- ASN1STOP
```

RLF-TimersAndConstants field descriptions

пЗху

Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

t3x1

Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms50 corresponds with 50 ms and so on. E-UTRAN configures *RLF-TimersAndConstants-r13* only if UE supports *ce-ModeB*. UE shall use the extended values *t3xy-v1310* and *t3xy-v1330*, if present, and ignore the values signaled by *t3xy-r9*.

– RN-SubframeConfig

The IE RN-SubframeConfig is used to specify the subframe configuration for an RN.

RN-SubframeConfig information element

```
-- ASN1START
RN-SubframeConfig-r10 ::=
                               SEQUENCE {
   subframeConfigPattern-r10
                                      CHOICE {
       subframeConfigPatternFDD-r10
                                       BIT STRING (SIZE(8)),
       subframeConfigPatternTDD-r10 INTEGER (0..31)
                                                                      OPTIONAL, -- Need ON
   rpdcch-Config-r10
                                  SEQUENCE {
       resourceAllocationType-r10 ENUMERATED {type0, type1, type2Localized, type2Distributed,
                                                   spare4, spare3, spare2, spare1},
       resourceBlockAssignment-r10
                                           CHOICE {
           type01-r10
                                               CHOICE {
                                                  BIT STRING (SIZE(6)),
               nrb6-r10
               nrb15-r10
                                                   BIT STRING (SIZE(8)),
               nrh25-r10
                                                  BIT STRING (SIZE(13)).
               nrb50-r10
                                                  BIT STRING (SIZE(17)),
               nrb75-r10
                                                   BIT STRING (SIZE(19)),
               nrb100-r10
                                                  BIT STRING (SIZE(25))
            type2-r10
                                               CHOICE {
               nrb6-r10
                                                  BIT STRING (SIZE(5)),
               nrb15-r10
                                                   BIT STRING (SIZE(7)),
               nrb25-r10
                                                  BIT STRING (SIZE(9)),
               nrb50-r10
                                                  BIT STRING (SIZE(11)),
               nrb75-r10
                                                   BIT STRING (SIZE(12)),
               nrb100-r10
                                                  BIT STRING (SIZE(13))
           },
       demodulationRS-r10
                                       ENUMERATED {crs},
           interleaving-r10
                                          ENUMERATED {crs, dmrs}
           noInterleaving-r10
       pdsch-Start-r10
                                      INTEGER (1..3),
       pucch-Config-r10
                                      CHOICE {
                                          CHOICE {
           tdd
               channelSelectionMultiplexingBundling
                                                     SEQUENCE {
                   n1PUCCH-AN-List-r10
                                             SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)
               fallbackForFormat3
                                              SEOUENCE {
                   n1PUCCH-AN-P0-r10
                                                INTEGER (0..2047),
                   n1PUCCH-AN-P1-r10
                                                  INTEGER (0..2047)
                                                                         OPTIONAL
                                                                                      -- Need OR
```

RN-SubframeConfig field descriptions

demodulationRS

Indicates which reference signals are used for R-PDCCH demodulation according to TS 36.216 [55, 7.4.1]. Value interleaving corresponds to cross-interleaving and value noInterleaving corresponds to no cross-interleaving according to TS 36.216 [55, 7.4.2 and 7.4.3].

n1PUCCH-AN-List

Parameter: $n_{\mathrm{PUCCH},t}^{(1)}$, see TS 36.216, [55, 7.5.1]. This parameter is only applicable for TDD. Configures PUCCH HARQ-ACK resources if the RN is configured to use HARQ-ACK channel selection, HARQ-ACK multiplexing or HARQ-ACK bundling.

n1PUCCH-AN-P0, n1PUCCH-AN-P1

Parameter: $n_{\text{PUCCH}}^{(1,p)}$, for antenna port P0 and for antenna port P1 respectively, see TS 36.216, [55, 7.5.1] for FDD and [55, 7.5.2] for TDD.

pdsch-Start

Parameter: DL-StartSymbol, see TS 36.216 [55, Table 5.4-1].

resource Allocation Type

Represents the resource allocation used: type 0, type 1 or type 2 according to TS 36.213 [23, 7.1.6]. Value type0 corresponds to type 0, value type1 corresponds to type 1, value type2Localized corresponds to type 2 with localized virtual resource blocks and type2Distributed corresponds to type 2 with distributed virtual resource blocks.

resourceBlockAssignment

Indicates the resource block assignment bits according to TS 36.213 [23, 7.1.6]. Value type01 corresponds to type 0 and type 1, and the value type2 corresponds to type 2. Value nrb6 corresponds to a downlink system bandwidth of 6 resource blocks, value nrb15 corresponds to a downlink system bandwidth of 15 resource blocks, and so on.

subframeConfigPatternFDD

Parameter: SubframeConfigurationFDD, see TS 36.216 [55, Table 5.2-1]. Defines the DL subframe configuration for eNB-to-RN transmission, i.e. those subframes in which the eNB may indicate downlink assignments for the RN. The radio frame in which the pattern starts (i.e. the radio frame in which the first bit of the subframeConfigPatternFDD corresponds to subframe #0) occurs when SFN mod 4 = 0.

subframeConfigPatternTDD

Parameter: SubframeConfigurationTDD, see TS 36.216 [55, Table 5.2-2]. Defines the DL and UL subframe configuration for eNB-RN transmission.

SchedulingRequestConfig

The IE Scheduling Request Config is used to specify the Scheduling Request related parameters

SchedulingRequestConfig information element

```
-- ASN1START
SchedulingRequestConfig ::=
                                CHOICE {
   release
                                        NULL,
                                        SEQUENCE {
   setup
        sr-PUCCH-ResourceIndex
                                            INTEGER (0..2047),
        sr-ConfigIndex
                                            INTEGER (0..157),
        dsr-TransMax
                                            ENUMERATED {
                                                n4, n8, n16, n32, n64, spare3, spare2, spare1}
SchedulingRequestConfig-v1020 ::= SEQUENCE {
   sr-PUCCH-ResourceIndexP1-r10
                                        INTEGER (0..2047)
                                                                    OPTIONAL
                                                                                     -- Need OR
```

```
SchedulingRequestConfigSCell-r13 ::=
                                          CHOICE {
   release
                                    NULL,
   setup
                                    SEQUENCE {
       sr-PUCCH-ResourceIndex-r13
                                          INTEGER (0..2047),
       sr-PUCCH-ResourceIndexP1-r13
                                         INTEGER (0..2047)
                                                                     OPTIONAL,
       sr-ConfigIndex-r13
                                          INTEGER (0..157),
       dsr-TransMax-r13
                                         ENUMERATED {
                                             n4, n8, n16, n32, n64, spare3, spare2, spare1}
-- ASN1STOP
```

SchedulingRequestConfig field descriptions

dsr-TransMax

Parameter for SR transmission in TS 36.321 [6, 5.4.4]. The value n4 corresponds to 4 transmissions, n8 corresponds to 8 transmissions and so on. EUTRAN configures the same value for all serving cells for which this field is configured.

sr-ConfigIndex

Parameter I_{SR} . See TS 36.213 [23,10.1]. The values 156 and 157 are not applicable for Release 8.

sr-PUCCH-ResourceIndex, sr-PUCCH-ResourceIndexP1

Parameter: $n_{\text{PUCCH,SRI}}^{(1,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. E-UTRAN configures sr-PUCCH-ResourceIndexP1 only if sr-PUCCHResourceIndex is configured.

SoundingRS-UL-Config

The IE *SoundingRS-UL-Config* is used to specify the uplink Sounding RS configuration for periodic and aperiodic sounding.

SoundingRS-UL-Config information element

```
-- ASN1START
SoundingRS-UL-ConfigCommon ::=
                                   CHOICE {
   release
                                       SEQUENCE {
   setup
       srs-BandwidthConfig
                                           ENUMERATED {bw0, bw1, bw2, bw3, bw4, bw5, bw6, bw7},
       srs-SubframeConfig
                                           ENUMERATED
                                              sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,
                                               sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15},
       ackNackSRS-SimultaneousTransmission BOOLEAN,
                                                                      OPTIONAL -- Cond TDD
       srs-MaxUpPts
                                          ENUMERATED {true}
}
SoundingRS-UL-ConfigDedicated ::= CHOICE{
   release
   setup
       srs-Bandwidth
                                          ENUMERATED {bw0, bw1, bw2, bw3},
                                          ENUMERATED {hbw0, hbw1, hbw2, hbw3},
       srs-HoppingBandwidth
       freqDomainPosition
                                          INTEGER (0..23),
       duration
                                          BOOLEAN,
       srs-ConfigIndex
                                           INTEGER (0..1023),
                                          INTEGER (0..1),
       transmissionComb
       cyclicShift
                                          ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
}
SoundingRS-UL-ConfigDedicated-v1020 ::= SEQUENCE {
   srs-AntennaPort-r10
                                      SRS-AntennaPort
SoundingRS-UL-ConfigDedicated-v1310 ::= CHOICE{
   release
       transmissionComb-v1310
                                           INTEGER (2..3)
                                                                      OPTIONAL, -- Need OR
       cyclicShift-v1310
                                           ENUMERATED {cs8, cs9, cs10, cs11} OPTIONAL,
                                                                                        -- Need
OR
       transmissionCombNum-r13
                                  ENUMERATED {n2, n4} OPTIONAL -- Need OR
```

```
SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 ::=
                                                CHOICE {
    release
                                         NULL,
                                         SEQUENCE {
    setup
                                             ENUMERATED {sym2, sym4},
ENUMERATED {bw0, bw1, bw2, bw3},
        srs-UpPtsAdd-r13
        srs-Bandwidth-r13
        srs-HoppingBandwidth-r13
                                             ENUMERATED {hbw0, hbw1, hbw2, hbw3},
        freqDomainPosition-r13
                                             INTEGER (0..23),
        duration-r13
                                             BOOLEAN,
                                             INTEGER (0..1023),
INTEGER (0..3),
        srs-ConfigIndex-r13
        transmissionComb-r13
        cyclicShift-r13
                                             ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7,
                                                         cs8, cs9, cs10, cs11},
        srs-AntennaPort-r13
                                             SRS-AntennaPort,
        transmissionCombNum-r13
                                             ENUMERATED {n2, n4}
}
SoundingRS-UL-ConfigDedicatedAperiodic-r10 ::= CHOICE{
    release
                                        NULL,
                                         SEQUENCE {
                                            INTEGER (0..31),
        srs-ConfigIndexAp-r10
        srs-ConfigApDCI-Format4-r10
                                             SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r10 OPTIONAL, --
Need ON
        srs-ActivateAp-r10
                                             CHOICE {
                release
                                                 SEQUENCE {
                setup
                    srs-ConfigApDCI-Format0-r10
                                                        SRS-ConfigAp-r10,
                    srs-ConfigApDCI-Format1a2b2c-r10
                                                             SRS-ConfigAp-r10,
                }
                                                                              OPTIONAL
                                                                                          -- Need ON
    }
}
SoundingRS-UL-ConfigDedicatedAperiodic-v1310 ::=
                                                   CHOICE {
    release
                                         NULL,
                                         SEQUENCE {
        srs-ConfigApDCI-Format4-v1310
                                             SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-v1310
    OPTIONAL, -- Need ON
        srs-ActivateAp-v1310
                                             CHOICE {
                release
                                                 NULL,
                                                 SEQUENCE {
                    srs-ConfigApDCI-Format0-v1310
                                                         SRS-ConfigAp-v1310 OPTIONAL,
                                                                                          -- Need ON
                    srs-ConfigApDCI-Formatla2b2c-v1310 SRS-ConfigAp-v1310 OPTIONAL
                                                                                          -- Need ON
                                                                              OPTIONAL
                                                                                          -- Need ON
    }
}
SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 ::= CHOICE{
    setup
                                         SEQUENCE {
                                            ENUMERATED {sym2, sym4},
        srs-UpPtsAdd-r13
        srs-ConfigIndexAp-r13
                                             INTEGER (0..31),
        srs-ConfigApDCI-Format4-r13
                                             SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r13 OPTIONAL,--
Need ON
        srs-ActivateAp-r13
                                             CHOICE {
                                                NULL,
                release
                                                 SEQUENCE {
                    srs-ConfigApDCI-Format0-r13
                                                       SRS-ConfigAp-r13,
                                                            SRS-ConfigAp-r13
                    srs-ConfigApDCI-Format1a2b2c-r13
                }
        }
                                                                              OPTIONAL
                                                                                          -- Need ON
}
SoundingRS-UL-ConfigDedicatedAperiodic-v1430 ::=
                                                     CHOICE {
    release
    setup
                                         SEQUENCE {
                                             INTEGER (1..4) OPTIONAL
                                                                              -- Need ON
        srs-SubframeIndication-r14
SRS-ConfigAp-r10 ::= SEQUENCE {
  srs-AntennaPortAp-r10
                                         SRS-AntennaPort,
```

```
srs-BandwidthAp-r10
                                     ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
ENUMERATED {n2, n4} OPTIONAL -- Need OR
}
SRS-ConfigAp-r13 ::= SEQUENCE {
   srs-AntennaPortAp-r13 SRS-AntennaPort,
srs-BandwidthAp-r13 ENUMERATED {bw0, bw1, bw2, bw3},
freqDomainPositionAp-r13 INTEGER (0..23),
transmissionCombAp-r13 INTEGER (0..3),
cyclicShiftAp-r13 ENUMERATED {cs0, cs1, cs2, cs3,
cs8, cs9, cs10, cs11},
  srs-AntennaPortAp-r13
                                     ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7,
                                        cs8, cs9, cs10, cs11},
   transmissionCombNum-r13
                                    ENUMERATED {n2, n4}
}
SRS-AntennaPort ::=
                                 ENUMERATED {an1, an2, an4, spare1}
-- ASN1STOP
```

SoundingRS-UL-Config field descriptions

ackNackSRS-SimultaneousTransmission

Parameter: Simultaneous-AN-and-SRS, see TS 36.213 [23, 8.2]. For SCells without PUCCH configured, this field is not applicable and the UE shall ignore the value.

cyclicShift, cyclicShiftAp

Parameter: n_SRS for periodic and aperiodic sounding reference signal transmission respectively except for an LAA SCell. See TS 36.211 [21, 5.5.3.1], where cs0 corresponds to 0 etc.

duration

Parameter: Duration for periodic sounding reference signal transmission except for an LAA SCell. See TS 36.213 [21, 8.2]. FALSE corresponds to "single" and value TRUE to "indefinite".

freqDomainPosition, freqDomainPositionAp

Parameter: $n_{\rm RRC}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].

srs-AntennaPort, srs-AntennaPortAp

Indicates the number of antenna ports used for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3]. UE shall release *srs-AntennaPort* if *SoundingRS-UL-ConfigDedicated* is released.

srs-Bandwidth, srs-BandwidthAp

Parameter: $B_{\rm SRS}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, tables 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4]. For LAA SCell only bw0 is applied.

srs-BandwidthConfig

Parameter: SRS Bandwidth Configuration. See TS 36.211, [21, table 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4]. Actual configuration depends on UL bandwidth. bw0 corresponds to value 0, bw1 to value 1 and so on.

srs-ConfigApDCI-Format0 / srs-ConfigApDCI-Format1a2b2c / srs-ConfigApDCI-Format4

Parameters indicate the resource configurations for aperiodic sounding reference signal transmissions triggered by DCI formats 0, 1A, 2B, 2C, 4. See TS 36.213 [23, 8.2].

srs-ConfigIndex, srs-ConfigIndexAp

Parameter: I_{SRS} for periodic and aperiodic sounding reference signal transmission respectively except for an LAA SCell. See TS 36.213 [23, table 8.2-1 and table 8.2-2] for periodic and TS 36.213 [23, table 8.2-4 and table 8.2-5] for aperiodic SRS transmission.

srs-HoppingBandwidth

Parameter: SRS hopping bandwidth $b_{hop} \in \{0,1,2,3\}$ for periodic sounding reference signal transmission except for an LAA SCell, see TS 36.211 [21, 5.5.3.2] where hbw0 corresponds to value 0, hbw1 to value 1 and so on.

srs-MaxUpPts

Parameter: srsMaxUpPts, see TS 36.211 [21, 5.5.3.2]. If this field is present, reconfiguration of $m_{\rm SRS,0}^{\rm max}$ applies for UpPts, otherwise reconfiguration does not apply.

srs-SubframeConfig

Parameter: SRS SubframeConfiguration except for an LAA SCell. See TS 36.211, [21, table 5.5.3.3-1] applies for FDD whereas TS 36.211 [21, table 5.5.3.3-2] applies for TDD. sc0 corresponds to value 0, sc1 corresponds to value 1 and so on.

srs-SubframeIndication

Parameter: SRS subframe indication in SRS parameter set configuration for aperiodic sounding reference signal transmission on an LAA SCell configured with uplink, see TS 36.213 [23].

srs-UpPtsAdd

The field only applies for TDD and frame structure type 3, see TS 36.211 [21]. If E-UTRAN configures both soundingRS-UL-ConfigDedicatedUpPTsExt and soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt srs-UpPtsAdd in both fields is set to the same value.

transmissionComb, transmissionCombAp

Parameter: $k_{\text{TC}} \in \{0..3\}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].

Conditional presence	Explanation
TDD	This field is optional present for TDD, need OR; it is not present for FDD and the UE shall
	delete any existing value for this field.

SPS-Config

The IE SPS-Config is used to specify the semi-persistent scheduling configuration.

SPS-Config information element

```
-- ASN1START
SPS-Config ::= SEQUENCE {
    semiPersistSchedC-RNTI
                                    C-RNTI
                                                            OPTIONAL,
                                                                                -- Need OR
    sps-ConfigDL
                                    SPS-ConfigDL
                                                           OPTIONAL,
                                                                                -- Need ON
    sps-ConfigUL
                                    SPS-ConfigUL
                                                           OPTIONAL
                                                                                -- Need ON
SPS-Config-v1430 ::=
                       SEQUENCE {
   ul-SPS-V-RNTI-r14
                                       C-RNTI
                                                                OPTIONAL,
                                                                                    -- Need OR
    sl-SPS-V-RNTI-r14
                                                                                    -- Need OR
                                        C-RNTI
                                                                OPTIONAL.
                                                                                    -- Need ON
    sps-ConfigUL-ToAddModList-r14
                                       SPS-ConfigUL-ToAddModList-r14 OPTIONAL,
    sps-ConfigUL-ToReleaseList-r14
                                     SPS-ConfigUL-ToReleaseList-r14 OPTIONAL,
                                                                                    -- Need ON
    sps-ConfigSL-ToAddModList-r14
                                     SPS-ConfigSL-ToReleaseList-r14 OPTIONAL
                                       SPS-ConfigSL-ToAddModList-r14
                                                                       OPTIONAL,
                                                                                    -- Need ON
                                                                                    -- Need ON
    sps-ConfigSL-ToReleaseList-r14
}
SPS-ConfigUL-ToAddModList-r14 ::= SEQUENCE (SIZE (1..maxConfigSPS-r14)) OF SPS-ConfigUL
SPS-ConfigUL-ToReleaseList-r14 ::= SEQUENCE (SIZE (1..maxConfigSPS-r14)) OF SPS-ConfigIndex-r14
SPS-ConfigSL-ToAddModList-r14 ::= SEQUENCE (SIZE (1..maxConfigSPS-r14)) OF SPS-ConfigSL-r14
SPS-ConfigSL-ToReleaseList-r14 ::= SEQUENCE (SIZE (1..maxConfigSPS-r14)) OF SPS-ConfigIndex-r14
SPS-ConfigDL ::=
                 CHOICE {
    release
                                    NULL,
    setup
                                    SEQUENCE {
                                            ENTIMERATED {
       semiPersistSchedIntervalDL
                                                sf10, sf20, sf32, sf40, sf64, sf80,
                                                sf128, sf160, sf320, sf640, spare6,
                                                spare5, spare4, spare3, spare2,
                                               spare1},
        numberOfConfSPS-Processes
                                            INTEGER (1..8),
        n1PUCCH-AN-PersistentList
                                            N1PUCCH-AN-PersistentList,
        [ twoAntennaPortActivated-r10
                                           CHOICE {
                                               NULL,
               release
                                                SEQUENCE {
                setup
                    n1PUCCH-AN-PersistentListP1-r10 N1PUCCH-AN-PersistentList
            }
                                                                            OPTIONAL
                                                                                        -- Need ON
        ]]
   }
}
SPS-ConfigUL ::=
                    CHOICE {
    release
                                    NULL,
    setup
                                    SEQUENCE {
        semiPersistSchedIntervalUL
                                            ENUMERATED {
                                               sf10, sf20, sf32, sf40, sf64, sf80,
                                                sf128, sf160, sf320, sf640, sf1-v1430,
                                                sf2-v1430, sf3-v1430, sf4-v1430, sf5-v1430,
                                               spare1},
        implicitReleaseAfter
                                            ENUMERATED \{e2, e3, e4, e8\},\
        p0-Persistent
                                            SEQUENCE {
           p0-NominalPUSCH-Persistent
                                               INTEGER (-126..24),
            p0-UE-PUSCH-Persistent
                                               INTEGER (-8..7)
               OPTIONAL.
                                                                        -- Need OP
        twoIntervalsConfig
                                           ENUMERATED {true}
                                                                       OPTIONAL,
                                                                                    -- Cond TDD
        [[ p0-PersistentSubframeSet2-r12
               release
                                                    NULL,
                setup
                                                    SEQUENCE {
                   p0-NominalPUSCH-PersistentSubframeSet2-r12
                                                                       INTEGER (-126..24),
                    p0-UE-PUSCH-PersistentSubframeSet2-r12
                                                                        INTEGER (-8..7)
            }
                                                                        OPTIONAL
                                                                                    -- Need ON
        ]],
        [[ numberOfConfUlSPS-Processes-r13
                                                                        OPTIONAL -- Need OR
                                                  INTEGER (1..8)
        11,
                                                   ENUMERATED {true}
                                                                            OPTIONAL,
        [ fixedRV-NonAdaptive-r14
                                                                                        -- Need OR
            {\tt sps-ConfigIndex-r14}
                                                   SPS-ConfigIndex-r14
                                                                          OPTIONAL,
                                                                                       -- Need OR
            semiPersistSchedIntervalUL-v1430
                                                    ENUMERATED {
                                            sf50, sf100, sf200, sf300, sf400, sf500,
                                            sf600, sf700, sf800, sf900, sf1000, spare5,
```

SPS-Config field descriptions

fixedRV-NonAdaptive

If this field is present and *skipUplinkTxSPS* is configured, non-adaptive retransmissions on configured uplink grant uses redundancy version 0, otherwise the redundancy version for each retransmission is updated based on the sequence of redundancy versions as described in TS 36.321 [6].

implicitReleaseAfter

Number of empty transmissions before implicit release, see TS 36.321 [6, 5.10.2]. Value e2 corresponds to 2 transmissions, e3 corresponds to 3 transmissions and so on. If *skipUplinkTxSPS* is configured, the UE shall ignore this field.

n1PUCCH-AN-PersistentList, n1PUCCH-AN-PersistentListP1

List of parameter: $n_{\rm PUCCH}^{(1,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. Field n1-PUCCH-AN-PersistentListP1 is applicable only if the twoAntennaPortActivatedPUCCH-Format1a1b in PUCCH-ConfigDedicated-v1020 is set to true. Otherwise the field is not configured.

numberOfConfSPS-Processes

The number of configured HARQ processes for downlink Semi-Persistent Scheduling, see TS 36.321 [6].

numberOfConfUISPS-Processes

The number of configured HARQ processes for uplink Semi-Persistent Scheduling, see TS 36.321 [6]. E-UTRAN always configures this field for asynchronous UL HARQ. Otherwise it does not configure this field.

p0-NominalPUSCH-Persistent

Parameter: $P_{\text{O_NOMINAL_PUSCH}}(0)$. See TS 36.213 [23, 5.1.1.1], unit dBm step 1. This field is applicable for persistent scheduling, only. If choice setup is used and p0-Persistent is absent, apply the value of p0-NominalPUSCH for p0-NominalPUSCH-Persistent. If uplink power control subframe sets are configured by tpc-SubframeSet, this field applies for uplink power control subframe set 1.

p0-NominalPUSCH-PersistentSubframeSet2

Parameter: $P_{\text{O_NOMINAL_PUSCH}}(0)$. See TS 36.213 [23, 5.1.1.1], unit dBm step 1. This field is applicable for persistent scheduling, only. If p0-PersistentSubframeSet2-r12 is not configured, apply the value of p0-NominalPUSCH-SubframeSet2-r12 for p0-NominalPUSCH-PersistentSubframeSet2. E-UTRAN configures this field only if uplink power control subframe sets are configured by tpc-SubframeSet, in which case this field applies for uplink power control subframe set 2.

p0-UE-PUSCH-Persistent

Parameter: $P_{\text{O_UE_PUSCH}}(0)$. See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for persistent scheduling, only. If choice setup is used and p0-Persistent is absent, apply the value of p0-UE-PUSCH for p0-UE-PUSCH-Persistent. If uplink power control subframe sets are configured by tpc-SubframeSet, this field applies for uplink power control subframe set 1.

p0-UE-PUSCH-PersistentSubframeSet2

Parameter: $P_{\text{O_UE_PUSCH}}(0)$. See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for persistent scheduling, only. If p0-PersistentSubframeSet2-r12 is not configured, apply the value of p0-UE-PUSCH-SubframeSet2 for $p0\text{-}UE\text{-}PUSCH\text{-}PersistentSubframeSet2}$. E-UTRAN configures this field only if uplink power control subframe sets are configured by tpc-SubframeSet, in which case this field applies for uplink power control subframe set 2.

semiPersistSchedC-RNTI

Semi-persistent Scheduling C-RNTI, see TS 36.321 [6].

semiPersistSchedIntervalDL

Semi-persistent scheduling interval in downlink, see TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, the UE shall round this parameter down to the nearest integer (of 10 sub-frames), e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames.

semiPersistSchedIntervalSL

Semi-persistent scheduling interval in sidelink, see TS 36.321 [6]. Value in number of sub-frames. Value sf20 corresponds to 20 sub-frames, sf50 corresponds to 50 sub-frames and so on.

semiPersistSchedIntervalUL

Semi-persistent scheduling interval in uplink, see TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, when the configured Semi-persistent scheduling interval is greater than or equal to 10 sub-frames, the UE shall round this parameter down to the nearest integer (of 10 sub-frames), e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames. If semiPersistSchedIntervalUL-v1430 is configured, the UE only considers this extension (and igno*res semiPersistSchedIntervalUL* i.e. without suffix).

sI-SPS-V-RNTI

SL Semi-Persistent Scheduling V-RNTI for V2X sidelink communication, see TS 36.321 [6].

sps-ConfigIndex

Indicates the index of one of multiple SL/UL SPS configurations.

sps-ConfigSL-ToAddModList

Indicates the SL SPS configurations to be added or modified, identified by SPS-ConfigIndex.

sps-ConfigSL-ToReleaseList

Indicates the SL SPS configurations to be released, identified by SPS-ConfigIndex.

SPS-Config field descriptions

sps-ConfigUL-ToAddModList

Indicates the UL SPS configurations to be added or modified, identified by SPS-ConfigIndex.

sps-ConfigUL-ToReleaseList

Indicates the UL SPS configurations to be released, identified by SPS-ConfigIndex.

twoIntervalsConfig

Trigger of two-intervals-Semi-Persistent Scheduling in uplink. See TS 36.321 [6, 5.10]. If this field is present and the configured Semi-persistent scheduling interval greater than or equal to 10 sub-frames, two-intervals-SPS is enabled for uplink. Otherwise, two-intervals-SPS is disabled.

ul-SPS-V-RNTI

UL Semi-Persistent Scheduling V-RNTI for UEs capable of multiple uplink SPS configurations and which support V2X communication, see TS 36.321 [6].

Conditional presence	Explanation
TDD	This field is optional present for TDD, need OR; it is not present for FDD and the UE shall
	delete any existing value for this field.

SRS-TPC-PDCCH-Config

The IE SRS-TPC-PDCCH-Config is used to specify the RNTIs and indexes for A-SRS trigger and TPC according to TS 36.212 [22].

SRS-TPC-PDCCH-Config information element

```
-- ASN1START
SRS-TPC-PDCCH-Config-r14 ::=
                                              CHOICE {
   release
                                      NULL,
                                      SEQUENCE {
    setup
        srs-TPC-RNTI-r14
                                                          BIT STRING (SIZE (16)),
        startingBitOfFormat3B-r14
                                                          INTEGER (0..31),
       fieldTypeFormat3B-r14
                                                          INTEGER (1..4),
       srs-CC-SetIndexlist-r14
                                                              SEQUENCE (SIZE(1..4)) OF SRS-CC-
SetIndex-r14
             OPTIONAL -- Cond SRS-Trigger-TypeA
SRS-CC-SetIndex-r14 ::= SEQUENCE {
   cc-SetIndex-r14
                             INTEGER (0..3),
    cc-IndexInOneCC-Set-r14
                              INTEGER (0..7)
-- ASN1STOP
```

SRS-TPC-PDCCH-Config field descriptions

cc-IndexInOneCC-Set

Indicates the CC index in one CC set for Type A associated with the group DCI with SRS request field (optional) and TPC commands for a PUSCH-less SCell

cc-SetIndex

Indicates the CC set index for Type A associated with the group DCI with SRS request field (optional) and TPC commands for a PUSCH-less SCell.

fieldTypeFormat3B

The type of a field within the group DCI with SRS request fields (optional) and TPC commands for a PUSCH-less SCell, which indicates how many bits in the field are for SRS request (0 or 1/2) and how many bits in the field are for TPC (1 or 2). Note that for Type A, there is a common SRS request field for all SCells in the set, but each SCell has its own TPC command bits. See TS 36.212 [22, 5.3.3.1.7A]. EUTRAN configures this field with the same value for all PUSCH-less SCells.

srs-CC-SetIndexlist

Indicates the index of the *SRS-TPC-PDCCH-Config* for Type A trigger by the group DCI with SRS request field (optional) and TPC commands for a PUSCH-less SCell. Each set may contain at most 8 CCs.

srs-TPC-RNTI

RNTI for SRS trigger and power control using DCI format 3B, see TS 36.212 [22, 5.1.3.1].

startingBitOfFormat3B

The starting bit position of a block within the group DCI with SRS request fields (optional) and TPC commands for a PUSCH-less SCell.

Conditional presence	Explanation
SRS-Trigger-TypeA	The field is mandatory present if <i>typeA-SRS-TPC-PDCCH-Group-r14</i> is present.
	Otherwise the field is not present and the UE shall delete any existing value for this field.

TDD-Config

The IE TDD-Config is used to specify the TDD specific physical channel configuration.

TDD-Config information element

```
-- ASN1START
TDD-Config ::=
                                    SEQUENCE {
                                        ENUMERATED {
    subframeAssignment
                                            sa0, sa1, sa2, sa3, sa4, sa5, sa6},
    specialSubframePatterns
                                        ENUMERATED {
                                            ssp0, ssp1, ssp2, ssp3, ssp4,ssp5, ssp6, ssp7,
                                            ssp8}
TDD-Config-v1130 ::=
                                    SEQUENCE {
                                       ENUMERATED {ssp7,ssp9}
    specialSubframePatterns-v1130
TDD-Config-v1430 ::=
                                   SEQUENCE {
                                       ENUMERATED {ssp10}
    specialSubframePatterns-v1430
TDD-ConfigSL-r12 ::=
                            SEQUENCE {
    subframeAssignmentSL-r12
                                            ENUMERATED {
                                            none, sa0, sa1, sa2, sa3, sa4, sa5, sa6}
-- ASN1STOP
```

TDD-Config field descriptions

specialSubframePatterns

Indicates Configuration as in TS 36.211 [21, table 4.2-1] where ssp0 points to Configuration 0, ssp1 to Configuration 1 etc. Value ssp7 points to Configuration 7 for extended cyclic prefix, value ssp9 points to Configuration 9 for normal cyclic prefix and value ssp10 points to Configration 10 for normal cyclic prefix. E-UTRAN signals ssp7 only when setting specialSubframePatterns (without suffix i.e. the version defined in REL-8) to ssp4. E-UTRAN signals value ssp9 only when setting specialSubframePatterns (without suffix) to ssp5. E-UTRAN signals value ssp10 only when setting specialSubframePatterns (without suffix) to ssp0 or ssp5. If specialSubframePatterns-v1130 or specialSubframePatterns-v1430 is present, the UE shall ignore specialSubframePatterns-v1130 and specialSubframePatterns-v1430 are present, the UE shall ignore specialSubframePatterns-v1130.

subframeAssignment

Indicates DL/UL subframe configuration where sa0 points to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for serving cells residing on same frequency band.

subframeAssignmentSL

Indicates UL/ DL subframe configuration where sa0 points to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. The value *none* means that no TDD specific physical channel configuration is applicable (i.e. the carrier on which *MasterInformationBlock-SL* is transmitted is an FDD UL carrier or the carrier on which *MasterInformationBlock-SL-V2X* is transmitted is a carrier for V2X sidelink communication).

TimeAlignmentTimer

The IE *TimeAlignmentTimer* is used to control how long the UE considers the serving cells belonging to the associated TAG to be uplink time aligned. Corresponds to the Timer for time alignment in TS 36.321 [6]. Value in number of subframes. Value sf500 corresponds to 500 sub-frames, sf750 corresponds to 750 sub-frames and so on.

TimeAlignmentTimer information element

TPC-PDCCH-Config

The IE *TPC-PDCCH-Config* is used to specify the RNTIs and indexes for PUCCH and PUSCH power control according to TS 36.212 [22]. The power control function can either be setup or released with the IE.

TPC-PDCCH-Config information element

```
-- ASN1START
TPC-PDCCH-Config ::=
                                         CHOICE {
   release
                                         NULL,
                                         SEQUENCE {
    setup
        tpc-RNTI
                                             BIT STRING (SIZE (16)),
                                             TPC-Index
        tpc-Index
TPC-PDCCH-ConfigSCell-r13 ::=
                                                  CHOICE {
   release
                                         SEQUENCE {
        tpc-Index-PUCCH-SCell-r13
                                         TPC-Index
}
                                         CHOICE {
TPC-Index ::=
    indexOfFormat3
                                             INTEGER (1..15),
                                             INTEGER (1..31)
    indexOfFormat3A
-- ASN1STOP
```

TPC-PDCCH-Config field descriptions

indexOfFormat3

Index of N when DCI format 3 is used. See TS 36.212 [22, 5.3.3.1.6].

IndexOfFormat3A

Index of M when DCI format 3A is used. See TS 36.212 [22, 5.3.3.1.7].

tpc-Index

Index of N or M, see TS 36.212 [22, 5.3.3.1.6 and 5.3.3.1.7], where N or M is dependent on the used DCI format (i.e. format 3 or 3a).

tpc-Index-PUCCH-SCell

Index of N or M, see TS 36.212 [22, 5.3.3.1.6 and 5.3.3.1.7], where N or M is dependent on the used DCI format (i.e. format 3 or 3a).

tpc-RNTI

RNTI for power control using DCI format 3/3A, see TS 36.212 [22].

TunnelConfigLWIP

The IE *TunnelConfigLWIP* is used to setup/release LWIP Tunnel.

```
-- ASN1START
TunnelConfigLWIP-r13 ::= SEQUENCE {
   IKE-Identity-r13,
   ] ]
      lwip-Counter-r13
                      INTEGER (0..65535)
                                           OPTIONAL
                                                       -- Cond LWIP-Setup
   ]]
}
IKE-Identity-r13 ::= SEQUENCE {
                       OCTET STRING
   idI-r13
IP-Address-r13 ::= CHOICE {
   ipv4-r13
                           BIT STRING (SIZE (32)),
                           BIT STRING (SIZE (128))
   ipv6-r13
-- ASN1STOP
```

TunnelConfigLWIP field descriptions

ip-Address

Parameter indicates the LWIP-SeGW IP Address to be used by the UE for initiating LWIP Tunnel establishment [32].

ike-Identity

Parameter indicates the IKE Identity elements (IDi) to be used in IKE Authentication Procedures [32].

Iwip-Counter

Indicates the parameter used by UE for computing the security keys used in LWIP tunnel establishment, as specified in TS 33.401 [32].

Conditional presence	Explanation
LWIP-Setup	The field is mandatory present upon setup of LWIP tunnel. Otherwise the field is optional, Need ON.

UplinkPowerControl

The IE *UplinkPowerControlCommon* and IE *UplinkPowerControlDedicated* are used to specify parameters for uplink power control in the system information and in the dedicated signalling, respectively.

UplinkPowerControl information elements

```
-- ASN1START

UplinkPowerControlCommon ::= SEQUENCE {
   p0-NominalPUSCH INTEGER (-126..24),
   alpha Alpha-r12,
```

```
p0-NominalPUCCH
                                      INTEGER (-127..-96),
   deltaFList-PUCCH
                                       DeltaFList-PUCCH,
   deltaPreambleMsg3
                                      INTEGER (-1..6)
}
UplinkPowerControlCommon-v1020 ::= SEQUENCE {
   deltaF-PUCCH-Format3-r10
                                          ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2,
                                                       deltaF3, deltaF4, deltaF5, deltaF6},
   deltaF-PUCCH-Format1bCS-r10
                                          ENUMERATED {deltaF1, deltaF2, spare2, spare1}
UplinkPowerControlCommon-v1310 ::= SEQUENCE {
                                     ENUMERATED {deltaF16, deltaF15, deltaF14, deltaF13, deltaF12,
   deltaF-PUCCH-Format4-r13
                                     deltaF11, deltaF10, spare1}
                                                                         OPTIONAL, -- Need OR
    deltaF-PUCCH-Format5-13
                                     ENUMERATED { deltaF13, deltaF12, deltaF11, deltaF10, deltaF9,
                                     deltaF8, deltaF7, spare1}
                                                                        OPTIONAL -- Need OR
UplinkPowerControlCommonPSCell-r12 ::=
                                         SEQUENCE {
-- For uplink power control the additional/ missing fields are signalled (compared to SCell)
                                  ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2,
   deltaF-PUCCH-Format3-r12
                                                       deltaF3, deltaF4, deltaF5, deltaF6},
   deltaF-PUCCH-Format1bCS-r12
                                          ENUMERATED {deltaF1, deltaF2, spare2, spare1},
   p0-NominalPUCCH-r12
                                          INTEGER (-127..-96),
   deltaFList-PUCCH-r12
                                          DeltaFList-PUCCH
}
UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {
   p0-NominalPUSCH-r10
                                       INTEGER (-126..24),
   alpha-r10
                                       Alpha-r12
UplinkPowerControlCommonSCell-v1130 ::= SEQUENCE {
   deltaPreambleMsg3-r11
                                      INTEGER (-1..6)
UplinkPowerControlCommonSCell-v1310 ::= SEQUENCE {
-- For uplink power control the additional/ missing fields are signalled (compared to SCell)
   p0-NominalPUCCH
                                           INTEGER (-127..-96),
   deltaFList-PUCCH
                                           DeltaFList-PUCCH,
                                           ENUMERATED {deltaF-1, deltaF0, deltaF1,
   deltaF-PUCCH-Format3-r12
                                           deltaF2, deltaF3, deltaF4, deltaF5,
                                           deltaF6}
                                                                          OPTIONAL,
                                                                                      -- Need OR
   deltaF-PUCCH-Format1bCS-r12
                                           ENUMERATED {deltaF1, deltaF2,
                                           spare2, spare1}
                                                                          OPTIONAL,
                                                                                      -- Need OR
                                           ENUMERATED {deltaF16, deltaF15, deltaF14,
   deltaF-PUCCH-Format4-r13
                                           deltaF13, deltaF12, deltaF11, deltaF10,
                                           spare1}
                                                                          OPTIONAL,
                                                                                      -- Need OR
   deltaF-PUCCH-Format5-13
                                           ENUMERATED { deltaF13, deltaF12, deltaF11,
                                           deltaF10, deltaF9, deltaF8, deltaF7,
                                                                                      -- Need OR
                                           spare1}
                                                                          OPTIONAL
                                                  SEQUENCE {
UplinkPowerControlCommonPUSCH-LessCell-v1430 ::=
                                                  INTEGER (-126..24) OPTIONAL,
INTEGER (-126..24) OPTIONAL,
   p0-Nominal-PeriodicSRS-r14
                                                                                     -- Need OR
                                                                                     -- Need OR
   p0-Nominal-AperiodicSRS-r14
                                                                                     -- Need OR
   alpha-SRS-r14
                                              Alpha-r12
                                                                          OPTIONAL
UplinkPowerControlDedicated ::= SEQUENCE {
   p0-UE-PUSCH
                                       INTEGER (-8..7),
   deltaMCS-Enabled
                                       ENUMERATED {en0, en1},
   accumulationEnabled
                                      BOOLEAN,
   p0-UE-PUCCH
                                       INTEGER (-8..7),
   pSRS-Offset
                                       INTEGER (0..15),
   filterCoefficient
                                       FilterCoefficient
                                                                         DEFAULT fc4
UplinkPowerControlDedicated-v1020 ::= SEQUENCE {
                                                                          OPTIONAL,
   deltaTxD-OffsetListPUCCH-r10 DeltaTxD-OffsetListPUCCH-r10
                                                                                      -- Need OR
   pSRS-OffsetAp-r10
                                      INTEGER (0..15)
                                                                          OPTIONAL
                                                                                      -- Need OR
UplinkPowerControlDedicated-v1130 ::= SEQUENCE {
                                                                          OPTIONAL,
   pSRS-Offset-v1130
                                          INTEGER (16..31)
                                                                                      -- Need OR
   pSRS-OffsetAp-v1130
                                          INTEGER (16..31)
                                                                          OPTIONAL,
   deltaTxD-OffsetListPUCCH-v1130
                                          DeltaTxD-OffsetListPUCCH-v1130 OPTIONAL
```

```
UplinkPowerControlDedicated-v1250 ::= SEQUENCE {
    set2PowerControlParameter CHOICE {
            up NULL,
tpc-SubframeSet-r12
p0-NominalPuscur 1
        release
        setup
                                               BIT STRING (SIZE(10)),
                                                    INTEGER (-126..24),
            alpha-SubframeSet2-r12
p0-UE-PUSCH-SubframeSet2-r12
                                                  Alpha-r12,
                                                  INTEGER (-8..7)
   }
}
UplinkPUSCH-LessPowerControlDedicated-v1430 ::=
                                                     SEQUENCE {
                                                  INTEGER (-8..7) OPTIONAL, -- Need OR INTEGER (-8..7) OPTIONAL, -- Need OR
    p0-UE-PeriodicSRS-r14
    p0-UE-AperiodicSRS-r14
    accumulationEnabled-r14
                                                  BOOLEAN
UplinkPowerControlDedicatedSCell-r10 ::=
                                                 SEQUENCE {
  p0-UE-PUSCH-r10 INTEGER (-8..7), deltaMCS-Enabled-r10 ENUMERATED {
    deltaMCS-Enabled-r10
accumulationEnabled-r10
BOOLEAN,
INTEGER (0..15),
                                           ENUMERATED {en0, en1},
   pSRS-Offset-r10 INTEGER (0..15),
pSRS-OffsetAp-r10 INTEGER (0..15)
filterCoefficient-r10 FilterCoefficient
pathlossReferenceLinking-r10 ENUMERATED {pCell, sCell}
   pSRS-Offset-r10
                                                                                OPTIONAL,
                                                                                             -- Need OR
                                                                              DEFAULT fc4,
UplinkPowerControlDedicatedSCell-v1310 ::= SEQUENCE {
--Release 8
   p0-UE-PUCCH
                                         INTEGER (-8..7),
--Release 10
   deltaTxD-OffsetListPUCCH-r10 DeltaTxD-OffsetListPUCCH-r10 OPTIONAL -- Need OR
                                    ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1}
Alpha-r12 ::=
   deltaF-PUCCH ::=

deltaF-PUCCH-Format1

deltaF-PUCCH-Format2b

deltaF-PUCCH-Format2a

deltaF-PUCCH-Format2b
DeltaFList-PUCCH ::=
                                    SEQUENCE {
                                    ENUMERATED {deltaF-2, deltaF0, deltaF2},
                                          ENUMERATED {deltaF1, deltaF3, deltaF5},
                                         ENUMERATED {deltaF-2, deltaF0, deltaF1, deltaF2},
                                         ENUMERATED {deltaF-2, deltaF0, deltaF2}, ENUMERATED {deltaF-2, deltaF0, deltaF2}
}
DeltaTxD-OffsetListPUCCH-r10 ::= SEQUENCE {
    deltaTxD-OffsetPUCCH-Format22a2b-r10 ENUMERATED {dB0, dB-2},
   deltaTxD-OffsetPUCCH-Format3-r10 ENUMERATED {dB0, dB-2},
DeltaTxD-OffsetListPUCCH-v1130 ::= SEQUENCE {
    -- ASN1STOP
```

UplinkPowerControl field descriptions

accumulationEnabled

Parameter: Accumulation-enabled, see TS 36.213 [23, 5.1.1.1, 5.1.3.1]. TRUE corresponds to "enabled" whereas FALSE corresponds to "disabled".

alpha

Parameter: α See TS 36.213 [23, 5.1.1.1] where all corresponds to 0, all04 corresponds to value 0.4, all05 to 0.5, all06 to 0.6, all07 to 0.7, all08 to 0.8, all09 to 0.9 and all corresponds to 1. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by *tpc-SubframeSet*.

alpha-SRS

Parameter: α_{SRS} . See TS 36.213 [23, 5.1.3.1] where all corresponds to 0, all04 corresponds to value 0.4, all05 to 0.5, all06 to 0.6, all07 to 0.7, all08 to 0.8, all09 to 0.9 and all corresponds to 1. This field applies for SRS power control on a PUSCH-less SCell.

alpha-SubframeSet2

Parameter: α. See TS 36.213 [23, 5.1.1.1] where all corresponds to 0, all04 corresponds to value 0.4, all05 to 0.5, all06 to 0.6, all07 to 0.7, all08 to 0.8, all09 to 0.9 and all corresponds to 1. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by *tpc-SubframeSet*.

deltaF-PUCCH-FormatX

Parameter: $\Delta_{F_PUCCH}(F)$ for the PUCCH formats 1, 1b, 2, 2a, 2b, 3, 4, 5 and 1b with channel selection. See TS 36.213 [23, 5.1.2] where deltaF-2 corresponds to -2 dB, deltaF0 corresponds to 0 dB and so on.

deltaMCS-Enabled

Parameter: Ks See TS 36.213 [23, 5.1.1.1]. en0 corresponds to value 0 corresponding to state "disabled". en1 corresponds to value 1.25 corresponding to "enabled".

deltaPreambleMsq3

Parameter: $\Delta_{PREAMBLE-Msg\,3}$ see TS 36.213 [23, 5.1.1.1]. Actual value = field value * 2 [dB].

deltaTxD-OffsetPUCCH-FormatX

Parameter: $\Delta_{TxD}(F')$ for the PUCCH formats 1, 1a/1b, 1b with channel selection, 2/2a/2b and 3 when two antenna ports are configured for PUCCH transmission. See TS 36.213 [23, 5.1.2.1] where dB0 corresponds to 0 dB, dB-1 corresponds to -1 dB, dB-2 corresponds to -2 dB. EUTRAN configures the field deltaTxD-OffsetPUCCH-Format1bCS-r11 for the PCell and/or the PSCell only.

filterCoefficient

Specifies the filtering coefficient for RSRP measurements used to calculate path loss, as specified in TS 36.213 [23, 5.1.1.1]. The same filtering mechanism applies as for *quantityConfig* described in 5.5.3.2.

p0-Nominal-AperiodicSRS

Parameter: $P_{\rm O_NOMINAL_\ SRS,c}(m)$ where $\it m$ =1. See TS 36.213 [23, 5.1.3.1], unit dBm.

p0-Nominal-PeriodicSRS

Parameter: $P_{\mathrm{O_NOMINAL_SRS,c}}(m)$ where \emph{m} =0. See TS 36.213 [23, 5.1.3.1], unit dBm.

p0-NominalPUCCH

Parameter: $P_{\rm O\ NOMINAL\ PUCCH}$ See TS 36.213 [23, 5.1.2.1], unit dBm.

p0-NominalPUSCH

Parameter: $P_{\text{O_NOMINAL_PUSCH}}(1)$ See TS 36.213 [23, 5.1.1.1], unit dBm. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

p0-NominalPUSCH-SubframeSet2

Parameter: $P_{\text{O_NOMINAL_PUSCH}}(1)$. See TS 36.213 [23, 5.1.1.1], unit dBm. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

p0-UE-AperiodicSRS

Parameter: $P_{\mathrm{O_UE_SRS,c}}(m)$ where m=1. See TS 36.213 [23, 5.1.3.1], unit dB.

p0-UE-PeriodicSRS

Parameter: $P_{\text{O UE SRS.c}}(m)$ where m=0. See TS 36.213 [23, 5.1.3.1], unit dB.

p0-UE-PUCCH

Parameter: $P_{\mathrm{O\ UE\ PUCCH}}$ See TS 36.213 [23, 5.1.2.1]. Unit dB

p0-UE-PUSCH

Parameter: $P_{\text{O_UE_PUSCH}}$ (1) See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for non-persistent scheduling, only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

UplinkPowerControl field descriptions

p0-UE-PUSCH-SubframeSet2

Parameter: $P_{\text{O_UE_PUSCH}}$ (1) See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for non-persistent scheduling, only. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

pathlossReferenceLinking

Indicates whether the UE shall apply as pathloss reference either the downlink of the PCell or of the SCell that corresponds with this uplink (i.e. according to the *cellIdentification* within the field *sCellToAddMod*). For SCells part of an STAG E-UTRAN sets the value to sCell.

pSRS-Offset, pSRS-OffsetAp

Parameter: P_{SRS_OFFSET} for periodic and aperiodic sounding reference signal transmission repectively. See TS 36.213 [23, 5.1.3.1]. For Ks=1.25, the actual parameter value is pSRS-Offset value -3. For Ks=0, the actual parameter value is -10.5 + 1.5*pSRS-Offset value.

If *pSRS-Offset-v1130* is included, the UE ignores *pSRS-Offset* (i.e., without suffix). Likewise, if *pSRS-OffsetAp-v1130* is included, the UE ignores *pSRS-OffsetAp-r10*. For *Ks*=0, E-UTRAN does not set values larger than 26.

tpc-SubframeSet

Indicates the uplink subframes (including UpPTS in special subframes) of the uplink power control subframe sets. Value 0 means the subframe belongs to uplink power control subframe set 1, and value 1 means the subframe belongs to uplink power control subframe set 2.

– WLAN-Id-List

The IE WLAN-Id-List is used to list WLAN(s) for configuration of WLAN measurements and WLAN mobility set.

```
-- ASN1START

WLAN-Id-List-r13 ::= SEQUENCE (SIZE (1..maxWLAN-Id-r13)) OF WLAN-Identifiers-r12

-- ASN1STOP
```

WLAN-MobilityConfig

The IE *WLAN-MobilityConfig* is used for configuration of WLAN mobility set and WLAN Status Reporting. E-UTRAN configures at least one WLAN identifier in the *WLAN-MobilityConfig*.

```
-- ASN1START
WLAN-MobilityConfig-r13 ::=
                                SEOUENCE {
                                        WLAN-Id-List-r13
                                                                     OPTIONAL,
    wlan-ToReleaseList-r13
                                                                                 -- Need ON
    wlan-ToAddList-r13
                                        WLAN-Id-List-r13
                                                                     OPTIONAL,
                                                                                 -- Need ON
    associationTimer-r13
                                        ENUMERATED {s10, s30,
                                        s60, s120, s240}
ENUMERATED {true}
                                                                     OPTIONAL,
                                                                                 -- Need OR
    successReportRequested-r13
                                                                     OPTIONAL,
                                                                                 -- Need OR
        wlan-SuspendConfig-r14
                                        WLAN-SuspendConfig-r14
                                                                     OPTIONAL
                                                                                 -- Need ON
-- ASN1STOP
```

WLAN-MobilityConfig field descriptions

associationTimer

Indicates the maximum time for connection to WLAN before connection failure reporting is initiated. Value s10 means 10 seconds, value s30 means 30 seconds and so on. E-UTRAN includes *associationTimer* only upon change in WLAN mobility set, *Iwa-WT-Counter* or *Iwip-Counter*.

successReportRequested

Indicates whether the UE shall report successful connection to WLAN. Applicable to LWA and LWIP.

wlan-ToAddList

Indicates the WLAN identifiers to be added to the WLAN mobility set.

wlan-ToReleaseList

Indicates the WLAN identifiers to be removed from the WLAN mobility set.

6.3.3 Security control information elements

NextHopChainingCount

The IE *NextHopChainingCount* is used to update the K_{eNB} key and corresponds to parameter NCC: See TS 33.401 [32, 7.2.8.4].

NextHopChainingCount information element

```
-- ASN1START

NextHopChainingCount ::= INTEGER (0..7)

-- ASN1STOP
```

SecurityAlgorithmConfig

The IE *SecurityAlgorithmConfig* is used to configure AS integrity protection algorithm (SRBs) and AS ciphering algorithm (SRBs and DRBs). For RNs, the IE *SecurityAlgorithmConfig* is also used to configure AS integrity protection algorithm for DRBs between the RN and the E-UTRAN.

SecurityAlgorithmConfig information element

SecurityAlgorithmConfig field descriptions

cipheringAlgorithm

Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.401 [32, 5.1.3.2].

integrityProtAlgorithm

Indicates the integrity protection algorithm to be used for SRBs, as specified in TS 33.401 [32, 5.1.4.2]. For RNs, also indicates the integrity protection algorithm to be used for integrity protection-enabled DRB(s).

ShortMAC-I

The IE *ShortMAC-I* is used to identify and verify the UE at RRC connection re-establishment. The 16 least significant bits of the MAC-I calculated using the security configuration of the source PCell, as specified in 5.3.7.4.

ShortMAC-I information element

```
-- ASN1START

ShortMAC-I ::= BIT STRING (SIZE (16))

-- ASN1STOP
```

6.3.4 Mobility control information elements

AdditionalSpectrumEmission

If an extension is signalled using the extended value range (as defined by IE *AdditionalSpectrumEmission-v10l0*), the corresponding original field, using the value range as defined by IE *AdditionalSpectrumEmission* i.e. without suffix) shall be set to value 32, if signalled. UE supporting an LTE band assigned NS values larger than 32 as defined in TS 36.101 [42, 6.2.4], needs to support extension signaling (as defined by IE *AdditionalSpectrumEmission-v10l0*).

AdditionalSpectrumEmission information element

```
-- ASN1START

AdditionalSpectrumEmission ::= INTEGER (1..32)

AdditionalSpectrumEmission-v1010 ::= INTEGER (33..288)

-- ASN1STOP
```

ARFCN-ValueCDMA2000

The IE *ARFCN-ValueCDMA2000* used to indicate the CDMA2000 carrier frequency within a CDMA2000 band, see C.S0002 [12].

ARFCN-ValueCDMA2000 information element

```
-- ASN1START

ARFCN-ValueCDMA2000 ::= INTEGER (0..2047)

-- ASN1STOP
```

ARFCN-ValueEUTRA

The IE *ARFCN-ValueEUTRA* is used to indicate the ARFCN applicable for a downlink, uplink or bi-directional (TDD) E-UTRA carrier frequency, as defined in TS 36.101 [42]. If an extension is signalled using the extended value range (as defined by IE *ARFCN-ValueEUTRA-v9e0*), the UE shall only consider this extension (and hence ignore the corresponding original field, using the value range as defined by IE *ARFCN-ValueEUTRA* i.e. without suffix, if signalled). In dedicated signalling, E-UTRAN only provides an EARFCN corresponding to an E-UTRA band supported by the UE.

ARFCN-ValueEUTRA information element

```
-- ASN1START

ARFCN-ValueEUTRA ::= INTEGER (0..maxEARFCN)

ARFCN-ValueEUTRA-v9e0 ::= INTEGER (maxEARFCN-Plus1..maxEARFCN2)

ARFCN-ValueEUTRA-r9 ::= INTEGER (0..maxEARFCN2)

-- ASN1STOP
```

NOTE: For fields using the original value range, as defined by IE *ARFCN-ValueEUTRA* i.e. without suffix, value *maxEARFCN* indicates that the E-UTRA carrier frequency is indicated by means of an extension. In such a case, UEs not supporting the extension consider the field to be set to a not supported value.

ARFCN-ValueGERAN

The IE ARFCN-ValueGERAN is used to specify the ARFCN value applicable for a GERAN BCCH carrier frequency, see TS 45.005 [20].

ARFCN-ValueGERAN information element

```
-- ASN1START

ARFCN-ValueGERAN ::= INTEGER (0..1023)

-- ASN1STOP
```

ARFCN-ValueUTRA

The IE *ARFCN-ValueUTRA* is used to indicate the ARFCN applicable for a downlink (Nd, FDD) or bi-directional (Nt, TDD) UTRA carrier frequency, as defined in TS 25.331 [19].

ARFCN-ValueUTRA information element

```
-- ASN1START

ARFCN-ValueUTRA ::= INTEGER (0..16383)

-- ASN1STOP
```

BandclassCDMA2000

The IE *BandclassCDMA2000* is used to define the CDMA2000 band in which the CDMA2000 carrier frequency can be found, as defined in C.S0057 [24, table 1.5-1].

BandclassCDMA2000 information element

BandIndicatorGERAN

The IE *BandIndicatorGERAN* indicates how to interpret an associated GERAN carrier ARFCN, see TS 45.005 [20]. More specifically, the IE indicates the GERAN frequency band in case the ARFCN value can concern either a DCS 1800 or a PCS 1900 carrier frequency. For ARFCN values not associated with one of these bands, the indicator has no meaning.

BandIndicatorGERAN information element

```
-- ASN1START

BandIndicatorGERAN ::= ENUMERATED {dcs1800, pcs1900}

-- ASN1STOP
```

- CarrierFreqCDMA2000

The IE CarrierFreqCDMA2000 used to provide the CDMA2000 carrier information.

CarrierFreqCDMA2000 information element

```
-- ASN1START

CarrierFreqCDMA2000 ::= SEQUENCE {
  bandClass BandclassCDMA2000,
  arfcn ARFCN-ValueCDMA2000
}

-- ASN1STOP
```

CarrierFreqGERAN

The IE CarrierFreqGERAN is used to provide an unambiguous carrier frequency description of a GERAN cell.

CarrierFreqGERAN information element

```
-- ASN1START

CarrierFreqGERAN ::= SEQUENCE {
   arfcn ARFCN-ValueGERAN,
   bandIndicator BandIndicatorGERAN
}

-- ASN1STOP
```

CarrierFreqGERAN field descriptions arfcn GERAN ARFCN of BCCH carrier. bandIndicator Indicates how to interpret the ARFCN of the BCCH carrier.

CarrierFreqsGERAN

The IE *CarrierFreqListGERAN* is used to provide one or more GERAN ARFCN values, as defined in TS 45.005 [43], which represents a list of GERAN BCCH carrier frequencies.

CarrierFreqsGERAN information element

```
-- ASN1START
CarrierFreqsGERAN ::=
                                SEQUENCE {
                                        ARFCN-ValueGERAN,
    {\tt startingARFCN}
    bandIndicator
                                         BandIndicatorGERAN,
    followingARFCNs
        explicitListOfARFCNs
                                             ExplicitListOfARFCNs,
        equallySpacedARFCNs
                                             SEQUENCE {
            arfcn-Spacing
                                                 INTEGER (1..8)
            numberOfFollowingARFCNs
                                                 INTEGER (0..31)
        },
        variableBitMapOfARFCNs
                                            OCTET STRING (SIZE (1..16))
ExplicitListOfARFCNs ::=
                                     SEQUENCE (SIZE (0..31)) OF ARFCN-ValueGERAN
-- ASN1STOP
```

CarrierFreqsGERAN field descriptions

arfcn-Spacing

Space, d, between a set of equally spaced ARFCN values.

bandIndicator

Indicates how to interpret the ARFCN of the BCCH carrier.

explicitListOfARFCNs

The remaining ARFCN values in the set are explicitly listed one by one.

followingARFCNs

Field containing a representation of the remaining ARFCN values in the set.

numberOfFollowingARFCNs

The number, n, of the remaining equally spaced ARFCN values in the set. The complete set of (n+1) ARFCN values is defined as: $\{s, ((s+d) \mod 1024), ((s+2*d) \mod 1024), ... ((s+n*d) \mod 1024)\}$.

startingARFCN

The first ARFCN value, s, in the set.

variableBitMapOfARFCNs

Bitmap field representing the remaining ARFCN values in the set. The leading bit of the first octet in the bitmap corresponds to the ARFCN = ((s + 1) mod 1024), the next bit to the ARFCN = ((s + 2) mod 1024), and so on. If the bitmap consist of N octets, the trailing bit of octet N corresponds to ARFCN = ((s + 8*N) mod 1024). The complete set of ARFCN values consists of ARFCN = s and the ARFCN values, where the corresponding bit in the bitmap is set to "1".

CarrierFregListMBMS

The IE CarrierFreqListMBMS is used to indicate the E-UTRA ARFCN values of the one or more MBMS frequencies the UE is interested to receive.

CarrierFreqListMBMS information element

```
-- ASN1START

CarrierFreqListMBMS-rll ::= SEQUENCE (SIZE (1..maxFreqMBMS-rll)) OF ARFCN-ValueEUTRA-r9

-- ASN1STOP
```

CDMA2000-Type

The IE *CDMA2000-Type* is used to describe the type of CDMA2000 network.

CDMA2000-Type information element

```
-- ASN1START

CDMA2000-Type ::= ENUMERATED {type1XRTT, typeHRPD}

-- ASN1STOP
```

– CellIdentity

The IE CellIdentity is used to unambiguously identify a cell within a PLMN.

CellIdentity information element

```
-- ASN1START

CellIdentity ::= BIT STRING (SIZE (28))

-- ASN1STOP
```

CellIndexList

The IE CellIndexList concerns a list of cell indices, which may be used for different purposes.

CellIndexList information element

```
-- ASN1START

CellIndexList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellIndex

CellIndex ::= INTEGER (1..maxCellMeas)

-- ASN1STOP
```

CellReselectionPriority

The IE *CellReselectionPriority* concerns the absolute priority of the concerned carrier frequency/ set of frequencies (GERAN)/ bandclass (CDMA2000), as used by the cell reselection procedure. Corresponds with parameter "priority" in TS 36.304 [4]. Value 0 means: lowest priority. The UE behaviour for the case the field is absent, if applicable, is specified in TS 36.304 [4].

CellReselectionPriority information element

```
-- ASN1START

CellReselectionPriority ::= INTEGER (0..7)

-- ASN1STOP
```

CellSelectionInfoCE

The IE CellSelectionInfoCE contains cell selection information for CE. The q-RxLevMinCE corresponds to parameter $Q_{rxlevmin_CE}$ in TS 36.304 [4]. The q-QualMinRSRQ-CE corresponds to parameter $Q_{qualmin_CE}$ in TS 36.304 [4]. If q-QualMinRSRQ-CE is not present, the UE applies the (default) value of negative infinity for $Q_{qualmin}$.

CellSelectionInfoCE information element

```
-- ASN1START

CellSelectionInfoCE-r13 ::= SEQUENCE {
    q-RxLevMinCE-r13 Q-RxLevMin,
    q-QualMinRSRQ-CE-r13 Q-QualMin-r9 OPTIONAL -- Need OR
}

-- ASN1STOP
```

CellSelectionInfoCE1

The IE *CellSelectionInfoCE1* contains cell selection information for BL UEs or UEs in CE supporting CE Mode B. The q-RxLevMinCE1 corresponds to parameter $Q_{rxlevmin_CE1}$ in TS 36.304 [4]. If delta-RxLevMinCE1 is not included, actual value $Q_{rxlevmin_CE1} = q$ -RxLevMinCE1* 2 [dBm]. If delta-RxLevMinCE1 is included, the actual value $Q_{rxlevmin_CE1} = (q$ -RxLevMinCE1 + delta-RxLevMinCE1) * 2 [dBm]. The q-QualMinRSRQ-CE1 corresponds to parameter $Q_{qualmin_CE1}$ in TS 36.304 [4]. If q-QualMinRSRQ-CE1 is not present, the UE applies the (default) value of negative infinity for $Q_{qualmin}$.

CellSelectionInfoCE1 information element

```
-- ASN1START

CellSelectionInfoCE1-r13 ::= SEQUENCE {
    q-RxLevMinCE1-r13 Q-RxLevMin,
    q-QualMinRSRQ-CE1-r13 Q-QualMin-r9 OPTIONAL -- Need OR
}

CellSelectionInfoCE1-v1360 ::= SEQUENCE {
    delta-RxLevMinCE1-v1360 INTEGER (-8..-1)
}
-- ASN1STOP
```

CellReselectionSubPriority

The IE *CellReselectionSubPriority* indicates a fractional value to be added to the value of cellReselectionPriority to obtain the absolute priority of the concerned carrier frequency for E-UTRA.-Value oDot2 corresponds to 0.2, oDot4 corresponds to 0.4 and so on.

CellReselectionSubPriority information element

```
-- ASN1START

CellReselectionSubPriority-r13 ::= ENUMERATED {oDot2, oDot4, oDot6, oDot8}

-- ASN1STOP
```

CSFB-RegistrationParam1XRTT

The IE *CSFB-RegistrationParam1XRTT* is used to indicate whether or not the UE shall perform a CDMA2000 1xRTT pre-registration if the UE does not have a valid / current pre-registration.

```
-- ASN1START
CSFB-RegistrationParam1XRTT ::= SEQUENCE {
                                       BIT STRING (SIZE (15)),
    sid
   nid
                                       BIT STRING (SIZE (16)),
   multipleSID
                                        BOOLEAN,
   multipleNID
                                       BOOLEAN,
   homeReg
                                       BOOLEAN,
    foreignSIDReg
                                       BOOLEAN,
   foreignNIDReg
                                      BOOLEAN,
   parameterReg
                                       BOOLEAN,
                                       BOOLEAN,
   powerUpReg
   registrationPeriod
registrationZone
                                      BIT STRING (SIZE (7)),
                                       BIT STRING (SIZE (12)),
                                       BIT STRING (SIZE (3)),
   totalZone
   zoneTimer
                                       BIT STRING (SIZE (3))
CSFB-RegistrationParam1XRTT-v920 ::=
                                        SEQUENCE {
                                        ENUMERATED {true}
   powerDownReg-r9
-- ASN1STOP
```

CSFB-RegistrationParam1XRTT field descriptions

foreignNIDReg

The CDMA2000 1xRTT NID roamer registration indicator.

foreignSIDReg

The CDMA2000 1xRTT SID roamer registration indicator.

homeReg

The CDMA2000 1xRTT Home registration indicator.

multipleNID

The CDMA2000 1xRTT Multiple NID storage indicator.

multipleSID

The CDMA2000 1xRTT Multiple SID storage indicator.

nid

Used along with the *sid* as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.

parameterReg

The CDMA2000 1xRTT Parameter-change registration indicator.

powerDownReg

The CDMA2000 1xRTT Power-down registration indicator. If set to TRUE, the UE that has a valid / current CDMA2000 1xRTT pre-registration will perform a CDMA2000 1xRTT power down registration when it is switched off.

powerUpReg

The CDMA2000 1xRTT Power-up registration indicator.

registrationPeriod

The CDMA2000 1xRTT Registration period.

registrationZone

The CDMA2000 1xRTT Registration zone.

sio

Used along with the *nid* as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.

totalZone

The CDMA2000 1xRTT Number of registration zones to be retained.

zoneTimer

The CDMA2000 1xRTT Zone timer length.

CellGlobalIdEUTRA

The IE *CellGlobalIdEUTRA* specifies the Evolved Cell Global Identifier (ECGI), the globally unique identity of a cell in E-UTRA.

CellGlobalIdEUTRA information element

```
-- ASN1START

CellGlobalIdEUTRA ::= SEQUENCE {
    plmn-Identity PLMN-Identity,
    cellIdentity CellIdentity
}

-- ASN1STOP
```

CellGlobalIdEUTRA field descriptions

cellIdentity

Identity of the cell within the context of the PLMN.

plmn-Identity

Identifies the PLMN of the cell as given by the first PLMN entry in the *plmn-IdentityList* in *SystemInformationBlockType1*.

CellGlobalIdUTRA

The IE CellGlobalIdUTRA specifies the global UTRAN Cell Identifier, the globally unique identity of a cell in UTRA.

CellGlobalIdUTRA information element

```
-- ASN1START
```

```
CellGlobalIdUTRA ::= SEQUENCE {
   plmn-Identity PLMN-Identity,
   cellIdentity BIT STRING (SIZE (28))
}
-- ASN1STOP
```

CellGloballdUTRA field descriptions

cellIdentity

UTRA Cell Identifier which is unique within the context of the identified PLMN as defined in TS 25.331 [19].

plmn-Identity

Identifies the PLMN of the cell as given by the common PLMN broadcast in the MIB, as defined in TS 25.331 [19].

CellGlobalIdGERAN

The IE *CellGlobalIdGERAN* specifies the Cell Global Identification (CGI), the globally unique identity of a cell in GERAN.

CellGlobalIdGERAN information element

```
-- ASN1START

CellGlobalIdGERAN ::= SEQUENCE {
    plmn-Identity PLMN-Identity,
    locationAreaCode BIT STRING (SIZE (16)),
    cellIdentity BIT STRING (SIZE (16))
}

-- ASN1STOP
```

CellGlobalIdGERAN field descriptions

cellIdentity

Cell Identifier which is unique within the context of the GERAN location area as defined in TS 23.003 [27].

IocationAreaCode

A fixed length code identifying the location area within a PLMN as defined in TS 23.003 [27].

plmn-Identity

Identifies the PLMN of the cell, as defined in TS 23.003 [27]..

CellGlobalIdCDMA2000

The IE *CellGlobalIdCDMA2000* specifies the Cell Global Identification (CGI), the globally unique identity of a cell in CDMA2000.

CellGloballdCDMA2000 information element

```
-- ASN1START

CellGlobalIdCDMA2000 ::= CHOICE {
    cellGlobalId1XRTT BIT STRING (SIZE (47)),
    cellGlobalIdHRPD BIT STRING (SIZE (128))
}

-- ASN1STOP
```

CellGlobalIdCDMA2000 field descriptions

cellGloballd1XRTT

Unique identifier for a CDMA2000 1xRTT cell, corresponds to BASEID, SID and NID parameters (in that order) defined in C.S0005 [25].

cellGloballdHRPD

Unique identifier for a CDMA2000 HRPD cell, corresponds to SECTOR ID parameter defined in C.S0024 [26, 14.9].

CellSelectionInfoNFreq

The IE *CellSelectionInfoNFreq* includes the parameters used for cell selection on a neighbouring frequency, see TS 36.304 [4].

CellSelectionInfoNFreq information element

```
-- ASN1START
CellSelectionInfoNFreq-r13 ::= SEQUENCE {
    -- Cell selection information as in SIB1
    g-RxLevMin-r13
                                Q-RxLevMin,
   q-RxLevMinOffset
                                                               OPTIONAL, -- Need OP
                                      INTEGER (1..8)
     - Cell re-selection information as in SIB3
                                       ENUMERATED {
   q-Hyst-r13
                                           dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                           dB12, dB14, dB16, dB18, dB20, dB22, dB24},
   q-RxLevMinReselection-r13
                                       Q-RxLevMin,
    t-ReselectionEUTRA-r13
                                       T-Reselection
 - ASN1STOP
```

- CSG-Identity

The IE CSG-Identity is used to identify a Closed Subscriber Group.

CSG-Identity information element

```
-- ASN1START

CSG-Identity ::= BIT STRING (SIZE (27))

-- ASN1STOP
```

FreqBandIndicator

The IE *FreqBandIndicator* indicates the E-UTRA operating band as defined in TS 36.101 [42, table 5.5-1]. If an extension is signalled using the extended value range (as defined by IE *FreqBandIndicator-v9e0*), the UE shall only consider this extension (and hence ignore the corresponding original field, using the value range as defined by IE *FreqBandIndicator* i.e. without suffix, if signalled).

FreqBandIndicator information element

```
-- ASN1START

FreqBandIndicator ::= INTEGER (1..maxFBI)

FreqBandIndicator-v9e0 ::= INTEGER (maxFBI-Plus1..maxFBI2)

FreqBandIndicator-r11 ::= INTEGER (1..maxFBI2)

-- ASN1STOP
```

NOTE: For fields using the original value range, as defined by IE *FreqBandIndicator* i.e. without suffix, value *maxFBI* indicates that the frequency band is indicated by means of an extension. In such a case, UEs not supporting the extension consider the field to be set to a not supported value.

MobilityControlInfo

The IE Mobility Controllnfo includes parameters relevant for network controlled mobility to/within E-UTRA.

MobilityControlInfo information element

```
-- ASN1START
MobilityControlInfo ::= SEQUENCE {
   targetPhysCellId
                                         PhysCellId,
    carrierFreq
                                         CarrierFreqEUTRA
                                                                              OPTIONAL,
                                                                                           -- Cond HO-
toEUTRA2
                                         CarrierBandwidthEUTRA
   carrierBandwidth
                                                                              OPTIONAL,
                                                                                          -- Cond HO-
toEUTRA
   {\tt additionalSpectrumEmission}
                                        AdditionalSpectrumEmission
                                                                              OPTIONAL,
                                                                                          -- Cond HO-
toEUTRA
                                         ENUMERATED {
    t.304
                                             ms50, ms100, ms150, ms200, ms500, ms1000,
                                             ms2000, ms10000-v1310},
    newUE-Identity
                                         C-RNTI,
   radioResourceConfigCommon
                                        RadioResourceConfigCommon,
    rach-ConfigDedicated
                                        RACH-ConfigDedicated
                                                                             OPTIONAL.
                                                                                          -- Need OP
    [[ carrierFreq-v9e0
                                        CarrierFreqEUTRA-v9e0
                                                                              OPTIONAL
                                                                                           -- Need ON
    ]],
                                        ENUMERATED {true}
    [[ drb-ContinueROHC-r11
                                                                              OPTIONAL
                                                                                           -- Cond HO
    ]],
    [[ mobilityControlInfoV2X-r14 MobilityControlInfoV2X-r14
                                                                              OPTIONAL, -- Need ON
        handoverWithoutWT-Change-r14 ENUMERATED {keepLWA-Config, sendEndMarker} OPTIONAL, --
Cond HO
                                        ENUMERATED {true}
                                                                              OPTIONAL,
       makeBeforeBreak-r14
                                                                                           -- Need OR
        rach-Skip-r14
                                         RACH-Skip-r14
                                                                              OPTIONAL,
                                                                                          -- Need OR
                                        ENUMERATED {true}
        sameSFN-Indication-r14
                                                                              OPTIONAL
                                                                                          -- Cond HO-
SFNsvnced
   11
MobilityControlInfo-v1010 ::= SEQUENCE {
    additionalSpectrumEmission-v1010 AdditionalSpectrumEmission-v1010 OPTIONAL -- Need ON
MobilityControlInfoSCG-r12 ::=
                                     SEQUENCE {
                                         ENUMERATED {
   t307-r12
                                            ms50, ms100, ms150, ms200, ms500, ms1000,
                                            ms2000, spare1},
    ue-IdentitySCG-r12
                                         C-RNTI
                                                                          OPTIONAL,
                                                                          OPTIONAL, -- Cond SCO
    rach-ConfigDedicated-r12
                                        RACH-ConfigDedicated
    cipheringAlgorithmSCG-r12
                                   CipheringAlgorithm-r12 OPTIONAL, -- Need ON
    [[ makeBeforeBreakSCG-r14
                                    ENUMERATED {true}
                                                                          OPTIONAL,
                                                                                      -- Need OR
        rach-SkipSCG-r14
                                        RACH-Skip-r14
                                                                          OPTIONAL
                                                                                       -- Need OR
    11
}
MobilityControlInfoV2X-r14 ::= SEQUENCE {
                                      SL-CommResourcePoolV2X-r14 OPTIONAL,
SL-CommRxPoolListV2X-r14 OPTIONAL,
SL-SyncConfigListV2X-r14 OPTIONAL,
SL-CBR-CommonTxConfigList-r14 OPTIONAL
    v2x-CommTxPoolExceptional-r14 SL-CommResourcePoolV2X-r14
                                                                                          -- Need OR
                                                                                          -- Need OR
   v2x-CommRxPool-r14
v2x-CommSyncConfig-r14
cbr-MobilityTxConfigList-r14
                                                                                          -- Need OR
                                                                                          -- Need OR
}
CarrierBandwidthEUTRA ::=
                                     SEQUENCE {
   dl-Bandwidth
                                         ENUMERATED {
                                                 n6, n15, n25, n50, n75, n100, spare10,
                                                 spare9, spare8, spare7, spare6, spare5,
                                                 spare4, spare3, spare2, spare1},
                                         ENUMERATED {
   ul-Bandwidth
                                                 n6, n15, n25, n50, n75, n100, spare10,
                                                 spare9, spare8, spare7, spare6, spare5,
spare4, spare3, spare2, spare1} OPTIONAL -- Need OP
CarrierFreqEUTRA ::=
                                     SEQUENCE {
                                        ARFCN-ValueEUTRA,
    dl-CarrierFreq
                                         ARFCN-ValueEUTRA
    ul-CarrierFreq
                                                                          OPTIONAL
                                                                                      -- Cond FDD
}
CarrierFreqEUTRA-v9e0 ::=
                                     SEOUENCE {
                                     ARFCN-ValueEUTRA-r9,
   dl-CarrierFreq-v9e0
    ul-CarrierFreq-v9e0
                                        ARFCN-ValueEUTRA-r9
                                                                     OPTIONAL -- Cond FDD
}
```

```
RACH-Skip-r14 ::=
                                                                                                                                                                                                                                                                                 SEQUENCE {
                             targetTA-r14
                                                                                                                                                                                                                                                                                CHOICE {
                                                         ta0-r14
                                                                                                                                                                                                                                                                                                           NULL,
                                                          ta0-r14
mcg-PTAG-r14
                                                                                                                                                                                                                                                                                                                                            NULL,
                                                                                                                                                                                                                                                                                                                                             NULL,
                                                            mcg-STAG-r14
                                                                                                                                                                                                                                                                                                           STAG-Id-r11,
                                                           scg-STAG-r14
                                                                                                                                                                                                                                                                                                             STAG-Id-r11
                             },
ul-ConfigInfo-rl4 SEQUENCE {
                                                         ConfigInfo-r14

numberOfConfUL-Processes-r14

ul-SchedInterval-r14

ul-StartSubframe-r14

location in the process of the proce
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      OPTIONAL -- Need OR
}
 -- ASN1STOP
```

MobilityControlInfo field descriptions

additionalSpectrumEmission

For a UE with no SCells configured for UL in the same band as the PCell, the UE shall apply the value for the PCell instead of the corresponding value from *SystemInformationBlockType2* or *SystemInformationBlockType1*. For a UE with SCell(s) configured for UL in the same band as the PCell, the UE shall, in case all SCells configured for UL in that band are released after handover completion, apply the value for the PCell instead of the corresponding value from *SystemInformationBlockType1*. The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs.

carrierBandwidth

Provides the parameters Downlink bandwidth, and Uplink bandwidth, see TS 36.101 [42].

carrierFreq

Provides the EARFCN to be used by the UE in the target cell.

cbr-MobilityTxConfigList

Indicates the list of CBR ranges and the list of PSSCH transmission parameter configurations available to configure congestion control to the UE for V2X sidelink communication during handover.

cipheringAlgorithmSCG

Indicates the ciphering algorithm to be used for SCG DRBs. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.

dl-Bandwidth

Parameter: Downlink bandwidth, see TS 36.101 [42].

drb-ContinueROHC

This field indicates whether to continue or reset, for this handover, the header compression protocol context for the RLC UM bearers configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset. E-UTRAN includes the field only in case of a handover within the same eNB.

handoverWithoutWT-Change

Indicates whether UE performs handover where LWA configuration is retained with the same WT If sendEndMarker is configured, the LWA end-marker for PDCP key change indication is used as defined in [8]. If value keepLWA-Config is configured, LWA end marker is not used and UE shall only retain the LWA configuration.

makeBeforeBreak

Indicates that the UE shall continue uplink transmission/ downlink reception with the source cell(s) before performing the first transmission through PRACH to the target intra-frequency PCell, or performing initial PUSCH transmission to the target intra-frequency PCell while *rach-Skip* is configured.

makeBeforeBreakSCG

Indicates that the UE shall continue uplink transmission/ downlink reception with the source cell(s) before performing the first transmission through PRACH to the target intra-frequency PSCell, or performing initial PUSCH transmission to the target intra-frequency PSCell while *rach-SkipSCG* is configured.

mobilityControlInfoV2X

Indicates the sidelink configurations of the target cell for V2X sidelink communication during handover.

numberOfConfUL-Processes

The number of configured HARQ processes for preallocated uplink grant, see TS 36.321 [6, 5.20].

rach-ConfigDedicated

The dedicated random access parameters. If absent the UE applies contention based random access as specified in TS 36.321 [6].

rach-Skip

This field indicates whether random access procedure for the target PCell is skipped.

rach-SkipSCG

This field indicates whether random access procedure for the target PSCell is skipped.

sameSFN-Indication

This field indicates that the target cell has the same SFN as the source cell and that the BL UE or UE in CE is not required to acquire *MasterInformationBlock* in the target PCell during handover to obtain the SFN of the target cell, as specified in section 5.3.5.4.

t304

Timer T304 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on. EUTRAN includes extended value *ms10000-v1310* only when UE supports CE.

t307

Timer T307 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on.

targetTA

This field refers to the timing adjustment indication, see TS 36.213 [23], indicating the N_{TA} value which the UE shall use for the target PTAG of handover or the target PSTAG of SCG change. *ta0* corresponds to N_{TA} =0. *mcg-PTAG* corresponds to the latest N_{TA} value of the PTAG associated with MCG. *scg-PTAG* corresponds to the latest N_{TA} value of the PTAG associated with SCG. *mcg-STAG* corresponds to the latest N_{TA} value of a MCG STAG indicated by the STAG-Id. *scg-STAG* corresponds to the latest N_{TA} value of a SCG STAG indicated by the STAG-Id.

ul-Bandwidth

Parameter: *Uplink bandwidth*, see TS 36.101 [42, table 5.6-1]. For TDD, the parameter is absent and it is equal to downlink bandwidth. If absent for FDD, apply the same value as applies for the downlink bandwidth.

MobilityControlInfo field descriptions

additional Spectrum Emission

For a UE with no SCells configured for UL in the same band as the PCell, the UE shall apply the value for the PCell instead of the corresponding value from *SystemInformationBlockType2* or *SystemInformationBlockType1*. For a UE with SCell(s) configured for UL in the same band as the PCell, the UE shall, in case all SCells configured for UL in that band are released after handover completion, apply the value for the PCell instead of the corresponding value from *SystemInformationBlockType1*. The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs.

ul-Grant

Indicates the resources of the target PCell/PSCell to be used for the uplink transmission of PUSCH [23, 8.8].

ul-SchedInterval

Indicates the scheduling interval in uplink, see TS 36.321 [6, 5.20]. Value in number of sub-frames. Value sf2 corresponds to 2 subframes, sf5 corresponds to 5 subframes and so on.

ul-StartSubframe

Indicates the subframe in which the UE may initiate the uplink transmission, see TS 36.321 [6, 5.20]. Value 0 corresponds to subframe number 0, 1 corresponds to subframe number 1 and so on. The subframe indicating a valid uplink grant according to the calculation of UL grant configured by *ul-StartSubframe* and *ul-SchedInterval*, see TS 36.321 [6, 5.20], is the same across all radio frames.

v2x-CommRxPool

Indicates reception pools for receiving V2X sidelink communication during handover.

v2x-CommSyncConfig

Indicates synchronization configurations for performing V2X sidelink communication during handover.

v2x-CommTxPoolExceptional

Indicates the transmission resources by which the UE is allowed to transmit V2X sidelink communication during handover.

Conditional presence	Explanation
FDD	The field is mandatory with default value (the default duplex distance defined for the concerned band, as specified in TS 36.101 [42]) in case of "FDD"; otherwise the field is not present.
НО	This field is optionally present, need OP, in case of handover within E-UTRA when the fullConfig is not included; otherwise the field is not present.
HO-SFNsynced	This field is optionally present, need OP, in case of source E-UTRA and target E-UTRA cells are SFN synchronised.
HO-toEUTRA	The field is mandatory present in case of inter-RAT handover to E-UTRA; otherwise the field is optionally present, need ON.
HO-toEUTRA2	The field is absent if <i>carrierFreq-v9e0</i> is present. Otherwise it is mandatory present in case of inter-RAT handover to E-UTRA and optionally present, need ON, in all other cases.
SCGEst	This field is mandatory present in case of SCG establishment; otherwise the field is optionally present, need ON.

MobilityParametersCDMA2000 (1xRTT)

The *MobilityParametersCDMA2000* contains the parameters provided to the UE for handover and (enhanced) CSFB to 1xRTT support, as defined in C.S0097 [53].

MobilityParametersCDMA2000 information element

-- ASN1START

MobilityParametersCDMA2000 ::= OCTET STRING

-- ASN1STOP

MobilityStateParameters 4 6 1

The IE MobilityStateParameters contains parameters to determine UE mobility state.

MobilityStateParameters information element

-- ASN1START

MobilityStateParameters field descriptions

n-CellChangeHigh

The number of cell changes to enter high mobility state. Corresponds to N_{CR_H} in TS 36.304 [4].

n-CellChangeMedium

The number of cell changes to enter medium mobility state. Corresponds to N_{CR_M} in TS 36.304 [4].

t-Evaluation

The duration for evaluating criteria to enter mobility states. Corresponds to T_{CRmax} in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.

t-HystNormal

The additional duration for evaluating criteria to enter normal mobility state. Corresponds to T_{CRmaxHyst} in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.

MultiBandInfoList

MultiBandInfoList information element

```
-- ASN1START

MultiBandInfoList ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator

MultiBandInfoList-v9e0 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF MultiBandInfo-v9e0

MultiBandInfoList-v10j0 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF NS-PmaxList-r10

MultiBandInfoList-v1010 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF NS-PmaxList-v1010

MultiBandInfoList-r11 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-r11

MultiBandInfo-v9e0 ::= SEQUENCE (FreqBandIndicator-v9e0 OPTIONAL -- Need OP

}

-- ASN1STOP
```

NS-PmaxList

The IE NS-PmaxList concerns a list of additionalPmax and additionalSpectrumEmission, as defined in TS 36.101 [42, table 6.2.4-1] for UEs neither in CE nor BL UEs and TS 36.101 [42, table 6.2.4E-1] for UEs in CE or BL UEs, for a given frequency band. E-UTRAN does not include the same value of additionalSpectrumEmission in SystemInformationBlockType2 within this list.

NS-PmaxList information element

```
-- ASN1START
NS-PmaxList-r10 ::=
                               SEQUENCE (SIZE (1..maxNS-Pmax-r10)) OF NS-PmaxValue-r10
                               SEQUENCE (SIZE (1..maxNS-Pmax-r10)) OF NS-PmaxValue-v1010
NS-PmaxList-v1010 ::=
NS-PmaxValue-r10 ::=
                               SEQUENCE {
    additionalPmax-r10
                                       P-Max
                                                                       OPTIONAL,
                                                                                   -- Need OP
    additionalSpectrumEmission
                                       AdditionalSpectrumEmission
NS-PmaxValue-v1010 ::=
                               SEQUENCE {
                                     AdditionalSpectrumEmission-v1010 OPTIONAL
    additionalSpectrumEmission-v1010
                                                                                       -- Need OP
```

```
}
-- ASN1STOP
```


The IE *PhysCellId* is used to indicate the physical layer identity of the cell, as defined in TS 36.211 [21].

PhysCellId information element

```
-- ASN1START

PhysCellid ::= INTEGER (0..503)

-- ASN1STOP
```

PhysCellIdRange

The IE *PhysCellIdRange* is used to encode either a single or a range of physical cell identities. The range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range. For fields comprising multiple occurrences of *PhysCellIdRange*, E-UTRAN may configure overlapping ranges of physical cell identities.

PhysCellIdRange information element

PhysCellIdRange field descriptions

range

Indicates the number of physical cell identities in the range (including *start*). Value n4 corresponds with 4, n8 corresponds with 8 and so on. The UE shall apply value 1 in case the field is absent, in which case only the physical cell identity value indicated by *start* applies.

start

Indicates the lowest physical cell identity in the range.

PhysCellIdRangeUTRA-FDDList

The IE *PhysCellIdRangeUTRA-FDDList* is used to encode one or more of *PhysCellIdRangeUTRA-FDD*. While the IE *PhysCellIdRangeUTRA-FDD* is used to encode either a single physical layer identity or a range of physical layer identities, i.e. primary scrambling codes. Each range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range.

PhysCellIdRangeUTRA-FDDList information element

-- ASN1STOP

PhysCellIdRangeUTRA-FDDList field descriptions

range

Indicates the number of primary scrambling codes in the range (including *start*). The UE shall apply value 1 in case the field is absent, in which case only the primary scrambling code value indicated by *start* applies.

start

Indicates the lowest primary scrambling code in the range.

PhysCellIdCDMA2000

The IE *PhysCellIdCDMA2000* identifies the PNOffset that represents the "Physical cell identity" in CDMA2000.

PhysCellIdCDMA2000 information element

```
-- ASN1START

PhysCellidCDMA2000 ::= INTEGER (0..maxPNOffset)

-- ASN1STOP
```

PhysCellIdGERAN

The IE *PhysCellIdGERAN* contains the Base Station Identity Code (BSIC).

PhysCellIdGERAN information element

```
-- ASN1START

PhysCellidGeran ::= SEQUENCE {
    networkColourCode BIT STRING (SIZE (3)),
    baseStationColourCode BIT STRING (SIZE (3))
}

-- ASN1STOP
```

PhysCellIdGERAN field descriptions baseStationColourCode Base station Colour Code as defined in TS 23.003 [27]. networkColourCode Network Colour Code as defined in TS 23.003 [27].

PhysCellIdUTRA-FDD

The IE *PhysCellIdUTRA-FDD* is used to indicate the physical layer identity of the cell, i.e. the primary scrambling code, as defined in TS 25.331 [19].

PhysCellIdUTRA-FDD information element

```
-- ASN1START

PhysCellidutra-FDD ::= INTEGER (0..511)

-- ASN1STOP
```

PhysCellIdUTRA-TDD

The IE *PhysCellIdUTRA-TDD* is used to indicate the physical layer identity of the cell, i.e. the cell parameters ID (TDD), as specified in TS 25.331 [19]. Also corresponds to the Initial Cell Parameter Assignment in TS 25.223 [46].

PhysCellIdUTRA-TDD information element

```
-- ASN1START

PhysCellidutra-tdd ::= INTEGER (0..127)

-- ASN1STOP
```

PLMN-Identity

The IE *PLMN-Identity* identifies a Public Land Mobile Network. Further information regarding how to set the IE are specified in TS 23.003 [27].

PLMN-Identity information element

```
-- ASN1START
PLMN-Identity ::=
                                    SEQUENCE {
                                       MCC
                                                            OPTIONAL,
                                                                                         -- Cond MCC
   mcc
   mnc
                                        MNC
MCC ::=
                                    SEQUENCE (SIZE (3)) OF
                                           MCC-MNC-Digit
MNC ::=
                                    SEQUENCE (SIZE (2..3)) OF
                                          MCC-MNC-Digit
MCC-MNC-Digit ::=
                                    INTEGER (0..9)
-- ASN1STOP
```

PLMN-Identity field descriptions

mcc

The first element contains the first MCC digit, the second element the second MCC digit and so on. If the field is absent, it takes the same value as the mcc of the immediately preceding IE PLMN-Identity. See TS 23.003 [27].

mnc

The first element contains the first MNC digit, the second element the second MNC digit and so on. See TS 23.003 [27].

Conditional presence	Explanation
MCC	This IE is mandatory when PLMN-Identity is included in CellGlobalIdEUTRA, in
	CellGloballdUTRA, in CellGloballdGERAN or in RegisteredMME. This IE is also
	mandatory in the first occurrence of the IE <i>PLMN-Identity</i> within the IE <i>PLMN-IdentityList</i> .
	Otherwise it is optional, need OP.

PLMN-IdentityList3

Includes a list of PLMN identities.

PLMN-IdentityList3 information element

```
-- ASN1START

PLMN-IdentityList3-r11 ::= SEQUENCE (SIZE (1..16)) OF PLMN-Identity

-- ASN1STOP
```

PreRegistrationInfoHRPD

```
-- ASN1START

PreRegistrationInfoHRPD ::= SEQUENCE {
```

```
preRegistrationAllowed
    preRegistrationZoneId
    preRegistrationZoneId
    secondaryPreRegistrationZoneIdList
}

SecondaryPreRegistrationZoneIdListHRPD := SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD

PreRegistrationZoneIdHRPD := INTEGER (0..255)

-- ASN1STOP
BOOLEAN,
PreRegistrationZoneIdHRPD OPTIONAL, -- cond PreRegAllowed
SecondaryPreRegistrationZoneIdListHRPD OPTIONAL -- Need OR

PreRegistrationZoneIdListHRPD := SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD

INTEGER (0..255)
```

PreRegistrationInfoHRPD field descriptions

preRegistrationAllowed

TRUE indicates that a UE shall perform a CDMA2000 HRPD pre-registration if the UE does not have a valid / current pre-registration. FALSE indicates that the UE is not allowed to perform CDMA2000 HRPD pre-registration in the current cell.

preRegistrationZoneID

ColorCode (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. It is used to control when the UE should register or re-register.

secondaryPreRegistrationZoneldList

List of SecondaryColorCodes (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. They are used to control when the UE should reregister.

Conditional presence	Explanation
PreRegAllowed	The field is mandatory in case the <i>preRegistrationAllowed</i> is set to <i>true</i> . Otherwise the
	field is not present and the UE shall delete any existing value for this field.

Q-QualMin

The IE Q-QualMin is used to indicate for cell selection/re-selection the required minimum received RSRQ level in the (E-UTRA) cell. Corresponds to parameter Q_{qualmin} in TS 36.304 [4]. Actual value Q_{qualmin} = field value [dB].

Q-QualMin information element

```
-- ASN1START
Q-QualMin-r9 ::= INTEGER (-34..-3)
-- ASN1STOP
```

– Q-RxLevMin

The IE Q-RxLevMin is used to indicate for cell selection/re-selection the required minimum received RSRP level in the (E-UTRA) cell. Corresponds to parameter $Q_{rxlevmin}$ in TS 36.304 [4]. Actual value $Q_{rxlevmin}$ = field value * 2 [dBm].

Q-RxLevMin information element

```
-- ASN1START

Q-RxLevMin ::= INTEGER (-70..-22)

-- ASN1STOP
```

Q-OffsetRange

The IE *Q-OffsetRange* is used to indicate a cell, CSI-RS resource or frequency specific offset to be applied when evaluating candidates for cell re-selection or when evaluating triggering conditions for measurement reporting. The value in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

Q-OffsetRange information element

Q-OffsetRangeInterRAT

The IE *Q-OffsetRangeInterRAT* is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB.

Q-OffsetRangeInterRAT information element

```
-- ASN1START

Q-OffsetRangeInterRAT ::= INTEGER (-15..15)

-- ASN1STOP
```

ReselectionThreshold

The IE *ReselectionThreshold* is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = field value * 2 [dB].

ReselectionThreshold information element

```
-- ASN1START

ReselectionThreshold ::= INTEGER (0..31)

-- ASN1STOP
```

ReselectionThresholdQ

The IE *ReselectionThresholdQ* is used to indicate a quality level threshold for cell reselection. Actual value of threshold = field value [dB].

ReselectionThresholdQ information element

```
-- ASN1START

ReselectionThresholdQ-r9 ::= INTEGER (0..31)

-- ASN1STOP
```

SCellIndex

The IE SCellIndex concerns a short identity, used to identify an SCell.

SCellIndex information element

```
-- ASN1START

SCellIndex-r10 ::= INTEGER (1..7)
SCellIndex-r13 ::= INTEGER (1..31)

-- ASN1STOP
```

ServCellIndex

The IE *ServCellIndex* concerns a short identity, used to identify a serving cell (i.e. the PCell or an SCell). Value 0 applies for the PCell, while the *SCellIndex* that has previously been assigned applies for SCells.

ServCellIndex information element

```
-- ASN1START

ServCellIndex-r10 ::= INTEGER (0..7)
ServCellIndex-r13 ::= INTEGER (0..31)

-- ASN1STOP
```

SpeedStateScaleFactors

The IE *SpeedStateScaleFactors* concerns factors, to be applied when the UE is in medium or high speed state, used for scaling a mobility control related parameter.

SpeedStateScaleFactors information element

SpeedStateScaleFactors field descriptions

sf-High

The concerned mobility control related parameter is multiplied with this factor if the UE is in High Mobility state as defined in TS 36.304 [4]. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5, oDot75 corresponds to 0.75 and so on.

sf-Medium

The concerned mobility control related parameter is multiplied with this factor if the UE is in Medium Mobility state as defined in TS 36.304 [4]. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5, oDot75 corresponds to 0.75 and so on.

SystemInfoListGERAN

The IE SystemInfoListGERAN contains system information of a GERAN cell.

SystemInfoListGERAN information element

```
-- ASN1START

SystemInfoListGERAN ::= SEQUENCE (SIZE (1..maxGERAN-SI)) OF OCTET STRING (SIZE (1..23))

-- ASN1STOP
```

SystemInfoListGERAN field descriptions

SystemInfoListGERAN

Each OCTET STRING contains one System Information (SI) message as defined in TS 44.018 [45, table 9.1.1] excluding the L2 Pseudo Length, the RR management Protocol Discriminator and the Skip Indicator or a complete Packet System Information (PSI) message as defined in TS 44.060 [36, table 11.2.1].

SystemTimeInfoCDMA2000

The IE *SystemTimeInfoCDMA2000* informs the UE about the absolute time in the current cell. The UE uses this absolute time knowledge to derive the CDMA2000 Physical cell identity, expressed as PNOffset, of neighbour CDMA2000 cells.

NOTE: The UE needs the CDMA2000 system time with a certain level of accuracy for performing measurements as well as for communicating with the CDMA2000 network (HRPD or 1xRTT).

SystemTimeInfoCDMA2000 information element

```
-- ASN1START

SystemTimeInfoCDMA2000 ::= SEQUENCE {
    cdma-EUTRA-Synchronisation BOOLEAN,
    cdma-SystemTime CHOICE {
        synchronousSystemTime BIT STRING (SIZE (39)),
        asynchronousSystemTime BIT STRING (SIZE (49))
    }
}

-- ASN1STOP
```

SystemTimeInfoCDMA2000 field descriptions

asynchronousSystemTime

The CDMA2000 system time corresponding to the SFN boundary at or after the ending boundary of the SI-Window in which *SystemInformationBlockType8* is transmitted. E-UTRAN includes this field if the E-UTRA frame boundary is not aligned to the start of CDMA2000 system time. This field size is 49 bits and the unit is 8 CDMA chips based on 1.2288 Mcps.

cdma-EUTRA-Synchronisation

TRUE indicates that there is no drift in the timing between E-UTRA and CDMA2000. FALSE indicates that the timing between E-UTRA and CDMA2000 can drift. NOTE 1

synchronousSystemTime

CDMA2000 system time corresponding to the SFN boundary at or after the ending boundary of the SI-window in which *SystemInformationBlockType8* is transmitted. E-UTRAN includes this field if the E-UTRA frame boundary is aligned to the start of CDMA2000 system time. This field size is 39 bits and the unit is 10 ms based on a 1.2288 Mcps chip rate.

NOTE 1: The following table shows the recommended combinations of the *cdma-EUTRA-Synchronisation* field and the choice of cdma-SystemTime included by E-UTRAN for FDD and TDD:

FDD/TDD	cdma-EUTRA-Synchronisation	synchronousSystemTime	asynchronousSystemTime
FDD	FALSE	Not Recommended	Recommended
FDD	TRUE	Recommended	Recommended
TDD	FALSE	Not Recommended	Recommended
TDD	TRUE	Recommended	Recommended

TrackingAreaCode

The IE *TrackingAreaCode* is used to identify a tracking area within the scope of a PLMN, see TS 24.301 [35].

TrackingAreaCode information element

```
-- ASN1START

TrackingAreaCode ::= BIT STRING (SIZE (16))

-- ASN1STOP
```

T-Reselection

The IE *T-Reselection* concerns the cell reselection timer Treselection_{RAT} for E-UTRA, UTRA, GERAN or CDMA2000. Value in seconds. For value 0, behaviour as specified in 7.3.2 applies.

T-Reselection information element

```
-- ASN1START

T-Reselection ::= INTEGER (0..7)

-- ASN1STOP
```

T-ReselectionEUTRA-CE

The IE *T-ReselectionEUTRA-CE* concerns the cell reselection timer Treselection_{EUTRA_CE} as specified in TS 36.304 [4]. Value in seconds. For value 0, behaviour as specified in 7.3.2 applies.

T-ReselectionEUTRA-CE information element

```
-- ASN1START

T-ReselectionEUTRA-CE-r13 ::= INTEGER (0..15)

-- ASN1STOP
```

6.3.5 Measurement information elements

AllowedMeasBandwidth

The IE *AllowedMeasBandwidth* is used to indicate the maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "N_{RB}" TS 36.104 [47]. The values mbw6, mbw15, mbw25, mbw50, mbw75, mbw100 indicate 6, 15, 25, 50, 75 and 100 resource blocks respectively.

AllowedMeasBandwidth information element

```
-- ASN1START

AllowedMeasBandwidth ::= ENUMERATED {mbw6, mbw15, mbw25, mbw50, mbw75, mbw100}

-- ASN1STOP
```

– CSI-RSRP-Range

The IE *CSI-RSRP-Range* specifies the value range used in CSI-RSRP measurements and thresholds. Integer value for CSI-RSRP measurements according to mapping table in TS 36.133 [16].

CSI-RSRP-Range information element

```
-- ASN1START

CSI-RSRP-Range-r12 ::= INTEGER(0..97)

-- ASN1STOP
```

– Hysteresis

The IE *Hysteresis* is a parameter used within the entry and leave condition of an event triggered reporting condition. The actual value is field value * 0.5 dB.

Hysteresis information element

```
-- ASN1START

Hysteresis ::= INTEGER (0..30)

-- ASN1STOP
```

LocationInfo

The IE *LocationInfo* is used to transfer detailed location information available at the UE to correlate measurements and UE position information.

LocationInfo information element

```
-- ASN1START
LocationInfo-r10 ::=
                      SEQUENCE {
    locationCoordinates-r10
                                            CHOICE {
                                             OCTET STRING,
        ellipsoid-Point-r10
        ellipsoidPointWithAltitude-r10
                                                OCTET STRING,
        ellipsoidPointWithUncertaintyCircle-r11
                                                                 OCTET STRING,
        ellipsoidPointWithUncertaintyEllipse-rl1
                                                                 OCTET STRING.
        \verb|ellipsoidPointWithAltitudeAndUncertaintyEllipsoid-r11 & OCTET STRING, \\
        ellipsoidArc-r11
                                                                 OCTET STRING.
       polygon-r11
                                                                 OCTET STRING
   horizontalVelocity-r10
                                            OCTET STRING
                                                                        OPTIONAL.
    gnss-TOD-msec-r10
                                            OCTET STRING
                                                                         OPTIONAL,
}
-- ASN1STOP
```

LocationInfo field descriptions

ellipsoidArc

Parameter *EllipsoidArc* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit. *ellipsoid-Point*

Parameter *Ellipsoid-Point* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

ellipsoidPointWithAltitude

Parameter *EllipsoidPointWithAltitude* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

ellipsoid Point With Altitude And Uncertainty Ellipsoid

Parameter EllipsoidPointWithAltitudeAndUncertaintyEllipsoid defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

ellipsoidPointWithUncertaintyCircle

Parameter *Ellipsoid-PointWithUncertaintyCircle* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

ellipsoidPointWithUncertaintyEllipse

Parameter *EllipsoidPointWithUncertaintyEllipse* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

gnss-TOD-msec

Parameter *Gnss-TOD-msec* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

horizontalVelocity

Parameter *HorizontalVelocity* defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

polygon

Parameter Polygon defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.

MBSFN-RSRQ-Range

The IE *MBSFN-RSRQ-Range* specifies the value range used in MBSFN RSRQ measurements. Integer value for MBSFN RSRQ measurements according to mapping table in TS 36.133 [16].

MBSFN-RSRQ-Range information element

```
-- ASN1START

MBSFN-RSRQ-Range-r12 ::= INTEGER(0..31)

-- ASN1STOP
```

MeasConfig

The IE *MeasConfig* specifies measurements to be performed by the UE, and covers intra-frequency, inter-frequency and inter-RAT mobility as well as configuration of measurement gaps.

MeasConfig information element

```
-- ASN1START
MeasConfig ::=
                                   SEQUENCE {
     - Measurement objects
   measObjectToRemoveList
                                       MeasObjectToRemoveList
                                                                           OPTIONAL,
                                                                                       -- Need ON
   measObjectToAddModList
                                       MeasObjectToAddModList
                                                                           OPTIONAL,
                                                                                       -- Need ON
    -- Reporting configurations
   reportConfigToRemoveList
                                       ReportConfigToRemoveList
                                                                           OPTIONAL,
                                                                                       -- Need ON
   reportConfigToAddModList
                                       ReportConfigToAddModList
                                                                           OPTIONAL,
                                                                                       -- Need ON
    -- Measurement identities
                                       MeasIdToRemoveList
    measIdToRemoveList
                                                                           OPTIONAL,
                                                                                       -- Need ON
    measIdToAddModList
                                       MeasIdToAddModList
                                                                           OPTIONAL,
                                                                                       -- Need ON
     - Other parameters
    quantityConfig
                                       QuantityConfig
                                                                           OPTIONAL,
                                                                                       -- Need ON
                                       MeasGapConfig
                                                                                       -- Need ON
    measGapConfig
                                                                           OPTIONAL,
    s-Measure
                                       RSRP-Range
                                                                           OPTIONAL,
                                                                                       -- Need ON
                                       PreRegistrationInfoHRPD
    preRegistrationInfoHRPD
                                                                           OPTIONAL,
                                                                                       -- Need OP
    speedStatePars CHOICE {
        release
                                           NULL.
        setup
                                           SEOUENCE {
           mobilityStateParameters
                                               MobilityStateParameters,
           timeToTrigger-SF
                                               SpeedStateScaleFactors
    }
                                                                           OPTIONAL,
                                                                                       -- Need ON
    [[ measObjectToAddModList-v9e0
                                           MeasObjectToAddModList-v9e0
                                                                           OPTIONAL
                                                                                       -- Need ON
    11,
                                           BOOLEAN
    [[ allowInterruptions-r11
                                                                           OPTIONAL
                                                                                       -- Need ON
    ]],
                                   CHOICE {
    [[
       measScaleFactor-r12
           release
                                       NULL,
                                       MeasScaleFactor-r12
           setup
                                                                       OPTIONAL, -- Need ON
                                                                       OPTIONAL, -- Need ON OPTIONAL, -- Need ON
        measIdToRemoveListExt-r12
                                           MeasIdToRemoveListExt-r12
        measIdToAddModListExt-r12
                                           MeasIdToAddModListExt-r12
       measRSRQ-OnAllSymbols-r12
                                                                       OPTIONAL -- Need ON
                                       BOOLEAN
    ]],
    [[
       measObjectToRemoveListExt-r13
                                           -- Need ON
                                           MeasObjectToAddModListExt-r13
        measObjectToAddModListExt-r13
                                                                           OPTIONAL,
                                                                                       -- Need ON
                                                                                       -- Need ON
       measIdToAddModList-v1310
                                           MeasIdToAddModList-v1310
                                                                           OPTIONAL,
                                           MeasIdToAddModListExt-v1310 OPTIONAL,

MeasIdToAddModListExt-v1310 OPTIONAL
        measIdToAddModListExt-v1310
                                                                                       -- Need ON
       measGapConfigPerCC-List-r14
                                           MeasGapConfigPerCC-List-r14
                                                                          OPTIONAL,
                                                                                       -- Need ON
    [ [
                                                                           OPTIONAL
       measGapSharingConfig-r14
                                           MeasGapSharingConfig-r14
                                                                                       -- Need ON
    11
                                   SEQUENCE (SIZE (1..maxMeasId)) OF MeasId
MeasIdToRemoveList ::=
MeasIdToRemoveListExt-r12 ::=
                                   SEQUENCE (SIZE (1..maxMeasId)) OF MeasId-v1250
MeasObjectToRemoveList ::=
                                   SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectId
MeasObjectToRemoveListExt-r13 ::=
                                   SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectId-v1310
ReportConfigToRemoveList ::=
                                   SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigId
-- ASN1STOP
```

MeasConfig field descriptions

allowInterruptions

Value TRUE indicates that the UE is allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for *measCycleSCell* of less than 640ms, as specified in TS 36.133 [16]. E-UTRAN enables this field only when an SCell is configured.

measGapConfig

Used to setup and release measurement gaps. E-UTRAN includes either measGapConfig or measGapConfigPerCC-List, if any.

measGapConfigPerCC-List

Used to setup and release serving cell sepecific measurement gaps. E-UTRAN includes either measGapConfig or measGapConfigPerCC-List, if any.

measGapSharingConfig

Used to setup and release measurement gap sharing for intra- and inter-frequency measurement for BL UEs.

measIdToAddModList

List of measurement identities. Field *measIdToAddModListExt* includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2. If E-UTRAN includes *measIdToAddModList-v1310* it includes the same number of entries, and listed in the same order, as in *measIdToAddModList* (i.e. without suffix). If E-UTRAN includes *measIdToAddModListExt-v1310*, it includes the same number of entries, and listed in the same order, as in *measIdToAddModListExt-r12*.

measIdToRemoveList

List of measurement identities to remove. Field *measIdToRemoveListExt* includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.

measObjectToAddModList

If E-UTRAN includes *measObjectToAddModList-v9e0* it includes the same number of entries, and listed in the same order, as in *measObjectToAddModList* (i.e. without suffix). Field *measObjectToAddModListExt* includes additional measurement object identities i.e. extends the size of the measurement object identity list using the general principles specified in 5.1.2.

measObjectToRemoveList

List of measurement objects to remove. Field *measObjectToRemoveListExt* includes additional measurement object identities i.e. extends the size of the measurement object identity list using the general principles specified in 5.1.2.

measRSRQ-OnAllSymbols

Value *TRUE* indicates that the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. If *widebandRSRQ-Meas* is enabled for the frequency in *MeasObjectEUTRA*, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols with wider bandwidth for concerned frequency in accordance with TS 36.214 [48].

measScaleFactor

Even if *reducedMeasPerformance* is not included in any *measObjectEUTRA* or *measObjectUTRA*, E-UTRAN may configure this field. The UE behavior is specified in TS 36.133 [16].

preRegistrationInfoHRPD

The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE.

reportConfigToRemoveList

List of measurement reporting configurations to remove.

s-Measure

PCell quality threshold controlling whether or not the UE is required to perform measurements of intra-frequency, inter-frequency and inter-RAT neighbouring cells. Value "0" indicates to disable *s-Measure*.

timeToTrigger-SF

The timeToTrigger in ReportConfigEUTRA and in ReportConfigInterRAT are multiplied with the scaling factor applicable for the UE's speed state.

MeasDS-Config

The IE *MeasDS-Config* specifies information applicable for discovery signals measurement.

MeasDS-Config information elements

```
-- ASN1START

MeasDS-Config-r12 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        dmtc-PeriodOffset-r12 CHOICE {
            ms40-r12 INTEGER(0..39),
            ms80-r12 INTEGER(0..79),
            ms160-r12 INTEGER(0..159),
            ...
    },
```

```
ds-OccasionDuration-r12 CHOICE {
                                          INTEGER(1..maxDS-Duration-r12),
           durationFDD-r12
           durationTDD-r12
                                          INTEGER(2..maxDS-Duration-r12)
       measCSI-RS-ToRemoveList-r12 MeasCSI-RS-ToRemoveList-r12 OPTIONAL,
                                                                         -- Need ON
       measCSI-RS-ToAddModList-r12 MeasCSI-RS-ToAddModList-r12 OPTIONAL,
                                                                         -- Need ON
MeasCSI-RS-ToRemoveList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12
MeasCSI-RS-ToAddModList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Config-r12
MeasCSI-RS-Id-r12 ::=
                              INTEGER (1..maxCSI-RS-Meas-r12)
MeasCSI-RS-Config-r12 ::=
                             SEQUENCE {
   measCSI-RS-Id-r12
                                  MeasCSI-RS-Id-r12,
   physCellId-r12
                                  INTEGER (0..503),
   resourceConfig-r12
                                  INTEGER (0..503),
                                 INTEGER (0..31),
   subframeOffset-r12
                                 INTEGER (0..4),
   csi-RS-IndividualOffset-r12 Q-OffsetRange,
-- ASN1STOP
```

MeasDS-Config field descriptions

csi-RS-IndividualOffset

CSI-RS individual offset applicable to a specific CSI-RS resource. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

dmtc-PeriodOffset

Indicates the discovery signals measurement timing configuration (DMTC) periodicity (*dmtc-Periodicity*) and offset (*dmtc-Offset*) for this frequency. For DMTC periodicity, value ms40 corresponds to 40ms, ms80 corresponds to 80ms and so on. The value of DMTC offset is in number of subframe(s). The duration of a DMTC occasion is 6ms.

ds-OccasionDuration

Indicates the duration of discovery signal occasion for this frequency. Discovery signal occasion duration is common for all cells transmitting discovery signals on one frequency. If the *carrierFreq* in the measurement object is on an unlicensed band as specified in [42], the UE shall ignore the field *ds-OccasionDuration* for the carrier frequency and apply a value 1 instead.

measCSI-RS-ToAddModList

List of CSI-RS resources to add/ modify in the CSI-RS resource list for discovery signals measurement.

measCSI-RS-ToRemoveList

List of CSI-RS resources to remove from the CSI-RS resource list for discovery signals measurement.

physCellId

Indicates the physical cell identity where UE may assume that the CSI-RS and the PSS/SSS/CRS corresponding to the indicated physical cell identity are guasi co-located with respect to average delay and doppler shift.

resourceConfig

Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2]. If the *carrierFreq* in the measurement object is on an unlicensed band as specified in [42], E-UTRAN does not configure the values {0, 4, 5, 9, 10, 11, 18, 19}.

scramblingIdentity

Parameter: Pseudo-random sequence generator parameter, $n_{\rm ID}$, see TS 36.213 [23, 7.2.5].

subframeOffset

Indicates the subframe offset between SSS of the cell indicated by physCellId and the CSI-RS resource in a discovery signal occasion. The field *subframeOffset* is set to values 0 if the *carrierFreq* in the measurement object is on an unlicensed band as specified in [42].

MeasGapConfig

The IE *MeasGapConfig* specifies the measurement gap configuration and controls setup/ release of measurement gaps.

MeasGapConfig information element

```
CHOICE {
MeasGapConfig ::=
   release
                                         NULL,
                                         SEQUENCE {
    setup
        gapOffset
                                              CHOICE {
                                                      INTEGER (0..39),
                ap0
                                                      INTEGER (0..79),
                ap1
                qp2-r14
                                                      INTEGER (0..39),
                gp3-r14
                                                      INTEGER (0..79),
                                                      INTEGER (0..39),
                qp-ncsq0-r14
                gp-ncsg1-r14
                                                      INTEGER (0..79),
                gp-ncsg2-r14
                                                      INTEGER (0..39),
                gp-ncsg3-r14
                                                      INTEGER (0..79)
                                                     INTEGER (0..1279),
                gp-nonUniform1-r14
                                                     INTEGER (0..2559),
INTEGER (0..5119),
                gp-nonUniform2-r14
                gp-nonUniform3-r14
                gp-nonUniform4-r14
                                                     INTEGER (0..10239)
    }
-- ASN1STOP
```

MeasGapConfig field descriptions

gapOffset

Value *gapOffset* of *gp0* corresponds to gap offset of Gap Pattern Id "0" with MGRP = 40ms, *gapOffset* of *gp1* corresponds to gap offset of Gap Pattern Id "1" with MGRP = 80ms, *gapOffset* of *gp2* corresponds to gap offset of Gap Pattern Id "2" with MGRP = 40ms and MGL = 3ms, *gapOffset* of *gp3* Gap Pattern Id "3" with MGRP = 80ms and MGL = 3ms, *gapOffset* of *gp-ncsg0* corresponds to gap offset of NCSG Pattern Id "0" with VIRP = 40ms and ML = 4ms, *gapOffset* of *gp-ncsg1* corresponds to gap offset of NCSG Pattern Id "1" with VIRP = 80ms and ML = 4ms, *gapOffset* of *gp-ncsg2* corresponds to gap offset of NCSG Pattern Id "2" with VIRP = 40ms and ML = 3ms, *gapOffset* of *gp-ncsg3* corresponds to gap offset of NCSG Pattern Id "3" with VIRP = 80ms and ML = 3ms. *gapOffset* of *gp-nonUniform1* corresponds to gap offset of non uniform gap pattern Id "1" with LMGRP = 1280ms, *gapOffset* of *gp-nonUniform2* corresponds to gap offset of non uniform gap pattern Id "2" with LMGRP = 2560ms, *gapOffset* of *gp-nonUniform3* corresponds to gap offset of non uniform gap pattern Id "3" with LMGRP = 5120ms, *gapOffset* of *gp-nonUniform4* corresponds to gap offset of non uniform gap pattern Id "4" with LMGRP = 10240ms. Also used to specify the measurement gap pattern to be applied, as defined in TS 36.133 [16]. For Gap Patterns (including non-uniform gap patterns, but excluding NCSG patterns), E-UTRAN includes the same *gapOffset* value (gap pattern id and gap offset) for all serving cells that are configured with a Gap Pattern. For NCSG Patterns, E-UTRAN includes *gapOffset* value indicating VIRP and gap offset consistent with the Gap Pattern configuration (MGRP and gap offset).

servCellId

Identifies the serving cell for which measurement gap configuration is provided (setup) or deleted (release).

MeasGapConfigPerCC-List

The IE *MeasGapConfigPerCC-List* specifies the measurement gap configuration and controls setup/ release of measurement gaps.

MeasGapConfigPerCC-List information element

```
-- ASN1START
MeasGapConfigPerCC-List-r14 ::= CHOICE {
                             NULL,
   release
                              SEQUENCE {
       measGapConfigToRemoveList-r14 MeasGapConfigToRemoveList-r14 OPTIONAL,
                                                                                -- Need ON
       measGapConfigToAddModList-r14 MeasGapConfigToAddModList-r14 OPTIONAL
                                                                                -- Need ON
}
MeasGapConfigToRemoveList-r14 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF ServCellIndex-r13
MeasGapConfigToAddModList-r14 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasGapConfigPerCC-r14
MeasGapConfigPerCC-r14 ::= SEQUENCE {
                      ServCellIndex-r13,
   servCellId-r14
   measGapConfigCC-r14
                             MeasGapConfig
}
```

-- ASN1STOP

MeasGapConfigPerCC-List field descriptions

measGapConfigToAddModList

List of serving cells and corresponding serving cell specific measurement gap configuration to add /modify.

measGapConfigToRemoveList

List of serving cells for which measurement gap configuration is removed.

MeasGapSharingConfig

The IE *MeasGapSharingConfig* specifies the measurement gap sharing scheme and controls setup/ release of measurement gap sharing.

MeasGapSharingConfig information element

```
-- ASN1START

MeasGapSharingConfig-r14 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
    measGapSharingScheme-r14 ENUMERATED {scheme00, scheme01, scheme11}
    }
}

-- ASN1STOP
```

MeasGapSharingConfig field descriptions

measGapSharingScheme

Indicates the measurement gaps sharing scheme for BL UEs in CE mode A and CE mode B, see TS 36.133 [16, Table 8.13.2.1.1.1-2 and Table 8.13.3.1.1.1-3]. Value *scheme00* corresponds to "00", value *scheme01* corresponds to "01", and so on.

– MeasId

The IE *MeasId* is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

MeasId information element

```
-- ASN1START

MeasId ::= INTEGER (1..maxMeasId)

MeasId-v1250 ::= INTEGER (maxMeasId-Plus1..maxMeasId-r12)

-- ASN1STOP
```

MeasIdToAddModList

The IE *MeasIdToAddModList* concerns a list of measurement identities to add or modify, with for each entry the *measId*, the associated *measObjectId* and the associated *reportConfigId*. Field *measIdToAddModListExt* includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.

MeasIdToAddModList information element

```
-- ASN1START

MeasIdToAddModList ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod

MeasIdToAddModList-v1310 ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod-v1310
```

```
MeasIdToAddModListExt-r12 ::=
                                  SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddModExt-r12
MeasIdToAddModListExt-v1310 ::=
                                  SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod-v1310
MeasIdToAddMod ::= SEQUENCE {
   measId
                                       MeasId,
   measObjectId
                                       MeasObjectId,
   reportConfigId
                                       ReportConfigId
MeasIdToAddModExt-r12 ::= SEQUENCE {
                                       MeasId-v1250,
   measId-v1250
   measObjectId-r12
                                       MeasObjectId,
   reportConfigId-r12
                                       ReportConfigId
}
MeasIdToAddMod-v1310 ::=
                           SEQUENCE {
   measObjectId-v1310
                              MeasObjectId-v1310
                                                       OPTIONAL
-- ASN1STOP
```

MeasIdToAddModList field descriptions

measObjectId

If the measObjectId-v1310 is included, the measObjectId or measObjectId-r12 is ignored by the UE.

MeasObjectCDMA2000

The IE MeasObjectCDMA2000 specifies information applicable for inter-RAT CDMA2000 neighbouring cells.

MeasObjectCDMA2000 information element

```
-- ASN1START
MeasObjectCDMA2000 ::=
                                   SEQUENCE {
                                       CDMA2000-Type,
   cdma2000-Type
    carrierFreq
                                       CarrierFreqCDMA2000,
                                       INTEGER (0..15)
   searchWindowSize
                                                                          OPTIONAL,
                                                                                      -- Need ON
   offsetFreq
                                       Q-OffsetRangeInterRAT
                                                                          DEFAULT 0,
                                                                          OPTIONAL,
   cellsToRemoveList
                                      CellIndexList
                                                                                      -- Need ON
    cellsToAddModList
                                       CellsToAddModListCDMA2000
                                                                          OPTIONAL,
                                                                                      -- Need ON
                                                                                      -- Need ON
   cellForWhichToReportCGI
                                      PhysCellIdCDMA2000
                                                                          OPTIONAL,
}
CellsToAddModListCDMA2000 ::=
                                   SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModCDMA2000
CellsToAddModCDMA2000 ::= SEQUENCE {
                                       INTEGER (1..maxCellMeas),
    cellIndex
   physCellId
                                       PhysCellIdCDMA2000
-- ASN1STOP
```

MeasObjectCDMA2000 field descriptions
carrierInfo
Identifies CDMA2000 carrier frequency for which this configuration is valid.
cdma2000-Type
The type of CDMA2000 network: CDMA2000 1xRTT or CDMA2000 HRPD.
cellindex
Entry index in the neighbouring cell list.
cellsToAddModList
List of cells to add/ modify in the neighbouring cell list.
cellsToRemoveList
List of cells to remove from the neighbouring cell list.
physCellid
CDMA2000 Physical cell identity of a cell in neighbouring cell list expressed as PNOffset.
searchWindowSize
Provides the search window size to be used by the UE for the neighbouring pilot, see C.S0005 [25].

MeasObjectEUTRA

The IE MeasObjectEUTRA specifies information applicable for intra-frequency or inter-frequency E-UTRA cells.

MeasObjectEUTRA information element

```
-- ASN1START
MeasObjectEUTRA ::=
                                                                                 SEQUENCE {
                                                                                  ARFCN-ValueEUTRA,
        carrierFreq
        allowedMeasBandwidth
presenceAntennaPort1
neighCellConfig
                                                                                             AllowedMeasBandwidth,
                                                                                            PresenceAntennaPort1,
                                                                                            NeighCellConfig,
                                                                                                                                                           DEFAULT dB0,
         offsetFreq
                                                                                             O-OffsetRange
          -- Cell list
                                                                              CellIndexList OPTIONAL,
CellsToAddModList OPTIONAL,
         cellsToRemoveList
         cellsToAddModList
                                                                                                                                                                                                   -- Need ON
            -- Black list
        blackCellsToRemoveList CellIndexList OPTIONAL, blackCellsToAddModList BlackCellsToAddModList OPTIONAL, cellForWhichToReportCGI PhysCellId OPTIONAL,
                                                                                                                                                                                                    -- Need ON
                                                                                                                                                                                                 -- Need ON
-- Need ON
                                                                                                                                                              OPTIONAL,
                                                                                            MeasCycleSCell-r10 OPTIONAL,
          [[measCycleSCell-r10
                                                                                                                                                                                           -- Need ON
                  measSubframePatternConfigNeigh-r10 MeasSubframePatternConfigNeigh-r10 OPTIONAL
                              -- Need ON
          11.
         [[widebandRSRQ-Meas-r11 BOOLEAN OPTIONAL -- Cond WB-RSRQ]],
[[ altTTT-CellsToRemoveList-r12 CellIndexList OPTIONAL,
    altTTT-CellsToAddModList-r12 AltTTT-CellsToAddModList-r12 OPTIONAL,
                                                                                                                                                                                                  -- Need ON
                                                                                                                                                                                                            -- Need ON
                                                                                     CHOICE {
                   t312-r12
                           release
                                                                                                      NULL,
                                                                                                       ENUMERATED {ms0, ms50, ms100, ms200,
                           setup
                                                                                                       ms300, ms400, ms500, ms1000}
                                                                                                                    OPTIONAL,
                                                                                                                                                                                          -- Need ON
                                                                                            BOULEAN OPTIONAL, -- Need ON MeasDS-Config-r12 OPTIONAL.
                  reducedMeasPerformance-r12 BOOLEAN
measDS-Config-r12 MeasDS-C
                   measDS-Config-r12
         ]],
          ] ]
                  rmtc-Config-r13 RMTC-Config-r13 OPTIONAL, -- Need ON carrierFreq-r13 ARFCN-ValueEUTRA-v9e0 OPTIONAL
                                                                                    ARFCN-ValueEUTRA-v9e0 OPTIONAL
                                                                                                                                                                                                               -- Need ON
         ]],
                   tx-ResourcePoolToRemoveList-r14 Tx-ResourcePoolMeasList-r14 OPTIONAL, -- Need ON tx-ResourcePoolToAddList-r14 Tx-ResourcePoolMeasList-r14 OPTIONAL, -- Need ON fembms-MixedCarrier-r14 BOOLEAN OPTIONAL -- Need ON -- Need O
                                                                                                                                                             OPTIONAL
                   fembms-MixedCarrier-r14
                                                                                                BOOLEAN
                                                                                                                                                                                                              -- Need ON
         11
MeasObjectEUTRA-v9e0 ::=
   carrierFreq-v9e0
                                                                                 SEOUENCE {
                                                                                           ARFCN-ValueEUTRA-v9e0
CellsToAddModList ::=
                                                     SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddMod
```

```
CellsToAddMod ::= SEQUENCE {
   cellIndex
                                       INTEGER (1..maxCellMeas),
                                       PhysCellId,
   physCellId
    cellIndividualOffset
                                        Q-OffsetRange
BlackCellsToAddModList ::=
                                  SEQUENCE (SIZE (1..maxCellMeas)) OF BlackCellsToAddMod
BlackCellsToAddMod ::= SEQUENCE {
  cellIndex
                                        INTEGER (1..maxCellMeas),
   physCellIdRange
                                        PhysCellIdRange
}
MeasCycleSCell-r10 ::=
                                    ENUMERATED {sf160, sf256, sf320, sf512,
                                                   sf640, sf1024, sf1280, spare1}
MeasSubframePatternConfigNeigh-r10 ::= CHOICE {
   release
   setup
                                            SEQUENCE {
       measSubframePatternNeigh-r10
                                               MeasSubframePattern-r10,
       measSubframeCellList-r10
                                                MeasSubframeCellList-r10 OPTIONAL -- Cond
always
}
MeasSubframeCellList-r10 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF PhysCellIdRange
AltTTT-CellsToAddModList-r12 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF AltTTT-CellsToAddMod-r12
AltTTT-CellsToAddMod-r12 ::= SEQUENCE {
   cellIndex-r12
                                            INTEGER (1..maxCellMeas),
   physCellIdRange-r12
                                            PhysCellIdRange
}
WhiteCellsToAddModList-r13 ::=
                                        SEQUENCE (SIZE (1..maxCellMeas)) OF WhiteCellsToAddMod-r13
WhiteCellsToAddMod-r13 ::= SEQUENCE {
                                            INTEGER (1..maxCellMeas),
   cellIndex-r13
   physCellIdRange-r13
                                            PhysCellIdRange
RMTC-Config-r13 ::= CHOICE {
   release
                                       NULL,
                                       SEQUENCE {
   setup
                                       ENUMERATED {ms40, ms80, ms160, ms320, ms640}, INTEGER(0..639) OPTIONAL,
       rmtc-Period-r13
       rmtc-Period-113
rmtc-SubframeOffset-r13
INTEGER(0..639)
FIGURE 13
ENUMERATED {sym1, sym14, sym28, sym42, sym70},
                                                                                         -- Need ON
   }
}
Tx-ResourcePoolMeasList-r14 ::= SEQUENCE (SIZE (1..maxSL-PoolToMeasure-r14)) OF SL-V2X-
TxPoolReportIdentity-r14
-- ASN1STOP
```

MeasObjectEUTRA field descriptions

altTTT-CellsToAddModList

List of cells to add/ modify in the cell list for which the alternative time to trigger specified by alternativeTimeToTrigger in reportConfigEUTRA, if configured, applies.

altTTT-CellsToRemoveList

List of cells to remove from the list of cells for alternative time to trigger.

blackCellsToAddModList

List of cells to add/ modify in the black list of cells.

blackCellsToRemoveList

List of cells to remove from the black list of cells.

carrierFrea

Identifies E-UTRA carrier frequency for which this configuration is valid. E-UTRAN does not configure more than one measurement object for the same physical frequency regardless of the E-ARFCN used to indicate this. CarrierFreq-r13 is included only when the extension list measObjectToAddModListExt-r13 is used. If *carrierFreq-r13* is present, *carrierFreq* (i.e., without suffix) shall be set to value *maxEARFCN*.

cellIndex

Entry index in the cell list. An entry may concern a range of cells, in which case this value applies to the entire range.

cellIndividualOffset

Cell individual offset applicable to a specific cell. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

cellsToAddModList

List of cells to add/ modify in the cell list.

cellsToRemoveList

List of cells to remove from the cell list.

fembms-MixedCarrier

If this field is set to *TRUE*, the cells on the carrier frequency indicated by the *measObject* are FeMBMS/Unicast-mixed cells.

measCycleSCell

The parameter is used only when an SCell is configured on the frequency indicated by the *measObject* and is in deactivated state, see TS 36.133 [16, 8.3.3]. E-UTRAN configures the parameter whenever an SCell is configured on the frequency indicated by the *measObject*, but the field may also be signalled when an SCell is not configured. Value *sf160* corresponds to 160 sub-frames, *sf256* corresponds to 256 sub-frames and so on.

measDS-Config

Parameters applicable to discovery signals measurement on the carrier frequency indicated by carrierFreq.

measDuration

Number of consecutive symbols for which the Physical Layer reports samples of RSSI, see TS 36.214 [48]. Value *sym1* corresponds to one symbol, *sym14* corresponds to 14 symbols, and so on.

measSubframeCellList

List of cells for which measSubframePatternNeigh is applied.

measSubframePatternNeigh

Time domain measurement resource restriction pattern applicable to neighbour cell RSRP and RSRQ measurements on the carrier frequency indicated by *carrierFreq*. For cells in *measSubframeCellList* the UE shall assume that the subframes indicated by *measSubframePatternNeigh* are non-MBSFN subframes, and have the same special subframe configuration as PCell.

offsetFreq

Offset value applicable to the carrier frequency. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

physCellId

Physical cell identity of a cell in the cell list.

physCellIdRange

Physical cell identity or a range of physical cell identities.

$reduced {\it MeasPerformance}$

If set to *TRUE*, the EUTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16].

rmtc-Config

Parameters applicable to RSSI and channel occupancy measurement on the carrier frequency indicated by *carrierFreq*.

rmtc-Period

Indicates the RSSI measurement timing configuration (RMTC) periodicity for this frequency. Value *ms40* corresponds to 40 ms periodicity, *ms80* corresponds to 80 ms periodicity and so on, see TS 36.214 [48].

rmtc-SubframeOffset

Indicates the RSSI measurement timing configuration (RMTC) subframe offset for this frequency. The value of *rmtc-SubframeOffset* should be smaller than the value of *rmtc-Period*, see TS 36.214 [48]. For inter-frequency measurements, this field is optional present and if it is not configured, the UE chooses a random value as *rmtc-SubframeOffset* for *measDuration* which shall be selected to be between 0 and the configured *rmtc-Period* with equal probability.

MeasObjectEUTRA field descriptions

t312

The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on.

tx-ResourcePoolToAddList

List of transmission pools identities to be added to the list of pools configured for CBR measurements and for which poolReportId is included in SL-V2X-ConfigDedicated or SystemInformationBlockType21.

tx-ResourcePoolToRemoveList

List of transmission resource pools identities to be removed from the list of pools configured for CBR measurements and for which *poolReportId* is included in *SL-V2X-ConfigDedicated* or *SystemInformationBlockType21*.

widebandRSRQ-Meas

If this field is set to TRUE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16].

whiteCellsToAddModList

List of cells to add/modify in the white list of cells.

whiteCellsToRemoveList

List of cells to remove from the white list of cells.

Conditional presence	Explanation
always	The field is mandatory present.
WB-RSRQ	The field is optionally present, need ON, if the measurement bandwidth indicated by
	allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present and the
	UE shall delete any existing value for this field, if configured.

- MeasObjectGERAN

The IE MeasObjectGERAN specifies information applicable for inter-RAT GERAN neighbouring frequencies.

MeasObjectGERAN information element

```
-- ASN1START

MeasObjectGERAN ::= SEQUENCE {
    carrierFreqs CarrierFreqsGERAN,
    offsetFreq Q-OffsetRangeInterRAT DEFAULT 0,
    ncc-Permitted BIT STRING(SIZE (8)) DEFAULT '11111111'B,
    cellForWhichToReportCGI PhysCellIdGERAN OPTIONAL, -- Need ON
    ...
}

-- ASN1STOP
```

MeasObjectGERAN field descriptions

ncc-Permitted

Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if a BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

carrierFreqs

If E-UTRAN includes cellForWhichToReportCGI, it includes only one GERAN ARFCN value in carrierFreqs.

MeasObjectId

The IE *MeasObjectId* used to identify a measurement object configuration.

MeasObjectId information element

```
-- ASN1START

MeasObjectId ::= INTEGER (1..maxObjectId)

MeasObjectId-v1310 ::= INTEGER (maxObjectId-Plus1-r13..maxObjectId-r13)

MeasObjectId-r13 ::= INTEGER (1..maxObjectId-r13)

-- ASN1STOP
```

MeasObjectToAddModList

The IE MeasObjectToAddModList concerns a list of measurement objects to add or modify

MeasObjectToAddModList information element

```
-- ASN1START
MeasObjectToAddModList ::=
                                   SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod
MeasObjectToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddModExt-r13
MeasObjectToAddModList-v9e0 ::=
                                   SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod-v9e0
MeasObjectToAddMod ::= SEQUENCE {
   measObjectId
                                       MeasObjectId,
   measObject
                                       CHOICE {
       measObjectEUTRA
                                          MeasObjectEUTRA,
       measObjectUTRA
                                          MeasObjectUTRA,
       measObjectGERAN
                                           MeasObjectGERAN
       measObjectCDMA2000
                                          MeasObjectCDMA2000,
       measObjectWLAN-r13
                                          MeasObjectWLAN-r13
    }
}
MeasObjectToAddModExt-r13 ::= SEQUENCE {
                               MeasObjectId-v1310,
   measObjectId-r13
   measObject-r13
                                         CHOICE {
                                               MeasObjectEUTRA,
       measObjectEUTRA-r13
       measObjectUTRA-r13
                                               MeasObjectUTRA,
       measObjectGERAN-r13
                                               MeasObjectGERAN,
       measObjectCDMA2000-r13
                                              MeasObjectCDMA2000,
       measObjectWLAN-v1320
                                               MeasObjectWLAN-r13
}
MeasObjectToAddMod-v9e0 ::= SEQUENCE {
    measObjectEUTRA-v9e0
                                       MeasObjectEUTRA-v9e0
                                                                  OPTIONAL
                                                                              -- Cond eutra
-- ASN1STOP
```

Conditional presence	Explanation
eutra	The field is optional present, need OR, if for the corresponding entry in
	MeasObjectToAddModList or MeasObjectToAddModListExt-r13 field measObject is set to
	measObjectEUTRA and its sub-field carrierFreq is set to maxEARFCN. Otherwise the
	field is not present and the UE shall delete any existing value for this field.

- MeasObjectUTRA

The IE MeasObjectUTRA specifies information applicable for inter-RAT UTRA neighbouring cells.

MeasObjectUTRA information element

```
-- ASN1START
MeasObjectUTRA ::=
                                   SEOUENCE {
   carrierFreq
                                      ARFCN-ValueUTRA,
    offsetFreq
                                       Q-OffsetRangeInterRAT
                                                                   DEFAULT 0,
                                       CellIndexList
    cellsToRemoveList
                                                                   OPTIONAL,
                                                                                       -- Need ON
    cellsToAddModList
                                      CHOICE
       cellsToAddModListUTRA-FDD
                                           CellsToAddModListUTRA-FDD,
       cellsToAddModListUTRA-TDD
                                         CellsToAddModListUTRA-TDD
                                                                   OPTIONAL,
                                                                                       -- Need ON
    cellForWhichToReportCGI
                                       CHOICE {
                                           PhysCellIdUTRA-FDD,
       utra-FDD
        utra-TDD
                                           PhysCellIdUTRA-TDD
```

```
OPTIONAL, -- Need ON
    [[ csg-allowedReportingCells-v930
                                               CSG-AllowedReportingCells-r9
                                                                             OPTIONAL
Need ON
    ]],
       reducedMeasPerformance-r12
    11
                                               BOOLEAN
                                                                   OPTIONAL
                                                                                   -- Need ON
    11
}
CellsToAddModListUTRA-FDD ::=
                                   SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-FDD
CellsToAddModUTRA-FDD ::= SEQUENCE {
                                       INTEGER (1..maxCellMeas),
    cellIndex
    physCellId
                                       PhysCellIdUTRA-FDD
CellsToAddModListUTRA-TDD ::=
                                   SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-TDD
CellsToAddModUTRA-TDD ::= SEQUENCE {
   cellIndex
                                       INTEGER (1..maxCellMeas),
                                       PhysCellIdUTRA-TDD
    physCellId
CSG-AllowedReportingCells-r9 ::=
                                       SEQUENCE {
   physCellIdRangeUTRA-FDDList-r9
                                           PhysCellIdRangeUTRA-FDDList-r9 OPTIONAL
                                                                                       -- Need OR
-- ASN1STOP
```

MeasObjectUTRA field descriptions

carrierFreq

Identifies UTRA carrier frequency for which this configuration is valid. E-UTRAN does not configure more than one measurement object for the same physical frequency regardless of the ARFCN used to indicate this.

callinday

Entry index in the neighbouring cell list.

cellsToAddModListUTRA-FDD

List of UTRA FDD cells to add/ modify in the neighbouring cell list.

cellsToAddModListUTRA-TDD

List of UTRA TDD cells to add/modify in the neighbouring cell list.

cellsToRemoveList

List of cells to remove from the neighbouring cell list.

csg-allowedReportingCells

One or more ranges of physical cell identities for which UTRA-FDD reporting is allowed.

reducedMeasPerformance

If set to *TRUE* the UTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16].

– MeasObjectWLAN

The IE *MeasObjectWLAN* specifies information applicable for inter-RAT WLAN measurements. E-UTRAN configures at least one WLAN identifier in the *MeasObjectWLAN*.

```
-- ASN1START
MeasObjectWLAN-r13 ::= SEQUENCE {
    carrierFreq-r13
                                   CHOICE {
                                       SEQUENCE (SIZE (1..maxWLAN-Bands-r13)) OF WLAN-
       bandIndicatorListWLAN-r13
BandIndicator-r13,
       carrierInfoListWLAN-r13
                                       SEQUENCE (SIZE (1..maxWLAN-CarrierInfo-r13)) OF WLAN-
CarrierInfo-r13
           OPTIONAL,
                       -- Need ON
    wlan-ToAddModList-r13
                                       WLAN-Id-List-r13
                                                                   OPTIONAL,
                                                                               -- Need ON
    wlan-ToRemoveList-r13
                                       WLAN-Id-List-r13
                                                                   OPTIONAL,
                                                                              -- Need ON
}
WLAN-BandIndicator-r13 ::= ENUMERATED {band2dot4, band5, band60-v1430, spare5, spare4, spare3,
spare2, spare1, ...}
-- ASN1STOP
```

MeasObjectWLAN field descriptions

bandIndicatorListWLAN

Includes the list of WLAN bands. Value band2dot4 indicates the 2.4GHz band, value band5 indicates the 5GHz band and value band60 indicates the 60GHz band.

carrierInfoListWLAN

Includes the list of WLAN carrier information for the measurement object.

wlan-ToAddModList

Includes the list of WLAN identifiers to be added to the measurement configuration.

wlan-ToRemoveList

Includes the list of WLAN identifiers to be removed from the measurement configuration.

MeasResults

The IE MeasResults covers measured results for intra-frequency, inter-frequency and inter- RAT mobility.

MeasResults information element

```
-- ASN1START
MeasResults ::=
                                     SECUENCE {
                                        MeasId,
   measId
    measResultPCell
                                     SEOUENCE {
        rsrpResult
                                             RSRP-Range,
        rsrqResult
                                             RSRO-Range
    measResultNeighCells
                                         CHOICE {
       measResultListEUTRA
                                          MeasResultListEUTRA,
        measResultListUTRA
                                             MeasResultListUTRA,
        measResultListGERAN
                                             MeasResultListGERAN.
        measResultsCDMA2000
                                             MeasResultsCDMA2000,
    }
                                                                              OPTIONAL,
    ...,
       measResultForECID-r9
                                             MeasResultForECID-r9
                                                                              OPTIONAL
    [[ locationInfo-r10
                                             LocationInfo-r10
                                                                              OPTIONAL.
        measResultServFreqList-r10
                                             MeasResultServFreqList-r10
                                                                              OPTIONAL
    ]],
    [[ measId-v1250
                                             MeasId-v1250
                                                                              OPTIONAL,
                                             RSRQ-Range-v1250
        measResultPCell-v1250
        measResultCSI-RS-List-r12
                                             MeasResultCSI-RS-List-r12
                                                                              OPTIONAL
    11.
                                             MeasResultForRSSI-r13
                                             MeasResultForRSSI-r13 OPTIONAL,
MeasResultServFreqListExt-r13 OPTIONAL,
    [[ measResultForRSSI-r13
        measResultForRSS1-r13
measResultServFreqListExt-r13
        measResultSSTD-r13
                                             MeasResultSSTD-r13
                                                                              OPTIONAL,
        measResultPCell-v1310
                                            SEQUENCE {
           rs-sinr-Result-r13
                                                 RS-SINR-Range-r13
                                                                              OPTIONAL,
        Jul-PDCP-DelayResultList-r13 UL-PDCP-DelayResultList-r13
measResultListWLAN-r13 MeasResultListWLAN-r13
                                                                              OPTIONAL.
        measResultListWLAN-r13
                                             MeasResultListWLAN-r13
                                                                              OPTIONAL
    ]],
       measResultPCell-v1360
                                             RSRP-Range-v1360
                                                                              OPTIONAL
    ] ]
    11,
       measResultListCBR-r14
                                             MeasResultListCBR-r14
                                                                              OPTIONAL,
    11
        measResultListWLAN-r14
                                             MeasResultListWLAN-r14
                                                                              OPTIONAL
    ]]
}
MeasResultListEUTRA ::=
                                   SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA
MeasResultEUTRA ::= SEQUENCE {
   physCellId
                                         PhysCellId,
    cai-Info
                                         SEOUENCE {
        cellGlobalId
                                             CellGlobalIdEUTRA,
        trackingAreaCode
                                             TrackingAreaCode,
                                             PLMN-IdentityList2
        plmn-IdentityList
                                                                              OPTIONAL
                                                                 OPTIONAL,
                                         SEQUENCE {
    measResult
        rsrpResult
                                            RSRP-Range
                                                                              OPTIONAL,
        rsrqResult
                                             RSRQ-Range
                                                                              OPTIONAL,
        [[ additionalSI-Info-r9
                                                 AdditionalSI-Info-r9
                                                                              OPTIONAL
```

```
ENUMERATED {true}
        [[ primaryPLMN-Suitable-r12
                                                                           OPTIONAL,
           measResult-v1250
                                               RSRQ-Range-v1250
                                                                           OPTIONAL
        ]],
        [[ rs-sinr-Result-r13
                                               RS-SINR-Range-r13
                                                                          OPTIONAL.
           cgi-Info-v1310
                                               SEQUENCE {
               freqBandIndicator-r13
                                               FreqBandIndicator-r11
                                                                              OPTIONAL,
               multiBandInfoList-r13
                                                   MultiBandInfoList-r11
                                                                              OPTIONAL,
               freqBandIndicatorPriority-r13
                                                  ENUMERATED {true}
                                                                              OPTIONAL
                                                                          OPTIONAL
        ]],
        [ [
           measResult-v1360
                                               RSRP-Range-v1360
                                                                                  OPTIONAL
        11
   }
}
MeasResultServFreqList-r10 ::= SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServFreq-r10
MeasResultServFreqListExt-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServFreq-r13
MeasResultServFreq-r10 ::=
                                  SEQUENCE {
    servFreqId-r10
                                       ServCellIndex-r10,
    measResultSCell-r10
                                       SEQUENCE {
       rsrpResultSCell-r10
                                          RSRP-Range,
       rsrqResultSCell-r10
                                           RSRQ-Range
                                                               OPTIONAL,
    measResultBestNeighCell-r10
                                       SEQUENCE {
       physCellId-r10
                                           PhysCellId,
       rsrpResultNCell-r10
                                           RSRP-Range,
                                           RSRQ-Range
       rsrqResultNCell-r10
    }
                                                               OPTIONAL,
    [[ measResultSCell-v1250
                                           RSRQ-Range-v1250
                                                              OPTIONAL,
       measResultBestNeighCell-v1250
                                          RSRQ-Range-v1250
                                                               OPTIONAL
       measResultSCell-v1310
                                           SEQUENCE {
         rs-sinr-Result-r13
                                             RS-SINR-Range-r13
              OPTIONAL,
       measResultBestNeighCell-v1310 SEQUENCE {
          rs-sinr-Result-r13
                                              RS-SINR-Range-r13
              OPTIONAL
    ]]
}
MeasResultServFreq-r13 ::=
                                 SEQUENCE {
    servFreqId-r13
                                       ServCellIndex-r13,
    measResultSCell-r13
                                       SEQUENCE {
                                        RSRP-Range,
       rsrpResultSCell-r13
        rsrqResultSCell-r13
                                           RSRQ-Range-r13,
       rs-sinr-Result-r13
                                          RS-SINR-Range-r13 OPTIONAL
                                                               OPTIONAL,
    measResultBestNeighCell-r13
                                       SEOUENCE {
                                         PhysCellId,
       physCellId-r13
        rsrpResultNCell-r13
                                           RSRP-Range,
       rsrqResultNCell-r13
                                           RSRQ-Range-r13,
       rs-sinr-Result-r13
                                           RS-SINR-Range-r13
                                                               OPTIONAL
    }
                                                               OPTIONAL,
    [[ measResultBestNeighCell-v1360 rsrpResultNCell-v1360
                                          SEQUENCE {
                                              RSRP-Range-v1360
                                                               OPTIONAL
    ]]
}
MeasResultCSI-RS-List-r12 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCSI-RS-r12
MeasResultCSI-RS-r12 ::=
                               SEQUENCE {
   measCSI-RS-Id-r12
                                 MeasCSI-RS-Id-r12,
    csi-RSRP-Result-r12
                                   CSI-RSRP-Range-r12,
MeasResultListUTRA ::=
                                   SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultUTRA
MeasResultUTRA ::= SEQUENCE {
   physCellId
        fdd
                                           PhysCellIdUTRA-FDD,
        tdd
                                           PhysCellIdUTRA-TDD
```

```
cgi-Info
                                         SEQUENCE {
        cellGlobalId
                                            CellGlobalIdUTRA,
                                             BIT STRING (SIZE (16)) OPTIONAL,
BIT STRING (SIZE (8)) OPTIONAL,
PLMN-IdentityList2 OPTIONAL
        locationAreaCode
        routingAreaCode
                                           PLMN-IdentityList2
        plmn-IdentityList
                                                                 OPTIONAL,
    measResult
                                         SEQUENCE {
        utra-RSCP
                                            INTEGER (-5..91)
                                                                              OPTIONAL,
        utra-EcN0
                                             INTEGER (0..49)
                                                                              OPTIONAL,
        [[ additionalSI-Info-r9
                                                                                      OPTIONAL
                                                 AdditionalSI-Info-r9
        1],
        [[ primaryPLMN-Suitable-r12
                                               ENUMERATED {true}
                                                                             OPTIONAL
    }
}
MeasResultListGERAN ::=
                                    SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultGERAN
MeasResultGERAN ::= SEQUENCE {
   carrierFreq
                                         CarrierFreqGERAN,
    physCellId
                                         PhysCellIdGERAN,
    cgi-Info
                                         SEQUENCE {
       cellGlobalId
                                             CellGlobalIdGERAN,
                                                                             OPTIONAL
                                             BIT STRING (SIZE (8))
        routingAreaCode
                                                                              OPTIONAL,
                                        SEQUENCE {
    measResult
                                            INTEGER (0..63),
       rssi
   sResultsCDMA2000 ::=

preRegistrationStatusHRPD
MeasResultsCDMA2000 ::=
                                    SEQUENCE {
                                        BOOLEAN.
                                         MeasResultListCDMA2000
MeasResultListCDMA2000 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCDMA2000
MeasResultCDMA2000 ::= SEQUENCE {
  physCellId
                                         PhysCellIdCDMA2000,
    cgi-Info
                                         CellGlobalIdCDMA2000
                                                                             OPTIONAL,
   measResult
                                         SEQUENCE {
       pilotPnPhase
                                            INTEGER (0..32767)
                                                                            OPTIONAL,
       pilotStrength
                                             INTEGER (0..63),
    }
                               SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultWLAN-r13
MeasResultListWLAN-r13 ::=
MeasResultListWLAN-r14 ::=
                               SEQUENCE (SIZE (1..maxWLAN-Id-Report-r14)) OF MeasResultWLAN-r13
MeasResultWLAN-r13 ::= SEQUENCE {
   wlan-Identifiers-r13
                                             WLAN-Identifiers-r12,
    carrierInfoWLAN-r13
                                             WLAN-CarrierInfo-r13
                                                                      OPTIONAL,
    bandWLAN-r13
                                             WLAN-BandIndicator-r13 OPTIONAL,
                                             WLAN-RSSI-Range-r13,
    rssiWLAN-r13
    availableAdmissionCapacityWLAN-r13
                                            INTEGER (0..31250)
                                                                     OPTIONAL,
                                            WLAN-backhaulRate-r12 OPTIONAL,
WLAN-backhaulRate-r12 OPTIONAL,
INTEGER (0..255) OPTIONAL,
INTEGER (0..65535) OPTIONAL,
ENUMERATED {true} OPTIONAL,
   backhaulDL-BandwidthWLAN-r13
   backhaulUL-BandwidthWLAN-r13
   channelUtilizationWLAN-r13
    stationCountWLAN-r13
                                             ENUMERATED {true}
    connectedWLAN-r13
                                                                     OPTIONAL.
MeasResultListCBR-r14 ::=
                                    SEQUENCE (SIZE (1..maxCBR-Report-r14)) OF MeasResultCBR-r14
MeasResultCBR-r14 ::= SEQUENCE {
   poolIdentity-r14 SL-V2X-TxPoolReportIdentity-r14,
    cbr-PSSCH-r14
                            SL-CBR-r14,
    cbr-PSCCH-r14
                           SL-CBR-r14
                                                      OPTIONAL
MeasResultForECID-r9 ::=
                               SEQUENCE {
  ue-RxTxTimeDiffResult-r9
                                             INTEGER (0..4095),
```

```
currentSFN-r9
                  BIT STRING (SIZE (10))
PLMN-IdentityList2 ::=
                           SEQUENCE (SIZE (1..5)) OF PLMN-Identity
csg-Identity-r9
                              CSG-Identity
                                                          OPTIONAL
MeasResultForRSSI-r13 ::= SEQUENCE {
                          RSSI-Range-r13,
  rssi-Result-r13
  channelOccupancy-r13
                                  INTEGER (0..100),
                           SEQUENCE (SIZE (1..maxQCI-r13)) OF UL-PDCP-DelayResult-r13
UL-PDCP-DelayResultList-r13 ::=
UL-PDCP-DelayResult-r13 ::= SEQUENCE {
  qci-Id-r13
                              ENUMERATED {qci1, qci2, qci3, qci4, spare4, spare3, spare2,
                              spare1},
                              INTEGER (0..31),
  excessDelay-r13
}
-- ASN1STOP
```

MeasResults field descriptions

availableAdmissionCapacityWLAN

Indicates the available admission capacity of WLAN as defined in IEEE 802.11-2012 [67].

backhaulDL-BandwidthWLAN

Indicates the backhaul available downlink bandwidth of WLAN, equal to Downlink Speed times Downlink Load defined in Wi-Fi Alliance Hotspot 2.0 [76].

backhaulUL-BandwidthWLAN

Indicates the backhaul available uplink bandwidth of WLAN, equal to Uplink Speed times Uplink Load defined in Wi-Fi Alliance Hotspot 2.0 [76].

bandWLAN

Indicates the WLAN band.

carrierInfoWLAN

Indicates the WLAN channel information.

cbr-PSSCH

Indicates the CBR measurement results on the PSSCH of the pool indicated by *poolIdentity*. If *adjacencyPSCCH-PSSCH* is set to *TRUE* for the pool indicated by *poolIdentity*, this field indicates the CBR measurement of both the PSSCH and PSCCH resources which are measured together.

cbr-PSCCH

Indicates the CBR measurement results on the PSCCH of the pool indicated by *poolIdentity*. This field is only included if *adjacencyPSCCH-PSSCH* is set to *FALSE* for the pool indicated by *poolIdentity*.

channelOccupancy

Indicates the percentage of samples when the RSSI was above the configured *channelOccupancyThreshold* for the associated *reportConfig*.

channelUtilizationWLAN

Indicates WLAN channel utilization as defined in IEEE 802.11-2012 [67].

connectedWLAN

Indicates whether the UE is connected to the WLAN for which the measurement results are applicable.

csg-MemberStatus

Indicates whether or not the UE is a member of the CSG of the neighbour cell.

currentSFN

Indicates the current system frame number when receiving the UE Rx-Tx time difference measurement results from lower layer.

excessDelay

Indicates excess queueing delay ratio in UL, according to excess delay ratio measurement report mapping table, as defined in TS 36.314 [71, Table 4.2.1.1.1-1]

IocationAreaCode

A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27].

measld

Identifies the measurement identity for which the reporting is being performed. If the *measId-v1250* is included, the *measId* (i.e. without a suffix) is ignored by eNB.

measResult

Measured result of an E-UTRA cell;

Measured result of a UTRA cell;

Measured result of a GERAN cell or frequency;

Measured result of a CDMA2000 cell:

Measured result of a WLAN;

Measured result of UE Rx-Tx time difference;

Measured result of UE SFN, radio frame and subframe timing difference; or

Measured result of RSSI and channel occupancy.

measResultCSI-RS-List

Measured results of the CSI-RS resources in discovery signals measurement.

measResultListCDMA2000

List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity.

measResultListEUTRA

List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity. For BL UEs or UEs in CE, when operating in CE Mode B, *measResult-v1360* is reported if the measured RSRP is less than -140 dBm.

measResultListGERAN

List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity.

measResultListUTRA

List of measured results for the maximum number of reported best cells for a UTRA measurement identity.

measResultListWLAN

List of measured results for the maximum number of reported best WLAN outside the WLAN mobility set and connected WLAN, if any, for a WLAN measurement identity.

MeasResults field descriptions

measResultPCell

Measured result of the PCell. For BL UEs or UEs in CE, when operating in CE Mode B, *measResultPCell-v1360* is reported if the measured RSRP is less than -140 dBm.

measResultsCDMA2000

Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements.

MeasResultServFreqList

Measured results of the serving frequencies: the measurement result of each SCell, if any, and of the best neighbouring cell on each serving frequency. For BL UEs or UEs in CE, when operating in CE Mode B, measResultBestNeighCell-v1360 is reported if the measured RSRP is less than -140 dBm.

pilotPnPhase

Indicates the arrival time of a CDMA2000 pilot, measured relative to the UE's time reference in units of PN chips, see C.S0005 [25]. This information is used in either SRVCC handover or enhanced 1xRTT CS fallback procedure to CDMA2000 1xRTT.

pilotStrength

CDMA2000 Pilot Strength, the ratio of pilot power to total power in the signal bandwidth of a CDMA2000 Forward Channel. See C.S0005 [25] for CDMA2000 1xRTT and C.S0024 [26] for CDMA2000 HRPD.

poolldentity

The identity of the transmission resource pool which is corresponding to the *poolReportId* configured in a resource pool for V2X sidelink communication.

plmn-IdentityList

The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast.

preRegistrationStatusHRPD

Set to TRUE if the UE is currently pre-registered with CDMA2000 HRPD. Otherwise set to FALSE. This can be ignored by the eNB for CDMA2000 1xRTT.

qci-ld

Indicates QCI value for which excessDelay is provided, according to TS 36.314 [71].

routingAreaCode

The RAC identity read from broadcast information, as defined in TS 23.003 [27].

rsrpResult

Measured RSRP result of an E-UTRA cell.

The rsrpResult is only reported if configured by the eNB.

rsraResult

Measured RSRQ result of an E-UTRA cell.

The rsrqResult is only reported if configured by the eNB.

rssi

GERAN Carrier RSSI. RXLEV is mapped to a value between 0 and 63, TS 45.008 [28]. When mapping the RXLEV value to the RSSI bit string, the first/leftmost bit of the bit string contains the most significant bit.

rssi-Result

Measured RSSI result in dBm.

rs-sinr-Result

Measured RS-SINR result of an E-UTRA cell.

The *rs-sinr-Result* is only reported if configured by the eNB.

rssiWLAN

Measured WLAN RSSI result in dBm.

stationCountWLAN

Indicates the total number stations currently associated with this WLAN as defined in IEEE 802.11-2012 [67].

ue-RxTxTimeDiffResult

UE Rx-Tx time difference measurement result of the PCell, provided by lower layers. If ue-

RxTxTimeDiffPeriodicalTDD-r13 is set to TRUE, the measurement mapping is according to EUTRAN TDD UE Rx-Tx time difference report mapping in TS 36.133 [16] and measurement result includes $N_{TAOffset}$, else the measurement mapping is according to EUTRAN FDD UE Rx-Tx time difference report mapping in TS 36.133 [16].

utra-EcN0

According to CPICH_Ec/No in TS 25.133 [29] for FDD. Fourteen spare values. The field is not present for TDD.

utra-RSCP

According to CPICH_RSCP in TS 25.133 [29] for FDD and P-CCPCH_RSCP in TS 25.123 [30] for TDD. Thirty-one spare values.

wlan-Identifiers

Indicates the WLAN parameters used for identification of the WLAN for which the measurement results are applicable.

MeasResultSSTD

The IE *MeasResultSSTD* consists of SFN, radio frame and subframe boundary difference between the PCell and the PSCell as specified in TS 36.214 [48] and TS 36.133 [16].

MeasResultSSTD information element

```
-- ASN1START

MeasResultSSTD-r13 ::= SEQUENCE {
    sfn-OffsetResult-r13 INTEGER (0..1023),
    frameBoundaryOffsetResult-r13 INTEGER (-5..4),
    subframeBoundaryOffsetResult-r13 INTEGER (0..127)
}

-- ASN1STOP
```

MeasResultSSTD field descriptions

sfn-OffsetResult

Indicates the SFN difference between the PCell and the PSCell as an integer value according to TS 36.214 [48].

frameBoundaryOffsetResult

Indicates the frame boundary difference between the PCell and the PSCell as an integer value according to TS 36.214 [48].

subframeBoundaryOffsetResult

Indicates the subframe boundary difference between the PCell and the PSCell as an integer value according to the mapping table in TS 36.133 [16].

MeasScaleFactor

The IE MeasScaleFactor specifies the factor for scaling the measurement performance requirements in TS 36.133 [16].

MeasScaleFactor information element

```
-- ASN1START

MeasScaleFactor-r12 ::= ENUMERATED {sf-EUTRA-cf1, sf-EUTRA-cf2}

-- ASN1STOP
```

NOTE: If the *reducedMeasPerformance* is not included in any *measObjectEUTRA* or *measObjectUTRA* and the *measScaleFactor* is included in the *measConfig*, E-UTRAN can configure any of the values for the *measScaleFactor* as specified in TS 36.133 [16].

QuantityConfig

The IE *QuantityConfig* specifies the measurement quantities and layer 3 filtering coefficients for E-UTRA and inter-RAT measurements.

QuantityConfig information element

```
-- ASN1START
                                    SEQUENCE {
QuantityConfig ::=
    {\tt quantity} {\tt ConfigEUTRA}
                                        QuantityConfigEUTRA
                                                                              OPTIONAL,
                                                                                          -- Need ON
    quantityConfigUTRA
                                        QuantityConfigUTRA
                                                                             OPTIONAL,
                                                                                          -- Need ON
                                                                             OPTIONAL,
    quantityConfigGERAN
                                        QuantityConfigGERAN
                                                                                          -- Need ON
    quantityConfigCDMA2000
                                        QuantityConfigCDMA2000
                                                                                          -- Need ON
                                                                             OPTIONAL,
       quantityConfigUTRA-v1020
                                        QuantityConfigUTRA-v1020
                                                                              OPTIONAL
                                                                                          -- Need ON
    ]],
       quantityConfigEUTRA-v1250
                                        QuantityConfigEUTRA-v1250
    [ [
                                                                             OPTIONAL
                                                                                          -- Need ON
    [[ quantityConfigEUTRA-v1310
                                         QuantityConfigEUTRA-v1310
                                                                             OPTIONAL,
                                                                                          -- Need ON
                                        QuantityConfigWLAN-r13
                                                                                          -- Need ON
        quantityConfigWLAN-r13
                                                                             OPTIONAL
    ]]
QuantityConfigEUTRA ::=
                                    SEQUENCE {
    filterCoefficientRSRP
                                        FilterCoefficient
                                                                              DEFAULT fc4,
                                        FilterCoefficient
    filterCoefficientRSRQ
                                                                              DEFAULT fc4
```

```
}
QuantityConfigEUTRA-v1250 ::= SEQUENCE {
                                                                                                               FilterCoefficient
           filterCoefficientCSI-RSRP-r12
                                                                                                                                                                                                                                     OPTIONAL
                                                                                                                                                                                                                                                                                       -- Need
OR
QuantityConfigEUTRA-v1310 ::=
                                                                                                        SEOUENCE {
                                                                                                                 FilterCoefficient
           filterCoefficientRS-SINR-r13
                                                                                                                                                                                                                                   DEFAULT fc4
                                                                                                         SEQUENCE {
OuantityConfigUTRA ::=
                                                                                                        ENUMERATED {cpich-RSCP, cpich-EcNO},
          measQuantityUTRA-FDD
           measQuantityUTRA-TDD
                                                                                                                      ENUMERATED {pccpch-RSCP},
           filterCoefficient
                                                                                                                       FilterCoefficient
                                                                                                                                                                                                                                      DEFAULT fc4
}
         filterCoefficient2-FDD-r10 Filter
QuantityConfigUTRA-v1020 ::=
                                                                                                                  FilterCoefficient
                                                                                                                                                                                                                                  DEFAULT fc4
QuantityConfigGERAN ::=
                                                                                                   SEQUENCE {
          measQuantityGERAN
                                                                                                                      ENUMERATED {rssi},
                                                                                                                      FilterCoefficient
           filterCoefficient
                                                                                                                                                                                                                                     DEFAULT fc2
QuantityConfigCDMA2000 ::= SEQUENCE {
          measQuantityCDMA2000
                                                                                                                      ENUMERATED {pilotStrength, pilotPnPhaseAndPilotStrength}
           filterCoefficient-r13

SEQUENCE {

ENUMERATION OF THE PROPERTY OF THE PROPERTY
QuantityConfigWLAN-r13 ::=
          measQuantityWLAN-r13
                                                                                                                 ENUMERATED {rssiWLAN},
                                                                                                                       FilterCoefficient
                                                                                                                                                                                                                                     DEFAULT fc4
-- ASN1STOP
```

QuantityConfig field descriptions

filterCoefficient2-FDD

Specifies the filtering coefficient used for the UTRAN FDD measurement quantity, which is not included in measQuantityUTRA-FDD, when reportQuantityUTRA-FDD is present in ReportConfigInterRAT.

filterCoefficientCSI-RSRP

Specifies the filtering coefficient used for CSI-RSRP

filterCoefficientRSRP

Specifies the filtering coefficient used for RSRP.

filterCoefficientRSRQ

Specifies the filtering coefficient used for RSRQ.

filterCoefficientRS-SINR

Specifies the filtering coefficient used for RS-SINR.

measQuantityCDMA2000

Measurement quantity used for CDMA2000 measurements. *pilotPnPhaseAndPilotStrength* is only applicable for *MeasObjectCDMA2000* of *cdma2000-Type* = *type1XRTT*.

measQuantityGERAN

Measurement quantity used for GERAN measurements.

measQuantityUTRA

Measurement quantity used for UTRA measurements.

measQuantityWLAN

Measurement quantity used for WLAN measurements.

quantityConfigCDMA2000

Specifies quantity configurations for CDMA2000 measurements.

quantityConfigEUTRA

Specifies filter configurations for E-UTRA measurements.

quantityConfigGERAN

Specifies quantity and filter configurations for GERAN measurements.

quantityConfigUTRA

Specifies quantity and filter configurations for UTRA measurements. Field *quantityConfigUTRA-v1020* is applicable only when reportQuantityUTRA-FDD is configured.

quantityConfigWLAN

Specifies quantity and filter configurations for WLAN measurements.

ReportConfigEUTRA

The IE *ReportConfigEUTRA* specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events concerning CRS are labelled AN with N equal to 1, 2 and so on.

- Event A1: Serving becomes better than absolute threshold;
- Event A2: Serving becomes worse than absolute threshold;
- Event A3: Neighbour becomes amount of offset better than PCell/ PSCell;
- Event A4: Neighbour becomes better than absolute threshold;
- Event A5: PCell/ PSCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2;
- Event A6: Neighbour becomes amount of offset better than SCell.

The E-UTRA measurement reporting events concerning CSI-RS are labelled CN with N equal to 1 and 2.

- Event C1: CSI-RS resource becomes better than absolute threshold;
- Event C2: CSI-RS resource becomes amount of offset better than reference CSI-RS resource.

The E-UTRA measurement reporting events concerning CBR are labelled VN with N equal to 1 and 2.

- Event V1: CBR becomes larger than absolute threshold;
- Event V2: CBR becomes smaller than absolute threshold.

ReportConfigEUTRA information element

```
-- ASN1START
ReportConfigEUTRA ::=
                                    SEQUENCE {
   triggerType
                                       CHOICE {
                                           SEOUENCE {
       event.
            eventId
                                                CHOICE {
                eventA1
                                                    SEQUENCE {
                   al-Threshold
                                                        ThresholdEUTRA
                                                    SEQUENCE {
                eventA2
                   a2-Threshold
                                                        ThresholdEUTRA
                                                    SEQUENCE {
                eventA3
                   a3-Offset
                                                        INTEGER (-30..30),
                   reportOnLeave
                                                        BOOLEAN
                eventA4
                                                    SEQUENCE {
                   a4-Threshold
                                                        ThresholdEUTRA
                eventA5
                                                    SEQUENCE {
                   a5-Threshold1
                                                        ThresholdEUTRA,
                   a5-Threshold2
                                                        ThresholdEUTRA
                },
                                                    SEQUENCE {
                eventA6-r10
                   a6-Offset-r10
                                                       INTEGER (-30..30),
                   a6-ReportOnLeave-r10
                                                       BOOLEAN
                eventC1-r12
                                                    SEQUENCE {
                   c1-Threshold-r12
                                                        ThresholdEUTRA-v1250,
                   c1-ReportOnLeave-r12
                                                       BOOLEAN
                eventC2-r12
                                                    SEQUENCE {
                   c2-RefCSI-RS-r12
                                                       MeasCSI-RS-Id-r12,
                   c2-Offset-r12
                                                        INTEGER (-30..30),
                    c2-ReportOnLeave-r12
                                                        BOOLEAN
                eventV1-r14
                                                    SEQUENCE {
                    v1-Threshold-r14
                                                        SL-CBR-r14
                eventV2-r14
                                                    SEQUENCE {
```

```
v2-Threshold-r14
                                                               SL-CBR-r14
             hysteresis
                                                        Hysteresis,
             timeToTrigger
                                                        TimeToTrigger
         },
         periodical
                                                        SEQUENCE {
             purpose
                                                            ENUMERATED {
                                                                reportStrongestCells, reportCGI}
                                             ENUMERATED {rsrp, rsrq},
ENUMERATED {sameAsTriggerQuantity, both},
    triggerQuantity
    reportOuantity
    maxReportCells
                                              INTEGER (1..maxCellReport),
    reportInterval
                                              ReportInterval,
    reportAmount
                                              ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
                                                  ENUMERATED {setup} OPTIONAL,
    [[ si-RequestForHO-r9
                                                                                             -- Cond reportCGI
         ue-RxTxTimeDiffPeriodical-r9
                                               ENUMERATED {setup}
                                                                             OPTIONAL
                                                                                             -- Need OR
    11,
                                                 ENUMERATED {true} OPTIONAL, -- Need OR ENUMERATED {setup} OPTIONAL -- Need OR
    [ includeLocationInfo-r10
        reportAddNeighMeas-r10
    release
                                                        NULL,
                                                        TimeToTrigger
             setup
                                                 OPTIONAL, -- Need ON
BOOLEAN OPTIONAL, -- Need ON
BOOLEAN OPTIONAL, -- Need ON
RSRQ-RangeConfig-r12 OPTIONAL, -- Need ON
RSRQ-RangeConfig-r12 OPTIONAL, -- Need ON
                                               BOOLEAN
BOOLEAN
         useT312-r12
        usePSCell-r12
aN-Threshold1-v1250
    RSRQ-RangeConiig-ii
a5-Threshold2-v1250
    RSRQ-RangeConfig-r12
    OPTIONAL,
reportStrongestCSI-RSs-r12
    BOOLEAN
    OPTIONAL,
reportCRS-Meas-r12
    BOOLEAN
    OPTIONAL,
-- Need ON
    OPTIONAL
-- Need ON
                                                                                        -- Need ON
    ]],
                                                                     OPTIONAL,
    [[ reportSSTD-Meas-r13
                                                  BOOLEAN
                                                                                        -- Need ON
         rs-sinr-Config-r13
                                                  CHOICE {
                                                        NULL,
             release
                                                        SEQUENCE {
              setup
                 triggerQuantity-v1310
                                                        ENUMERATED {sinr} OPTIONAL, -- Need ON RS-SINR-Range-r13 OPTIONAL, -- Need ON RS-SINR-Range-r13 OPTIONAL, -- Need ON
                  aN-Threshold1-r13
                  a5-Threshold2-r13
                                                           ENUMERATED {rsrpANDsinr, rsrqANDsinr, all}
                  reportQuantity-v1310
                                                                                    OPTIONAL,
                                                                                                  -- Need ON
         useWhiteCellList-r13
                                                  BOOLEAN
                                                                                    OPTIONAL,
                                                                                                  -- Need ON
         measRSSI-ReportConfig-r13 MeasRSSI-ReportConfig-r13 OPTIONAL, includeMultiBandInfo-r13 ENUMERATED {true} OPTIONAL,
                                                                                                  -- Need ON
                                                                                                  -- Cond
reportCGI
                                                  UL-DelayConfig-r13
         ul-DelayConfig-r13
                                                                                  OPTIONAL
                                                                                                  -- Need ON
    ]],
    [[ ue-RxTxTimeDiffPeriodicalTDD-r13 BOOLEAN
                                                                                   OPTIONAL
                                                                                                  -- Need ON
    ]],
    Π
        purpose-v1430 ENUMERATED {reportLocation, sidelink, spare2, spare1}
                                                                      OPTIONAL -- Need ON
    ]]
}
RSRQ-RangeConfig-r12 ::= CHOICE {
                                              NULL,
    release
    setup
                                              RSRQ-Range-v1250
}
ThresholdEUTRA ::=
                                         CHOICE {
    threshold-RSRP
                                             RSRP-Range,
    threshold-RSRQ
                                              RSRQ-Range
}
ThresholdEUTRA-v1250 ::=
                                       CSI-RSRP-Range-r12
MeasRSSI-ReportConfig-r13 ::= SEQUENCE {
   channelOccupancyThreshold-r13
                                                  RSSI-Range-r13
                                                                                  OPTIONAL
                                                                                                  -- Need OR
-- ASN1STOP
```

ReportConfigEUTRA field descriptions

a3-Offset/ a6-Offset/ c2-Offset

Offset value to be used in EUTRA measurement report triggering condition for event a3/ a6/ c2. The actual value is field value * 0.5 dB.

alternativeTimeToTrigger

Indicates the time to trigger applicable for cells specified in altTTT-CellsToAddModList of the associated measurement object, if configured

aN-ThresholdM/ cN-ThresholdM

Threshold to be used in EUTRA measurement report triggering condition for event number aN/ cN. If multiple thresholds are defined for event number aN/ cN, the thresholds are differentiated by M. E-UTRAN configures *aN-Threshold1* only for events A1, A2, A4, A5 and *a5-Threshold2* only for event A5.

c1-ReportOnLeave/c2-ReportOnLeave

Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a CSI-RS resource in csi-RS-TriggeredList, as specified in 5.5.4.1.

c2-RefCSI-RS

Identity of the CSI-RS resource from the *measCSI-RS-ToAddModList* of the associated *measObject*, to be used as the reference CSI-RS resource in EUTRA measurement report triggering condition for event c2.

channelOccupancyThreshold

RSSI threshold which is used for channel occupancy evaluation.

eventld

Choice of E-UTRA event triggered reporting criteria. EUTRAN may set this field to *eventC1* or *eventC2* only if *measDS-Config* is configured in the associated *measObject* with one or more CSI-RS resources. The *eventC1* and *eventC2* are not applicable for the *eventId* if RS-SINR is configured as *triggerQuantity* or *reportQuantity*.

includeMultiBandInfo

If this field is present, the UE shall acquire and include multi band information in the measurement report.

maxReportCells

Max number of cells, excluding the serving cell, to include in the measurement report concerning CRS, and max number of CSI-RS resources to include in the measurement report concerning CSI-RS.

measRSSI-ReportConfig

If this field is present, the UE shall perform measurement reporting for RSSI and channel occupancy and ignore the triggerQuantity, reportQuantity and maxReportCells fields. E-UTRAN only sets this field to true when setting triggerType to periodical and purpose to reportStrongestCells.

reportAmount

Number of measurement reports applicable for *triggerType event* as well as for *triggerType periodical*. In case *purpose* is set to *reportCGI* or *reportSSTD-Meas* is set to *true*, only value 1 applies.

reportCRS-Meas

Inidicates that UE shall include rsrp, rsrq together with csi-rsrp in the measurement report, if possible.

reportOnLeave/ a6-ReportOnLeave

Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in *cellsTriggeredList*, as specified in 5.5.4.1.

reportQuantity

The quantities to be included in the measurement report. The value both means that both the rsrp and rsrq quantities are to be included in the measurement report. The value *rsrpANDsinr* and *rsrqANDsinr* mean that both *rsrp* and *rs-sinr* quantities, and both *rsrq* and *rs-sinr* quantities are to be included respectively in the measurement report. The value *all* means that *rsrp*, *rsrq* and *rs-sinr* are to be included in the measurement report. In case *triggerQuantityCSI-RS* is included, only value *sameAsTriggerQuantity* applies. If *reportQuantity-v1310* is configured, the UE only considers this extension (and ignores *reportQuantity* i.e. without suffix).

reportSSTD-Meas

If this field is set to *true*, the UE shall measure SSTD between the PCell and the PSCell as specified in TS 36.214 [48] and ignore the *triggerQuantity*, *reportQuantity* and *maxReportCells* fields. E-UTRAN only sets this field to *true* when setting *triggerType* to *periodical* and *purpose* to *reportStrongestCells*.

reportStrongestCSI-RSs

Indicates that periodical CSI-RS measurement report is performed. EUTRAN configures value *TRUE* only if *measDS-Config* is configured in the associated *measObject* with one or more CSI-RS resources.

si-RequestForHO

The field applies to the *reportCGI* functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.

ThresholdEUTRA

For RSRP: RSRP based threshold for event evaluation. The actual value is field value – 140 dBm.

For RSRQ: RSRQ based threshold for event evaluation. The actual value is (field value - 40)/2 dB.

For RS-SINR: RS-SINR based threshold for event evaluation. The actual value is (field value -46)/2 dB.

For CSI-RSRP: CSI-RSRP based threshold for event evaluation. The actual value is field value - 140 dBm.

EUTRAN configures the same threshold quantity for all the thresholds of an event.

timeToTrigger

Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

ReportConfigEUTRA field descriptions

triggerQuantity

The quantity used to evaluate the triggering condition for the event concerning CRS. EUTRAN sets the value according to the quantity of the *ThresholdEUTRA* for this event. The values rsrp, rsrq and *sinr* correspond to Reference Signal Received Power (RSRP), Reference Signal Received Quality (RSRQ) and Reference Signal Signal to Noise and Interference Ratio (RS-SINR), see TS 36.214 [48]. If *triggerQuantity-v1310* is configured, the UE only considers this extension (and ignores *triggerQuantity* i.e. without suffix).

triggerQuantityCSI-RS

The quantity used to evaluate the triggering condition for the event concerning CSI-RS. The value *TRUE* corresponds to CSI Reference Signal Received Power (CSI-RSRP), see TS 36.214 [48]. E-UTRAN configures value *TRUE* if and only if the measurement reporting event concerns CSI-RS.

ue-RxTxTimeDiffPeriodical

If this field is present, the UE shall perform UE Rx-Tx time difference measurement reporting and ignore the fields triggerQuantity, reportQuantity and maxReportCells. If the field is present, the only applicable values for the corresponding triggerType and purpose are periodical and reportStrongestCells respectively.

ue-RxTxTimeDiffPeriodicalTDD

If this field is set to *TRUE*, the UE shall perform UE Rx-Tx time difference measurement reporting according to EUTRAN TDD UE Rx-Tx time difference report mapping in TS 36.133 [16]. If the field is configured, the *ue-RxTxTimeDiffPeriodical* shall be configured. The field is applicable for TDD only.

usePSCell

If this field is set to *TRUE* the UE shall use the PSCell instead of the PCell. E-UTRAN configures value *TRUE* only for events A3 and A5, see 5.5.4.4 and 5.5.4.6.

useT312

If value *TRUE* is configured, the UE shall use the timer T312 with the value *t312* as specified in the corresponding *measObject*. If the corresponding *measObject* does not include the timer T312 then the timer T312 is considered as not configured. E-UTRAN configures value *TRUE* only if *triggerType* is set to *event*.

useWhiteCellList

Indicates whether only the cells included in the white-list of the associated *measObject* are applicable as specified in 5.5.4.1. E-UTRAN does not configure the field for events A1, A2, C1 and C2.

ul-DelayConfig

If the field is present, E-UTRAN configures UL PDCP Packet Delay per QCI measurement and the UE shall ignore the fields *triggerQuantity* and *maxReportCells*. The applicable values for the corresponding *triggerType* and *reportInterval* are *periodical* and (one of the) ms1024, ms2048, ms5120 or ms10240 respectively. The *reportInterval* indicates the periodicity for performing and reporting of UL PDCP Delay per QCI measurement as specified in TS 36.314 [71].

Conditional presence	Explanation
reportCGI	The field is optional, need OR, in case <i>purpose</i> is included and set to <i>reportCGI</i> ;
	otherwise the field is not present and the UE shall delete any existing value for this field.

ReportConfigld

The IE ReportConfigId is used to identify a measurement reporting configuration.

ReportConfigId information element

-- ASN1START

ReportConfigId ::= INTEGER (1..maxReportConfigId)

-- ASN1STOP

ReportConfigInterRAT

The IE *ReportConfigInterRAT* specifies criteria for triggering of an inter-RAT measurement reporting event. The inter-RAT measurement reporting events for UTRAN, GERAN and CDMA2000 are labelled BN with N equal to 1, 2 and so on. The inter-RAT measurement reporting events for WLAN are labelled WN with N equal to 1, 2 and so on.

- Event B1: Neighbour becomes better than absolute threshold;
- Event B2: PCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.
- Event W1: WLAN becomes better than a threshold;
- Event W2: All WLAN inside WLAN mobility set become worse than a threshold1 and a WLAN outside WLAN mobility set becomes better than a threshold2;
- Event W3: All WLAN inside WLAN mobility set become worse than a threshold.

The b1 and b2 event thresholds for CDMA2000 are the CDMA2000 pilot detection thresholds are expressed as an unsigned binary number equal to $[-2 \times 10 \log 10 \ E_c/I_o]$ in units of 0.5dB, see C.S0005 [25] for details.

ReportConfigInterRAT information element

```
-- ASN1START
ReportConfigInterRAT ::=
                                    SEQUENCE {
    triggerType
                                        CHOICE {
        event
                                            SEQUENCE {
                                               CHOICE {
            eventId
                eventB1
                                                   SEQUENCE {
                   bl-Threshold
                                                        CHOICE {
                        bl-ThresholdUTRA
                                                            ThresholdUTRA,
                        bl-ThresholdGERAN
                                                            ThresholdGERAN
                        b1-ThresholdCDMA2000
                                                            ThresholdCDMA2000
                },
                eventB2
                                                    SEQUENCE {
                                                        ThresholdEUTRA,
                   b2-Threshold1
                    b2-Threshold2
                                                        CHOICE {
                        b2-Threshold2UTRA
                                                            ThresholdUTRA,
                        b2-Threshold2GERAN
                                                            ThresholdGERAN
                        b2-Threshold2CDMA2000
                                                            ThresholdCDMA2000
                    }
                },
                                                SEQUENCE {
                eventW1-r13
                    wl-Threshold-r13
                                                WLAN-RSSI-Range-r13
                eventW2-r13
                                                SEQUENCE {
                   w2-Threshold1-r13
                                                WLAN-RSSI-Range-r13,
                    w2-Threshold2-r13
                                                WLAN-RSSI-Range-r13
                eventW3-r13
                                                SEQUENCE {
                    w3-Threshold-r13
                                                WLAN-RSSI-Range-r13
            hysteresis
                                            Hysteresis,
            timeToTrigger
                                            TimeToTrigger
        periodical
                                                SEOUENCE {
                                                    ENUMERATED {
            purpose
                                                        reportStrongestCells,
                                                        reportStrongestCellsForSON,
                                                        reportCGI }
    maxReportCells
                                        INTEGER (1..maxCellReport),
   reportInterval
                                        ReportInterval.
                                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportAmount
    [[ si-RequestForHO-r9
                                            ENUMERATED {setup}
                                                                    OPTIONAL
                                                                                 -- Cond reportCGI
    11,
       reportQuantityUTRA-FDD-r10
                                            ENUMERATED {both}
                                                                    OPTIONAL
    11
                                                                                -- Need OR
    ]],
    [[
       includeLocationInfo-r11
                                            BOOLEAN
                                                                     OPTIONAL
                                                                                 -- Need ON
       b2-Threshold1-v1250
                                            CHOICE {
    [ [
           release
                                                NULL,
                                                RSRQ-Range-v1250
            setup
                                                                    OPTIONAL
                                                                                 -- Need ON
    1],
```

```
[[ reportAnyWLAN-r14
                                                          BOOLEAN
                                                                                             OPTIONAL -- Need ON
     ]]
ThresholdUTRA ::=
                                                CHOICE {
                                                      INTEGER (-5..91),
    utra-RSCP
    utra-EcN0
                                                      INTEGER (0..49)
ThresholdGERAN ::=
                                          INTEGER (0..63)
ThresholdCDMA2000 ::=
                                          INTEGER (0..63)
ReportQuantityWLAN-r13 ::=
                                          SEQUENCE {
     bandRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR carrierInfoRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR availableAdmissionCapacityRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
    bandRequestWLAN-r13
   backhaulDL-BandwidthRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR backhaulUL-BandwidthRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR channelUtilizationRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR stationCountRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
                                                                                             OPTIONAL,
-- ASN1STOP
```

ReportConfigInterRAT field descriptions

availableAdmissionCapacityRequestWLAN

The value true indicates that the UE shall include, if available, WLAN Available Admission Capacity in measurement reports.

backhaulDL-BandwidthRequestWLAN

The value true indicates that the UE shall include, if available, WLAN Backhaul Downlink Bandwidth in measurement reports.

backhaulUL-BandwidthRequestWLAN

The value true indicates that the UE shall include, if available, WLAN Backhaul Uplink Bandwidth in measurement reports.

bandRequestWLAN

The value true indicates that the UE shall include WLAN band in measurement reports.

bN-ThresholdM

Threshold to be used in inter RAT measurement report triggering condition for event number bN. If multiple thresholds are defined for event number bN, the thresholds are differentiated by M.

carrierInfoRequestWLAN

The value true indicates that the UE shall include, if available, WLAN Carrier Information in measurement reports.

channelUtilizationRequest-WLAN

The value true indicates that the UE shall include, if available, WLAN Channel Utilization in measurement reports.

eventld

Choice of inter-RAT event triggered reporting criteria.

maxReportCells

Max number of cells, excluding the serving cell, to include in the measurement report. In case *purpose* is set to *reportStrongestCellsForSON* only value 1 applies. For inter-RAT WLAN, it is the maximum number of WLANs to include in the measurement report.

Purpose

reportStrongestCellsForSON applies only in case reportConfig is linked to a measObject set to measObjectUTRA or measObjectCDMA2000.

reportAmount

Number of measurement reports applicable for *triggerType event* as well as for *triggerType periodical*. In case *purpose* is set to *reportCGI* or reportStrongestCellsForSON only value 1 applies.

reportAnyWLAN

Indicates UE to report any WLAN AP meeting the triggering requirements, even if it is not included in the corresponding *MeasObjectWLAN*.

reportQuantityUTRA-FDD

The quantities to be included in the UTRA measurement report. The value *both* means that both the cpich RSCP and cpich EcN0 quantities are to be included in the measurement report.

si-RequestForHO

The field applies to the *reportCGI* functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.

stationCountRequestWLAN The value true indicates that the UE shall in

The value true indicates that the UE shall include, if available, WLAN Station Count in measurement reports.

b1-ThresholdGERAN, b2-Threshold2GERAN

The actual value is field value - 110 dBm.

b1-ThresholdUTRA, b2-Threshold2UTRA

utra-RSCP corresponds to CPICH_RSCP in TS 25.133 [29] for FDD and P-CCPCH_RSCP in TS 25.123 [30] for TDD. utra-EcN0 corresponds to CPICH_Ec/No in TS 25.133 [29] for FDD, and is not applicable for TDD.

For utra-RSCP: The actual value is field value – 115 dBm.

For utra-EcN0: The actual value is (field value - 49)/2 dB.

timeToTrigger

Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

triggerType

E-UTRAN does not configure the value *periodical* in case *reportConfig* is linked to a *measObject* set to *measObjectWLAN*.

Conditional presence	Explanation
reportCGI	The field is optional, need OR, in case <i>purpose</i> is included and set to <i>reportCGI</i> ;
	otherwise the field is not present and the UE shall delete any existing value for this field.

ReportConfigToAddModList

The IE ReportConfigToAddModList concerns a list of reporting configurations to add or modify

ReportConfigToAddModList information element

```
-- ASN1START

ReportConfigToAddModList ::= SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod

ReportConfigToAddMod ::= SEQUENCE {
    reportConfigId ReportConfigId,
    reportConfig CHOICE {
        reportConfigEUTRA ReportConfigEUTRA,
        reportConfigInterRAT ReportConfigInterRAT
    }
}

-- ASN1STOP
```

- ReportInterval

The *ReportInterval* indicates the interval between periodical reports. The *ReportInterval* is applicable if the UE performs periodical reporting (i.e. when *reportAmount* exceeds 1), for *triggerType event* as well as for *triggerType periodical*. Value ms120 corresponds with 120 ms, ms240 corresponds with 240 ms and so on, while value min1 corresponds with 1 min, min6 corresponds with 6 min and so on.

ReportInterval information element

The IE *RSRP-Range* specifies the value range used in RSRP measurements and thresholds. Integer value for RSRP measurements according to mapping table in TS 36.133 [16]. A given field using *RSRP-Range-v1360* shall only be signalled if the corresponding original field (using *RSRP-Range* i.e. without suffix) is set to value 0.

RSRP-Range information element

```
-- ASN1START

RSRP-Range ::= INTEGER(0..97)

RSRP-Range-v1360 ::= INTEGER(-17..-1)

RSRP-RangeSL-r12 ::= INTEGER(0..13)

RSRP-RangeSL2-r12 ::= INTEGER(0..7)

RSRP-RangeSL3-r12 ::= INTEGER(0..11)

RSRP-RangeSL4-r13 ::= INTEGER(0..49)

-- ASN1STOP
```

RSRP-Range field descriptions

RSRP-Range

For BL UEs or UEs in CE, when operating in CE Mode B, RSRP-Range-v1360 (i.e., with suffix) is reported if the measured RSRP is less than -140 dBm.

RSRP-RangeSL

Value 0 corresponds to -infinity, value 1 to -115dBm, value 2 to -110dBm, and so on (i.e. in steps of 5dBm) until value 12, which corresponds to -60dBm, while value 13 corresponds to +infinity.

RSRP-RangeSL2

Value 0 corresponds to -infinity, value 1 to -110dBm, value 2 to -100dBm, and so on (i.e. in steps of 10dBm) until value 6, which corresponds to -60dBm, while value 7 corresponds to +infinity.

RSRP-RangeSL3

Value 0 corresponds to -110dBm, value 1 to -105dBm, value 2 to -100dBm, and so on (i.e. in steps of 5dBm) until value 10, which corresponds to -60dBm, while value 11 corresponds to +infinity.

RSRP-RangeSL4

Indicates the range for SD-RSRP. Value 0 corresponds to -130dBm, value 1 to -128dBm, value 2 to -126dBm, and so on (i.e. in steps of 2dBm) until value 48, which corresponds to -34dBm, while value 49 corresponds to +infinity.

RSRQ-Range

The IE *RSRQ-Range* specifies the value range used in RSRQ measurements and thresholds. Integer value for RSRQ measurements is according to mapping table in TS 36.133 [16]. A given field using *RSRQ-Range-v1250* shall only be signalled if the corresponding original field (using *RSRQ-Range* i.e. without suffix) is set to value 0 or 34. Only a UE indicating support of *extendedRSRQ-LowerRange-r12* or *rsrq-OnAllSymbols-r12* may report *RSRQ-Range-v1250*, and this may be done without explicit configuration from the E-UTRAN. If received, the UE shall use the value indicated by the *RSRQ-Range-v1250* and ignore the value signalled by *RSRQ-Range* (without the suffix). *RSRQ-Range-r13* covers the original range and extended *RSRQ-Range-v1250*. *RSRQ-Range-r13* may be signalled without the corresponding original field and without any requirements for indicated support of *extendedRSRQ-LowerRange-r12* or *rsrq-OnAllSymbols-r12*.

RSRQ-Range information element

```
-- ASN1START

RSRQ-Range ::= INTEGER(0..34)

RSRQ-Range-v1250 ::= INTEGER(-30..46)

RSRQ-Range-r13 ::= INTEGER(-30..46)

-- ASN1STOP
```


The IE RSRQ-Type specifies the RSRQ value type used in RSRQ measurements, see TS 36.214 [48].

RSRQ-Type information element

```
-- ASN1START

RSRQ-Type-r12 ::= SEQUENCE {
   allSymbols-r12 BOOLEAN,
   wideBand-r12 BOOLEAN
}

-- ASN1STOP
```

RSRQ-Type field descriptions

allSymbols

Value TRUE indicates use of all OFDM symbols when performing RSRQ measurements.

wideBand

Value TRUE indicates use of a wider bandwidth when performing RSRQ measurements.

The IE RS-SINR-Range specifies the value range used in RS-SINR measurements and thresholds. Integer value for RS-SINR measurements is according to mapping table in TS 36.133 [16].

RS-SINR-Range information element

```
-- ASN1START

RS-SINR-Range-r13 ::= INTEGER(0..127)

-- ASN1STOP
```

– RSSI-Range-r13

The IE *RSSI-Range* specifies the value range used in RSSI measurements and thresholds. Integer value for RSSI measurements is according to mapping table in TS 36.133 [16].

RSSI-Range information element

```
-- ASN1START

RSSI-Range-r13 ::= INTEGER(0..76)

-- ASN1STOP
```

TimeToTrigger

The IE *TimeToTrigger* specifies the value range used for time to trigger parameter, which concerns the time during which specific criteria for the event needs to be met in order to trigger a measurement report. Value ms0 corresponds to 0 ms and behaviour as specified in 7.3.2 applies, ms40 corresponds to 40 ms, and so on.

TimeToTrigger information element

UL-DelayConfig

The IE *UL-DelayConfig* IE specifies the configuration of the UL PDCP Packet Delay per QCI measurement specified in TS36.314 [71].

UL-DelayConfig information element

UL-DelayConfig field descriptions

delayThreshold

Indicates the delay threshold value used by UE to provide results of UL PDCP Packet Delay per QCI measurement as specified in TS 36.314 [71]. Value in milliseconds. Value ms30 means 30 ms and so on.

WLAN-CarrierInfo

The IE WLAN-CarrierInfo is used to identify the WLAN frequency band information, as specified in Annex E in [67].

WLAN-CarrierInfo information element

```
-- ASN1START
WLAN-CarrierInfo-r13 ::=
                                   SEQUENCE {
                              INTEGER (0..255) OPTIONAL, -- Need ON ENUMERATED {unitedStates, europe, japan, global, ...}
    operatingClass-r13
    countryCode-r13
                                                                                             OPTIONAL,
Need ON
    channelNumbers-r13
                               WLAN-ChannelList-r13
                                                              OPTIONAL,
                               SEQUENCE (SIZE (1..maxWLAN-Channels-r13)) OF WLAN-Channel-r13
WLAN-ChannelList-r13 ::=
WLAN-Channel-r13 ::=
                        INTEGER (0..255)
-- ASN1STOP
```

WLAN-CarrierInfo field descriptions

channelNumbers

Indicates the WLAN channels as defined in IEEE 802.11-2012 [67]. Value 0 is not used.

countryCode

Indicates the country code of WLAN as defined in IEEE 802.11-2012 [67].

operatingClass

Indicates the Operating Class of WLAN as defined in IEEE 802.11-2012 [67].

– WLAN-RSSI-Range

The IE *WLAN-RSSI-Range* specifies the value range used in WLAN RSSI measurements and thresholds. Integer value for WLAN RSSI measurements is according to mapping table in TS 36.133 [16]. Value 0 corresponds to -infinity, value 1 to -100dBm, value 2 to -99dBm, and so on (i.e. in steps of 1dBm) until value 140, which corresponds to 39dBm, while value 141 corresponds to +infinity.

WLAN-RSSI-Range information element

```
-- ASN1START
WLAN-RSSI-Range-r13 ::= INTEGER(0..141)
-- ASN1STOP
```

– WLAN-Status

The IE WLAN-Status indicates the current status of WLAN connection. The values are set as described in Sections 5.6.15.2 and 5.6.15.4.

WLAN-Status information element

```
-- ASN1START

WLAN-Status-r13 ::= ENUMERATED {successfulAssociation, failureWlanRadioLink, failureWlanUnavailable, failureTimeout}
```

```
WLAN-Status-v1430 ::= ENUMERATED {suspended, resumed}
-- ASN1STOP
```

WLAN-SuspendConfig

The IE WLAN-SuspendConfig is used for configuration of WLAN suspend/resume functionality.

WLAN-SuspendConfig field descriptions

wlan-SuspendResumeAllowed

Indicates whether the UE is allowed to use suspend-resume mechanism, i.e., to indicate WLAN being temporarily unavailable and WLAN being available again after temporary unavailability.

wlan-SuspendTriggersStatusReport

Indicates whether the UE shall trigger PDCP status report as defined in [8] when WLAN is temporarily unavailable and UE reports this status.

6.3.6 Other information elements

AbsoluteTimeInfo

The IE *AbsoluteTimeInfo* indicates an absolute time in a format YY-MM-DD HH:MM:SS and using BCD encoding. The first/ leftmost bit of the bit string contains the most significant bit of the most significant digit of the year and so on.

AbsoluteTimeInfo information element

```
-- ASN1START

AbsoluteTimeInfo-r10 ::= BIT STRING (SIZE (48))

-- ASN1STOP
```

AreaConfiguration

The AreaConfiguration indicates area for which UE is requested to perform measurement logging. If not configured, measurement logging is not restricted to specific cells or tracking areas but applies as long as the RPLMN is contained in plmn-IdentityList stored in VarLogMeasReport.

AreaConfiguration information element

AreaConfiguration field descriptions

plmn-Identity-perTAC-List

Includes the PLMN identity for each of the TA codes included in *trackingAreaCodeList*. The PLMN identity listed first in *plmn-Identity-perTAC-List* corresponds with the TA code listed first in *trackingAreaCodeList* and so on.

BandCombinationList

The IE BandCombinationList contains a list of CA band combinations.

BandCombinationList information element

– C-RNTI

The IE C-RNTI identifies a UE having a RRC connection within a cell.

C-RNTI information element

```
-- ASN1START

C-RNTI ::= BIT STRING (SIZE (16))

-- ASN1STOP
```

DedicatedInfoCDMA2000

The *DedicatedInfoCDMA2000* is used to transfer UE specific CDMA2000 information between the network and the UE. The RRC layer is transparent for this information.

DedicatedInfoCDMA2000 information element

```
-- ASN1START

DedicatedInfoCDMA2000 ::= OCTET STRING

-- ASN1STOP
```

DedicatedInfoNAS

The IE *DedicatedInfoNAS* is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this information.

DedicatedInfoNAS information element

```
-- ASN1START
```

```
DedicatedInfoNAS ::= OCTET STRING
-- ASN1STOP
```

FilterCoefficient

The IE *FilterCoefficient* specifies the measurement filtering coefficient. Value fc0 corresponds to k = 0, fc1 corresponds to k = 1, and so on.

FilterCoefficient information element

LoggingDuration

The *LoggingDuration* indicates the duration for which UE is requested to perform measurement logging. Value min10 corresponds to 10 minutes, value min20 corresponds to 20 minutes and so on.

LoggingDuration information element

- LoggingInterval

The *LoggingInterval* indicates the periodicity for logging measurement results. Value ms1280 corresponds to 1.28s, value ms2560 corresponds to 2.56s and so on.

LoggingInterval information element

MeasSubframePattern

The IE MeasSubframePattern is used to specify a subframe pattern. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where SFN is that of PCell and x is the size of the bit string divided by 10. "1" denotes that the corresponding subframe is used.

MeasSubframePattern information element

– MMEC

The IE MMEC identifies an MME within the scope of an MME Group within a PLMN, see TS 23.003 [27].

MMEC information element

```
-- ASN1START

MMEC ::= BIT STRING (SIZE (8))

-- ASN1STOP
```

NeighCellConfig

The IE NeighCellConfig is used to provide the information related to MBSFN and TDD UL/DL configuration of neighbour cells.

NeighCellConfig information element

```
-- ASN1START

NeighCellConfig ::= BIT STRING (SIZE (2))

-- ASN1STOP
```

NeighCellConfig field descriptions

neighCellConfig

Provides information related to MBSFN and TDD UL/DL configuration of neighbour cells of this frequency 00: Not all neighbour cells have the same MBSFN subframe allocation as the serving cell on this frequency, if

00: Not all neighbour cells have the same MBSFN subframe allocation as the serving cell on this frequency, i configured, and as the PCell otherwise

- 10: The MBSFN subframe allocations of all neighbour cells are identical to or subsets of that in the serving cell on this frequency, if configured, and of that in the PCell otherwise
- 01: No MBSFN subframes are present in all neighbour cells
- 11: Different UL/DL allocation in neighbouring cells for TDD compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise

For TDD, 00, 10 and 01 are only used for same UL/DL allocation in neighbouring cells compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise.

OtherConfig

The IE Other Config contains configuration related to other configuration

OtherConfig information element

```
-- ASN1START
OtherConfig-r9 ::= SEQUENCE {
   reportProximityConfig-r9
                                        ReportProximityConfig-r9
                                                                         OPTIONAL,
                                                                                      -- Need ON
    [[ idc-Config-r11
                                        IDC-Config-r11
                                                                         OPTIONAL,
                                                                                     -- Need ON
       \verb"powerPrefIndicationConfig-r11" PowerPrefIndicationConfig-r11 OPTIONAL",
                                                                                     -- Need ON
        obtainLocationConfig-r11
                                                                                     -- Need ON
                                        ObtainLocationConfig-r11
                                                                         OPTIONAL
```

```
spare2, spare1} OPTIONAL, -- Need OR
BOOLEAN OPTIONAL, -- Need ON
       sps-AssistanceInfoReport-r14
       delayBudgetReportingConfig-r14 CHOICE{
         release NULL,
                                SEQUENCE {
              delayBudgetReportingProhibitTimer-r14 ENUMERATED {
                                                         s0, s0dot4, s0dot8,
                                                         sldot6, s3, s6, s12, s30}
          }
                                                                OPTIONAL, -- Need ON
                                 CHOICE {
       rlm-ReportConfig-r14
                               NULL,
          release
          setup
                                SEQUENCE {
             rlmReportTimer-r14
                                          ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                          s60, s90, s120, s300, s600, spare3, spare2, spare1},
             rlmReportRep-MPDCCH-r14
                                          ENUMERATED {setup} OPTIONAL -- Need OR
          OPTIONAL -- Need ON
   11
}
   idc-Indication-rll
autonomousDari
IDC-Config-rll ::=
   autonomousDenialParameters-rll SEOHENGE (setup)
                                                               OPTIONAL, -- Need OR
          autonomousDenialSubframes-r11
                                              ENUMERATED {n2, n5, n10, n15,
                                                 n20, n30, spare2, spare1},
          autonomousDenialValidity-r11
                                              ENUMERATED {
                                                 sf200, sf500, sf1000, sf2000, spare4, spare3, spare2, spare1}
          OPTIONAL,
                       -- Need OR
   ...,
[[ idc-Indication-UL-CA-r11 ENUMERATED {setup}
                                                            OPTIONAL -- Cond idc-Ind
   ]],
       OPTIONAL -- Need OR
}
ObtainLocationConfig-r11 ::= SEQUENCE {
   obtainLocation-rll
                       ENUMERATED {setup}
                                                               OPTIONAL -- Need OR
PowerPrefIndicationConfig-rl1 ::= CHOICE{
  release
                       NULL,
   setup
                         SEQUENCE {
      powerPrefIndicationTimer-r11
                                       ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20,
                                      s30, s60, s90, s120, s300, s600, spare3,
                                       spare2, spare1}
   }
}
ReportProximityConfig-r9 ::= SEQUENCE {
   proximityIndicationEUTRA-r9 ENUMERATED {enabled} OPTIONAL, proximityIndicationUTRA-r9 ENUMERATED {enabled} OPTIONAL
                                                                        -- Need OR
                                                                       -- Need OR
-- ASN1STOP
```

OtherConfig field descriptions

autonomous Denial Subframes

Indicates the maximum number of the UL subframes for which the UE is allowed to deny any UL transmission. Value n2 corresponds to 2 subframes, n5 to 5 subframes and so on. E-UTRAN does not configure autonomous denial for frequencies on which SCG cells are configured.

autonomous Denial Validity

Indicates the validity period over which the UL autonomous denial subframes shall be counted. Value sf200 corresponds to 200 subframes, sf500 corresponds to 500 subframes and so on.

bw-PreferenceIndicationTimer

Prohibit timer for bandwidth preference indication reporting. Value in seconds. Value s0 means prohibit timer is set to 0 second, value s0 means prohibit timer is set to 0.5 second, value s1 means prohibit timer is set to 1 second and so on.

delayBudgetReportingProhibitTimer

Prohibit timer for delay budget reporting. Value in seconds. Value s0 means prohibit timer is set to 0 second, value s0dot4 means prohibit timer is set to 0.4 second, and so on.

idc-HardwareSharingIndication

The field is used to indicate whether the UE is allowed indicate in *InDeviceCoexIndication* that the cause of the problems are due to hardware sharing, and whether the UE is allowed to omit the TDM assistance information.

idc-Indication

The field is used to indicate whether the UE is configured to initiate transmission of the *InDeviceCoexIndication* message to the network.

idc-Indication-UL-CA

The field is used to indicate whether the UE is configured to provide IDC indications for UL CA using the InDeviceCoexIndication message.

obtainLocation

Requests the UE to attempt to have detailed location information available using GNSS. E-UTRAN configures the field only if *includeLocationInfo* is configured for one or more measurements.

powerPrefIndicationTimer

Prohibit timer for Power Preference Indication reporting. Value in seconds. Value s0 means prohibit timer is set to 0 second, value s0dot5 means prohibit timer is set to 0.5 second, value s1 means prohibit timer is set to 1 second and so on.

reportProximityConfig

Indicates, for each of the applicable RATs (EUTRA, UTRA), whether or not proximity indication is enabled for CSG member cell(s) of the concerned RAT. Note.

rlmReportTimer

Prohibit timer for RLM event reporting, i.e. "early-out-of-sync" and "early-in-sync" event reporting, as specified in section 5.6.10. Value in seconds. Value s0 means prohibit timer is set to 0 second, value s0dot5 means prohibit timer is set to 0.5 second, value s1 means prohibit timer is set to 1 second and so on.

rlmReportRep-MPDCCH

The field is used to indicate whether the UE is configured to report excess repetitions on MPDCCH.

sps-AssistanceInfoReport

Value TRUE indicates that the UE is allowed to report SPS-AssistanceInformation.

NOTE: Enabling/ disabling of proximity indication includes enabling/ disabling of the related functionality e.g. autonomous search in connected mode.

Conditional presence	Explanation
idc-Ind	The field is optionally present if <i>idc-Indication</i> is present, need OR. Otherwise the field is
	not present.

RAND-CDMA2000 (1xRTT)

The RAND-CDMA2000 concerns a random value, generated by the eNB, to be passed to the CDMA2000 upper layers.

RAND-CDMA2000 information element

ASN1START		
RAND-CDMA2000 ::=	BIT STRING (SIZE (32))	
ASN1STOP		

The IE *RAT-Type* is used to indicate the radio access technology (RAT), including E-UTRA, of the requested/transferred UE capabilities.

RAT-Type information element

ResumeIdentity

The IE ResumeIdentity is used to identify the suspended UE context

Resumeldentity information element

```
-- ASN1START

ResumeIdentity-r13 ::= BIT STRING (SIZE(40))

-- ASN1STOP
```

RRC-TransactionIdentifier

The IE *RRC-TransactionIdentifier* is used, together with the message type, for the identification of an RRC procedure (transaction).

RRC-TransactionIdentifier information element

```
-- ASN1START

RRC-TransactionIdentifier ::= INTEGER (0..3)

-- ASN1STOP
```

– S-TMSI

The IE *S-TMSI* contains an S-Temporary Mobile Subscriber Identity, a temporary UE identity provided by the EPC which uniquely identifies the UE within the tracking area, see TS 23.003 [27].

S-TMSI information element

S-TMSI field descriptions

m-TMSI

The first/leftmost bit of the bit string contains the most significant bit of the M-TMSI.

TraceReference

The TraceReference contains parameter Trace Reference as defined in TS 32.422 [58].

TraceReference information element

```
-- ASN1START

TraceReference-r10 ::= SEQUENCE {
   plmn-Identity-r10 PLMN-Identity,
   traceId-r10 OCTET STRING (SIZE (3))
}

-- ASN1STOP
```

UE-CapabilityRAT-ContainerList

The IE *UE-CapabilityRAT-ContainerList* contains list of containers, one for each RAT for which UE capabilities are transferred, if any.

UE-CapabilityRAT-ContainerList information element

```
-- ASN1START

UE-CapabilityRAT-ContainerList ::=SEQUENCE (SIZE (0..maxRAT-Capabilities)) OF UE-CapabilityRAT-Container

UE-CapabilityRAT-Container ::= SEQUENCE {
    rat-Type RAT-Type,
    ueCapabilityRAT-Container OCTET STRING
}

-- ASN1STOP
```

UECapabilityRAT-ContainerList field descriptions

ueCapabilityRAT-Container

Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT: For E-UTRA: the encoding of UE capabilities is defined in IE *UE-EUTRA-Capability*.

For UTRA: the octet string contains the INTER RAT HANDOVER INFO message defined in TS 25.331 [19]. For GERAN CS: the octet string contains the concatenated string of the Mobile Station Classmark 2 and Mobile Station Classmark 3. The first 5 octets correspond to Mobile Station Classmark 2 and the following octets correspond to Mobile Station Classmark 3. The Mobile Station Classmark 2 is formatted as 'TLV' and is coded in the same way as the *Mobile Station Classmark* 2 information element in TS 24.008 [49]. The first octet is the *Mobile station classmark* 2 *IEI* and its value shall be set to 33H. The second octet is the *Length of mobile station Classmark* 2 and its value shall be set to 3. The octet 3 contains the first octet of the value part of the *Mobile Station Classmark* 2 information element, the octet 4 contains the second octet of the value part of the *Mobile Station Classmark* 2 information element and so on. For each of these octets, the first/ leftmost/ most significant bit of the octet contains b8 of the corresponding octet of the Mobile Station Classmark 2. The Mobile Station Classmark 3 is formatted as 'V' and is coded in the same way as the value part in the *Mobile station classmark* 3 information element in TS 24.008 [49]. The sixth octet of this octet string contains octet 1 of the value part of *Mobile station classmark* 3 and so on. Note.

For GERAN PS: the encoding of UE capabilities is formatted as 'V' and is coded in the same way as the value part in the MS Radio Access Capability information element in TS 24.008 [49].

For CDMA2000-1XRTT: the octet string contains the A21 Mobile Subscription Information and the encoding of this is defined in A.S0008 [33]. The A21 Mobile Subscription Information contains the supported CDMA2000 1xRTT band class and band sub-class information.

NOTE: The value part is specified by means of CSN.1, which encoding results in a bit string, to which final padding may be appended up to the next octet boundary TS 24.008 [49]. The first/ leftmost bit of the CSN.1 bit string is placed in the first/ leftmost/ most significant bit of the first octet. This continues until the last bit of the CSN.1 bit string, which is placed in the last/ rightmost/ least significant bit of the last octet.

UE-EUTRA-Capability

The IE *UE-EUTRA-Capability* is used to convey the E-UTRA UE Radio Access Capability Parameters, see TS 36.306 [5], and the Feature Group Indicators for mandatory features (defined in Annexes B.1 and C.1) to the network. The IE *UE-EUTRA-Capability* is transferred in E-UTRA or in another RAT.

NOTE 0: For (UE capability specific) guidelines on the use of keyword OPTIONAL, see Annex A.3.5.

UE-EUTRA-Capability information element

```
-- ASN1START
                                   SEQUENCE {
UE-EUTRA-Capability ::=
    accessStratumRelease
                                            AccessStratumRelease,
    ue-Category
                                            INTEGER (1..5),
    pdcp-Parameters
                                            PDCP-Parameters,
    phyLayerParameters
                                           PhyLaverParameters,
    rf-Parameters
                                           RF-Parameters,
    measParameters
                                            MeasParameters,
    featureGroupIndicators
interRAT-Parameters
                                          BIT STRING (SIZE (32))
                                                                                   OPTIONAL,
                                      SEQUENCE
                                                 IRAT-ParametersUTRA-FDD
         utraFDD
                                                                                        OPTIONAL,
         utraTDD128
                                                 IRAT-ParametersUTRA-TDD128
                                                                                             OPTIONAL,
         utraTDD384
                                                 IRAT-ParametersUTRA-TDD384
                                                                                             OPTIONAL,
        utraTDD768
                                                IRAT-ParametersUTRA-TDD768
                                                                                             OPTIONAL,
         geran
                                                IRAT-ParametersGERAN
                                                                                            OPTIONAL,
         cdma2000-HRPD
                                                IRAT-ParametersCDMA2000-HRPD
                                                                                             OPTIONAL.
         cdma2000-1xRTT
                                                IRAT-ParametersCDMA2000-1XRTT
                                                                                             OPTIONAL
    nonCriticalExtension
                                           UE-EUTRA-Capability-v920-IEs
                                                                                  OPTIONAL
-- Late non critical extensions
UE-EUTRA-Capability-v9a0-IEs ::= SEQUENCE {
featureGroupIndRel9Add-r9 BIT ST
    featureGroupIndRel9Add-r9

BIT STRING (SIZE (32))

OPTIONAL,
fdd-Add-UE-EUTRA-Capabilities-r9

tdd-Add-UE-EUTRA-Capabilities-r9

OPTIONAL,
tdd-Add-UE-EUTRA-Capabilities-r9

OPTIONAL,
TONCTILICALEXTENSION
    nonCriticalExtension
                                           UE-EUTRA-Capability-v9c0-IEs
                                                                                    OPTIONAL
}
UE-EUTRA-Capability-v9c0-IEs ::= SEQUENCE {
   interRAT-ParametersUTRA-v9c0 IRAT-Parame
   nonCriticalExtension UE-EUTRA-C
                                            IRAT-ParametersUTRA-v9c0 OPTIONAL,
                                            UE-EUTRA-Capability-v9d0-IEs OPTIONAL
    nonCriticalExtension
UE-EUTRA-Capability-v9d0-IEs ::= SEQUENCE {
    phyLayerParameters-v9d0 PhyLayerParameters-v9d0
    phyLayerParameters-v9d0
                                            PhyLayerParameters-v9d0
                                                                               OPTIONAL.
                                            UE-EUTRA-Capability-v9e0-IEs
    nonCriticalExtension
                                                                               OPTIONAL
UE-EUTRA-Capability-v9e0-IEs ::= SEQUENCE {
                                       RF-Parameters-v9e0
    rf-Parameters-v9e0
                                                                                        OPTIONAL.
                                            UE-EUTRA-Capability-v9h0-IEs
    nonCriticalExtension
                                                                                        OPTIONAL
UE-EUTRA-Capability-v9h0-IES ::= SEQUENCE {
  interRAT-ParametersUTRA-v9h0 IRAT-ParametersUTRA-v9h0
                                                                                  OPTIONAL,
     -- Following field is only to be used for late REL-9 extensions
    lateNonCriticalExtension OCTET STRING
                                                                                        OPTIONAL,
    nonCriticalExtension
                                           UE-EUTRA-Capability-v10c0-IEs
                                                                                        OPTIONAL
}
UE-EUTRA-Capability-v10c0-IEs ::= SEQUENCE {
    otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10
                                                                                        OPTIONAL.
    nonCriticalExtension
                                           UE-EUTRA-Capability-v10f0-IEs
                                                                                        OPTIONAL
UE-EUTRA-Capability-v10f0-IEs ::= SEQUENCE {
    rf-Parameters-v10f0
                                           RF-Parameters-v10f0
                                                                                        OPTIONAL.
                                            UE-EUTRA-Capability-v10i0-IEs
    nonCriticalExtension
                                                                                        OPTIONAL
UE-EUTRA-Capability-v10i0-IEs ::= SEQUENCE {
                                           RF-Parameters-v10i0
    rf-Parameters-v10i0
                                                                                         OPTIONAL,
    -- Following field is only to be used for late REL-10 extensions
```

```
lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v10j0-IEs)
   OPTIONAL,
   nonCriticalExtension
                                      UE-EUTRA-Capability-v11d0-IEs
}
UE-EUTRA-Capability-v10j0-IEs ::= SEQUENCE {
   rf-Parameters-v10j0
                                      RF-Parameters-v10j0
                                                                              OPTIONAL.
   nonCriticalExtension
                                      SEQUENCE {}
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v11d0-IEs ::= SEQUENCE {
   otherParameters-v11d0
   rf-Parameters-v11d0
                                      RF-Parameters-v11d0
                                                                              OPTIONAL.
                                                                              OPTIONAL,
                                       Other-Parameters-v11d0
   nonCriticalExtension
                                      UE-EUTRA-Capability-v11x0-IEs
                                                                             OPTIONAL
UE-EUTRA-Capability-v11x0-IEs ::= SEQUENCE {
   -- Following field is only to be used for late REL-11 extensions
   lateNonCriticalExtension
                               OCTET STRING
                                                                                  OPTIONAL,
   nonCriticalExtension
                                      UE-EUTRA-Capability-v12b0-IEs
                                                                                  OPTIONAL
}
UE-EUTRA-Capability-v12b0-IEs ::= SEQUENCE {
   rf-Parameters-v12b0
                                      RF-Parameters-v12b0
   nonCriticalExtension
                                      UE-EUTRA-Capability-v12x0-IEs
                                                                             OPTIONAL
}
UE-EUTRA-Capability-v12x0-IEs ::= SEQUENCE {
    -- Following field is only to be used for late REL-12 extensions
   lateNonCriticalExtension
                                      OCTET STRING
                                                                              OPTIONAL.
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1370-IEs
                                                                              OPTIONAL
UE-EUTRA-Capability-v1370-IEs ::= SEQUENCE {
   ce-Parameters-v1370
                                      CE-Parameters-v1370
                                                                             OPTIONAL,
    fdd-Add-UE-EUTRA-Capabilities-v1370 UE-EUTRA-CapabilityAddXDD-Mode-v1370
                                                                              OPTIONAL.
   tdd-Add-UE-EUTRA-Capabilities-v1370 UE-EUTRA-CapabilityAddXDD-Mode-v1370
   nonCriticalExtension
                                      SEQUENCE {}
                                                                             OPTIONAL
 - Regular non critical extensions
UE-EUTRA-Capability-v920-IEs ::=
                                       SEQUENCE {
   phyLayerParameters-v920
                                       PhyLayerParameters-v920,
   interRAT-ParametersGERAN-v920
                                          IRAT-ParametersGERAN-v920,
   interRAT-ParametersUTRA-v920
                                           IRAT-ParametersUTRA-v920
                                                                             OPTIONAL,
                                           IRAT-ParametersCDMA2000-1XRTT-v920 OPTIONAL,
   interRAT-ParametersCDMA2000-v920
                                          ENUMERATED {noBenFromBatConsumpOpt} OPTIONAL,
   deviceType-r9
   csg-ProximityIndicationParameters-r9
                                          CSG-ProximityIndicationParameters-r9,
   neighCellSI-AcquisitionParameters-r9
                                          NeighCellSI-AcquisitionParameters-r9,
   son-Parameters-r9
                                          SON-Parameters-r9,
   nonCriticalExtension
                                          UE-EUTRA-Capability-v940-IEs
                                                                            OPTIONAL
}
UE-EUTRA-Capability-v940-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                      OCTET STRING (CONTAINING UE-EUTRA-Capability-v9a0-IEs)
                                                                          OPTIONAL.
   nonCriticalExtension
                                      UE-EUTRA-Capability-v1020-IEs
                                                                          OPTIONAL
UE-EUTRA-Capability-v1020-IEs ::= SEQUENCE {
   ue-Category-v1020
                                      INTEGER (6..8)
                                                                              OPTIONAL,
   phyLayerParameters-v1020
                                       PhyLayerParameters-v1020
                                                                              OPTIONAL,
   rf-Parameters-v1020
                                      RF-Parameters-v1020
                                                                              OPTIONAL,
   measParameters-v1020
                                      MeasParameters-v1020
                                                                              OPTIONAL,
   featureGroupIndRel10-r10
                                      BIT STRING (SIZE (32))
                                                                             OPTIONAL,
   interRAT-ParametersCDMA2000-v1020
                                     IRAT-ParametersCDMA2000-1XRTT-v1020
                                                                             OPTIONAL,
   ue-BasedNetwPerfMeasParameters-r10 UE-BasedNetwPerfMeasParameters-r10
                                                                              OPTIONAL,
   interRAT-ParametersUTRA-TDD-v1020 IRAT-ParametersUTRA-TDD-v1020
                                                                             OPTIONAL,
                                      UE-EUTRA-Capability-v1060-IEs
   nonCriticalExtension
                                                                             OPTIONAL
UE-EUTRA-Capability-v1060-IEs ::= SEQUENCE {
   fdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060
                                                                             OPTIONAL,
                                                                             OPTIONAL,
   tdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060
   rf-Parameters-v1060
                                      RF-Parameters-v1060
                                                                              OPTIONAL,
   nonCriticalExtension
                                      UE-EUTRA-Capability-v1090-IEs
                                                                             OPTIONAL
}
```

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UE-EUTRA-Capability-v1090-IEs ::= SEQUENCE {
                                       RF-Parameters-v1090
   rf-Parameters-v1090
                                                                              OPTIONAL,
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1130-IEs
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v1130-IEs ::= SEQUENCE {
   pdcp-Parameters-v1130
                                      PDCP-Parameters-v1130,
   phyLayerParameters-v1130
                                      PhyLayerParameters-v1130
                                                                              OPTIONAL,
   rf-Parameters-v1130
                                      RF-Parameters-v1130,
   measParameters-v1130
                                       MeasParameters-v1130
   interRAT-ParametersCDMA2000-v1130 IRAT-ParametersCDMA2000-v1130,
                                       Other-Parameters-r11,
   otherParameters-r11
   fdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130 OPTIONAL,
   tdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130
                                                                             OPTIONAL,
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1170-IEs
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v1170-IEs ::= SEQUENCE {
   phyLayerParameters-v1170
                                      PhyLayerParameters-v1170
   ue-Category-v1170
                                       INTEGER (9..10)
                                                                              OPTIONAL,
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1180-IEs
                                                                              OPTIONAL
UE-EUTRA-Capability-v1180-IEs ::= SEQUENCE {
   rf-Parameters-v1180
                                       RF-Parameters-v1180
                                                                              OPTIONAL.
                                       MBMS-Parameters-r11
                                                                              OPTIONAL,
   mbms-Parameters-r11
   fdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180
                                                                              OPTIONAL,
   tdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180
                                                                              OPTIONAL,
   nonCriticalExtension
                                      UE-EUTRA-Capability-v11a0-IEs
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v11a0-IEs ::= SEQUENCE {
   measParameters-v11a0
                                      INTEGER (11..12)
                                                                              OPTIONAL,
                                       MeasParameters-v11a0
                                                                              OPTIONAL.
   nonCriticalExtension
                                      UE-EUTRA-Capability-v1250-IEs
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v1250-IEs ::= SEQUENCE {
   phyLayerParameters-v1250
rf-Parameters-v1250
                                                                              OPTIONAL,
                                      PhyLayerParameters-v1250
                                                                              OPTIONAL,
                                      RF-Parameters-v1250
   rlc-Parameters-r12
                                       RLC-Parameters-r12
                                                                              OPTIONAL,
   ue-BasedNetwPerfMeasParameters-v1250 UE-BasedNetwPerfMeasParameters-v1250
                                                                                  OPTIONAL.
   ue-CategoryUL-r12 INTEGER (0..14)
ue-CategoryUL-r12 INTEGER (0..13)
                                                                              OPTIONAL,
                                                                              OPTIONAL.
   wlan-IW-Parameters-r12
                                 WLAN-IW-Parameters-r12
                                                                              OPTIONAL,
   measParameters-v1250
                                      MeasParameters-v1250
                                                                              OPTIONAL,
                                                                              OPTIONAL,
                                      DC-Parameters-r12
   dc-Parameters-r12
   mbms-Parameters-v1250
                                      MBMS-Parameters-v1250
                                                                              OPTIONAL,
   mac-Parameters-r12
                                      MAC-Parameters-r12
                                                                              OPTIONAL,
   fdd-Add-UE-EUTRA-Capabilities-v1250 UE-EUTRA-CapabilityAddXDD-Mode-v1250
   \verb|tdd-Add-UE-EUTRA-Capabilities-v1250| UE-EUTRA-CapabilityAddXDD-Mode-v1250| \\
                                                                              OPTIONAL,
   sl-Parameters-r12
                                   SL-Parameters-r12
                                                                     OPTIONAL.
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1260-IEs
                                                                              OPTIONAL
UE-EUTRA-Capability-v1260-IEs ::= SEQUENCE {
   ue-CategoryDL-v1260
                                       INTEGER (15..16)
                                                                              OPTIONAL,
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1270-IEs
                                                                              OPTIONAL
UE-EUTRA-Capability-v1270-IEs ::= SEQUENCE {
   rf-Parameters-v1270
                                      RF-Parameters-v1270
                                                                              OPTIONAL,
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1280-IEs
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v1280-IEs ::= SEQUENCE {
   phyLayerParameters-v1280 PhyLayerParameters-v1280
                                                                              OPTIONAL,
   nonCriticalExtension
                                      UE-EUTRA-Capability-v1310-IEs
                                                                              OPTIONAL
UE-EUTRA-Capability-v1310-IEs ::= SEQUENCE {
   ue-CategoryDL-v1310 ENUMERATED {n17, m1}
                                                                          OPTIONAL,
                                  ENUMERATED {n14, m1}
   ue-CategoryUL-v1310
                                                                          OPTIONAL,
   pdcp-Parameters-v1310
                                      PDCP-Parameters-v1310,
   rlc-Parameters-v1310
                                       RLC-Parameters-v1310,
                                                                              OPTIONAL,
   mac-Parameters-v1310
                                      MAC-Parameters-v1310
   phyLayerParameters-v1310
                                       PhyLayerParameters-v1310
                                                                              OPTIONAL,
   rf-Parameters-v1310
                                      RF-Parameters-v1310
                                                                              OPTIONAL,
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measParameters-v1310
                                      MeasParameters-v1310
                                                                              OPTIONAL,
   dc-Parameters-v1310
                                       DC-Parameters-v1310
                                                                              OPTIONAL,
   sl-Parameters-v1310
                                      SL-Parameters-v1310
                                                                              OPTIONAL,
                                      SCPTM-Parameters-r13
                                                                              OPTIONAL,
   scptm-Parameters-r13
   ce-Parameters-r13
                                      CE-Parameters-r13
                                                                              OPTIONAL,
                                    CE-Parameters III
IRAT-ParametersWLAN-r13,
   interRAT-ParametersWLAN-r13
   laa-Parameters-r13
                                      LAA-Parameters-r13
                                                                              OPTIONAL,
   lwa-Parameters-r13
                                      LWA-Parameters-r13
                                                                              OPTIONAL,
   wlan-IW-Parameters-v1310
                                          WLAN-IW-Parameters-v1310,
   lwip-Parameters-r13
                                      LWIP-Parameters-r13,
   fdd-Add-UE-EUTRA-Capabilities-v1310 UE-EUTRA-CapabilityAddXDD-Mode-v1310 OPTIONAL,
   tdd-Add-UE-EUTRA-Capabilities-v1310 UE-EUTRA-CapabilityAddXDD-Mode-v1310
                                                                              OPTIONAL.
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1320-IEs
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v1320-IEs ::= SEQUENCE {
   ce-Parameters-v1320 CE-Parameters-v1320 phyLayerParameters-v1320 PhyLayerParameters-v1320 PhyLayerParameters-v1320
                                                                              OPTIONAL,
                                      PhyLayerParameters-v1320
                                                                              OPTIONAL,
                                      RF-Parameters-v1320
                                                                             OPTIONAL,
   fdd-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320
                                                                              OPTIONAL,
   tdd-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320
                                                                              OPTIONAL,
   nonCriticalExtension
                                      UE-EUTRA-Capability-v1330-IEs
                                                                             OPTIONAL
UE-EUTRA-Capability-v1330-IEs ::= SEQUENCE {
   ue-CategoryDL-v1330 INTEGER (18..19)
phyLayerParameters-v1330 PhyLayerParameter
                                                                              OPTIONAL,
                                      PhyLayerParameters-v1330
                                                                              OPTIONAL,
   phyLayerraramcossue-CE-NeedULGaps-r13
                                       ENUMERATED {true}
                                                                          OPTIONAL,
   nonCriticalExtension
                                      UE-EUTRA-Capability-v1340-IEs
                                                                         OPTIONAL
}
UE-EUTRA-Capability-v1340-IEs ::= SEQUENCE {
   ue-CategoryUL-v1340 INTEGER (15)
                                                                          OPTIONAL,
                                      UE-EUTRA-Capability-v1350-IEs
   nonCriticalExtension
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v1350-IEs ::= SEQUENCE {
   ue-CategoryUL-v1350 ENUMERATED {oneBis}
ue-CategoryUL-v1350 ENUMERATED {oneBis}
                                                                          OPTIONAL,
                                                                          OPTIONAL,
   ce-Parameters-v1350
                                  CE-Parameters-v1350,
                                  UE-EUTRA-Capability-v1360-IEs
   nonCriticalExtension
                                                                          OPTIONAL
}
UE-EUTRA-Capability-v1360-IEs ::= SEQUENCE {
   other-Parameters-v1360 Other-Parameters-v1360
                                                                      OPTIONAL,
   nonCriticalExtension
                              UE-EUTRA-Capability-v1430-IEs
                                                                      OPTIONAL
}
UE-EUTRA-Capability-v1430-IEs ::= SEQUENCE {
   phyLayerParameters-v1430 PhyLayerParameters-v1430,
   ue-CategoryDL-v1430
                                      ENUMERATED {m2}
                                                                              OPTIONAL,
                                      ENUMERATED {n16, n17, n18, n19, n20, m2} OPTIONAL,
   ue-CategoryUL-v1430
   ue-CategoryUL-v1430b
                                      MAC-Parameters-v1430
                                     ENUMERATED {n21}
                                                                              OPTIONAL,
   mac-Parameters-v1430
                                                                              OPTIONAL,
                                     MeasParameters-v1430
   measParameters-v1430
                                                                              OPTIONAL,
                                    PDCP-Parameters-v1430
   pdcp-Parameters-v1430
                                                                              OPTIONAL,
   rlc-Parameters-v1430
                                      RLC-Parameters-v1430,
   rf-Parameters-v1430
                                     RF-Parameters-v1430
                                                                              OPTIONAL,
   laa-Parameters-v1430
                                      LAA-Parameters-v1430
                                                                              OPTIONAL.
                                     LWA-Parameters-v1430
   lwa-Parameters-v1430
                                                                              OPTIONAL.
                                                                              OPTIONAL,
   lwip-Parameters-v1430
                                     LWIP-Parameters-v1430
   otherParameters-v1430
                                      Other-Parameters-v1430,
   mmtel-Parameters-r14
                                     MMTEL-Parameters-r14
                                                                              OPTIONAL,
   mobilityParameters-r14
                                      MobilityParameters-r14
                                                                              OPTIONAL,
   ce-Parameters-v1430
                                      CE-Parameters-v1430,
   fdd-Add-UE-EUTRA-Capabilities-v1430 UE-EUTRA-CapabilityAddXDD-Mode-v1430
                                                                              OPTIONAL,
   tdd-Add-UE-EUTRA-Capabilities-v1430 UE-EUTRA-CapabilityAddXDD-Mode-v1430
                                                                              OPTIONAL,
                            MBMS-Parameters-v1430
   mbms-Parameters-v1430
                                                                             OPTIONAL,
   sl-Parameters-v1430
                                      SL-Parameters-v1430
                                                                              OPTIONAL,
   ue-BasedNetwPerfMeasParameters-v1430 UE-BasedNetwPerfMeasParameters-v1430
                                                                                     OPTIONAL,
                                                                    OPTIONAL,
   highSpeedEnhParameters-r14 HighSpeedEnhParameters-r14
   nonCriticalExtension
                                       UE-EUTRA-Capability-v1440-IEs
                                                                              OPTIONAL
}
UE-EUTRA-Capability-v1440-IEs ::= SEQUENCE {
                           LWA-Parameters-v1440,
   lwa-Parameters-v1440
   mac-Parameters-v1440
                                       MAC-Parameters-v1440,
   nonCriticalExtension
                                                                              OPTIONAL
                                      SEQUENCE { }
```

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}
UE-EUTRA-CapabilityAddXDD-Mode-r9 ::= SEQUENCE {
   {\tt neighCellSI-AcquisitionParameters-r9} \qquad {\tt NeighCellSI-AcquisitionParameters-r9} \qquad {\tt OPTIONAL},
}
UE-EUTRA-CapabilityAddXDD-Mode-v1060 ::= SEQUENCE {
   phyLayerParameters-v1060 PhyLayerParameters-v1020 OPTIONAL, featureGroupIndRel10-v1060 BIT STRING (SIZE (32)) OPTIONAL,
    interRAT-ParametersCDMA2000-v1060 IRAT-ParametersCDMA2000-1XRTT-v1020 OPTIONAL, interRAT-ParametersUTRA-TDD-v1060 IRAT-ParametersUTRA-TDD-v1020 OPTIONAL,
    [[ otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10 OPTIONAL
    11
}
UE-EUTRA-CapabilityAddXDD-Mode-v1130 ::= SEQUENCE {
   phyLayerParameters-v1130 PhyLayerParameters-v1130 MeasParameters-v1130 otherParameters-r11 Other-Parameters-r11
                                                                             OPTIONAL.
                                                                             OPTIONAL,
    otherParameters-r11
                                                                             OPTIONAL,
}
UE-EUTRA-CapabilityAddXDD-Mode-v1180 ::= SEQUENCE {
   mbms-Parameters-r11
                                       MBMS-Parameters-r11
UE-EUTRA-CapabilityAddXDD-Mode-v1250 ::= SEQUENCE {
   phyLayerParameters-v1250 PhyLayerParameters-v1250 OPTIONAL measParameters-v1250 MeasParameters-v1250 OPTIONAL
                                                                             OPTIONAL.
}
UE-EUTRA-CapabilityAddXDD-Mode-v1310 ::= SEQUENCE {
   phyLayerParameters-v1310 PhyLayerParameters-v1310
UE-EUTRA-CapabilityAddXDD-Mode-v1320 ::= SEQUENCE {
                                                                        OPTIONAL,
   phyLayerParameters-v1320 PhyLayerParameters-v1320
   scptm-Parameters-r13
                                        SCPTM-Parameters-r13
                                                                             OPTIONAL
}
UE-EUTRA-CapabilityAddXDD-Mode-v1370 ::= SEQUENCE {
   ce-Parameters-v1370
                                       CE-Parameters-v1370
                                                                            OPTIONAL
UE-EUTRA-CapabilityAddXDD-Mode-v1430 ::= SEQUENCE {
   phyLayerParameters-v1430 PhyLayerParameters-v1430 OPTIONAL, mmtel-Parameters-r14 MMTEL-Parameters-r14 OPTIONAL
AccessStratumRelease ::=
                                   ENUMERATED {
                                       rel8, rel9, rel10, rel11, rel12, rel13,
                                        rel14, spare1, ...}
MobilityParameters-r14 ::= makeBeforeBreak-r14
                                    SEQUENCE {
                                     ENUMERATED {supported}
                                                                                 OPTIONAL,
   rach-Less-r14
                                        ENUMERATED {supported}
                                                                                  OPTIONAL
}
DC-Parameters-r12 ::=
drb-TypeSplit-r12
                               SEQUENCE {
                                             ENUMERATED {supported}
                                                                            OPTIONAL,
                                             ENUMERATED {supported}
                                                                            OPTIONAL
   drb-TypeSCG-r12
}
DC-Parameters-v1310 ::= SEQUENCE { pdcp-TransferSplitUL-r13
                                            ENUMERATED {supported}
ENUMERATED {supported}
                                                                            OPTIONAL,
   ue-SSTD-Meas-r13
                                                                            OPTIONAL
MAC-Parameters-r12 ::=
                                    SEQUENCE {
  logicalChannelSR-ProhibitTimer-r12 ENUMERATED {supported} OPTIONAL,
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longDRX-Command-r12 ENUMERATED {supported}
                                                                    OPTIONAL
MAC-Parameters-v1310 ::=
                                           SEQUENCE {
    -Parameters-V1310 ::= SEQUENCE {
extendedMAC-LengthField-r13 ENUMERATED {supported}
extendedLongDRX-r13 ENUMERATED {supported}
                                                                               OPTIONAL,
                                                                            OPTIONAL
}
   -Parameters-v1430 ::= shortSPS-IntervalFDD-r14 ENUMERATED {supported} shortSPS-IntervalTDD-r14 ENUMERATED {supported} skipUplinkDynamic-r14 ENUMERATED {supported} } supported}
                                          SEQUENCE {
MAC-Parameters-v1430 ::=
                                                                                   OPTIONAL,
                                                                                 OPTIONAL,
                                                                                  OPTIONAL,
    multipleUplinkSPS-r14
                                    ENUMERATED {supported}
                                                                                   OPTIONAL,
    dataInactMon-r14
                                            ENUMERATED (supported)
                                                                                    OPTIONAL
}
MAC-Parameters-v1440 ::= SEQUENCE {
    rai-Support-r14 ENUMERATED {supported} OPTIONAL
RLC-Parameters-r12 ::= SEQUENCE {
   extended-RLC-LI-Field-r12 ENUMERATED {supported}}
RLC-Parameters-v1310 ::=
                                           SEQUENCE {
    extendedRLC-SN-SO-Field-r13
                                              ENUMERATED {supported} OPTIONAL
RLC-Parameters-v1430 ::=
                                          SEOUENCE {
                                             ENUMERATED {supported}
    extendedPollByte-r14
                                                                                       OPTIONAL
   P-Parameters ::= SEQUENCE {
supportedROHC-Profiles SEQUENCE {
profile0x0001 BOOLEA
PDCP-Parameters ::=
        profile0x0001
                                                BOOLEAN,
        profile0x0002
                                                BOOLEAN,
        profile0x0003
                                                BOOLEAN,
        profile0x0004
                                                BOOLEAN.
        profile0x0006
                                                BOOLEAN,
        profile0x0101
        profile0x0102
                                                BOOLEAN,
        profile0x0103
                                                BOOLEAN,
        profile0x0104
                                                BOOLEAN
    maxNumberROHC-ContextSessions
                                          ENUMERATED {
                                                cs2, cs4, cs8, cs12, cs16, cs24, cs32,
                                                 cs48, cs64, cs128, cs256, cs512, cs1024,
                                                 cs16384, spare2, spare1}
                                                                                             DEFAULT cs16,
}
PDCP-Parameters-v1130 ::= SEQUENCE { pdcp-SN-Extension-r11
    pdcp-SN-Extension-rl1 ENUMERATED {supported} OPTIONAL, supportRohcContextContinue-rl1 ENUMERATED {supported} OPTIONAL
}
   pdcp-SN-Extension-18bits-r13 SEQUENCE {
PDCP-Parameters-v1310 ::=
                                              ENUMERATED {supported} OPTIONAL
PDCP-Parameters-v1430 ::=
                                           SEQUENCE {
  supportedUplinkOnlyROHC-Profiles-r14 SEQUENCE {
        profile0x0006-r14
                                                    BOOLEAN
    maxNumberROHC-ContextSessions-r14
                                                ENUMERATED {
                                                 cs2, cs4, cs8, cs12, cs16, cs24, cs32,
                                                cs2, cs4, cs8, cs12, cs10, cs2, cs48, cs64, cs128, cs256, cs512, cs1024, cs48, cs64, cs128, cs256, cs512, cs1024,
}
PhyLayerParameters ::=
                                       SEQUENCE {
   ue-TxAntennaSelectionSupported BOOLEAN,
    ue-SpecificRefSigsSupported
                                      BOOLEAN
                                 SEQUENCE {
PhyLayerParameters-v920 ::=
  enhancedDualLayerFDD-r9 ENUMERATED {supported} OPTIONAL,
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OPTIONAL
PhyLaverParameters-v9d0 ::=
                                        SEQUENCE {
    tm5-FDD-r9
                                        ENUMERATED {supported}
                                                                            OPTIONAL,
                                        ENUMERATED {supported}
    tm5-TDD-r9
                                                                            OPTIONAL
PhyLayerParameters-v1020 ::=
                                          SEQUENCE {
    twoAntennaPortsForPUCCH-r10
tm9-With-8Tx-FDD-r10
pmi-Disabling-r10
                                            ENUMERATED {supported}
ENUMERATED {supported}
                                                                                              OPTIONAL,
                                                                                              OPTIONAL,
                                               ENUMERATED {supported}
ENUMERATED {supported}
    pmi-Disabling-r10
                                                                                              OPTIONAL,
    crossCarrierScheduling-r10
    multiclusterPUSCH-WithinCC-r10 ENUMERATED {supported}
nonContiguousHLERATED {supported}
                                                                                              OPTIONAL,
                                                                                              OPTIONAL,
                                                                                              OPTIONAL,
    nonContiguousUL-RA-WithinCC-List-r10 NonContiguousUL-RA-WithinCC-List-r10
                                                                                              OPTIONAL
PhyLayerParameters-v1130 ::= SEQUENCE {
    crs-InterfHandl-r11
                                                 ENUMERATED {supported}
                                                                                              OPTIONAL,
                                                 ENUMERATED {supported}
    ePDCCH-r11
                                                                                              OPTIONAL,
    multiACK-CSI-Reporting-r11
                                                ENUMERATED {supported}
                                                                                              OPTIONAL,
    ss-CCH-InterfHandl-r11
                                                 ENUMERATED {supported}
                                                                                              OPTIONAL,
    tdd-SpecialSubframe-r11
                                                ENUMERATED {supported}
                                                                                              OPTIONAL.
    txDiv-PUCCH1b-ChSelect-r11
                                                 ENUMERATED (supported)
                                                                                              OPTIONAL,
                                                 ENUMERATED {supported}
    ul-CoMP-r11
                                                                                              OPTIONAL
PhyLayerParameters-v1170 ::=
                                           SEQUENCE {
    interBandTDD-CA-WithDifferentConfig-r11 BIT STRING (SIZE (2))
                                                                                   OPTIONAL
PhyLayerParameters-v1250 ::= SEQUENCE {
    e-HARQ-Pattern-FDD-r12 ENUMERATED {supported}}
    enhanced-4TxCodebook-r12 ENUMERATED {supported}
    tdd-FDD-CA-PCellDuplex-r12 BIT STRING (SIZE (2))
    phy-TDD-ReConfig-TDD-PCell-r12 ENUMERATED {supported}
    phy-TDD-ReConfig-FDD-PCell-r12 ENUMERATED {supported}
    pusch-FeedbackMode-r12 ENUMERATED {supported}
                                           ENUMERATED {supported}
                                                                                   OPTIONAL.
                                                ENUMERATED {supported}
                                                                                   OPTIONAL,
                                                                                     OPTIONAL,
                                                                                   OPTIONAL,
                                               ENUMERATED {supported}
ENUMERATED {supported}
                                                                                  OPTIONAL,
    pusch-FeedbackMode-r12
    pusch-SRS-PowerControl-SubframeSet-r12 ENUMERATED {supported}
                                                                                   OPTIONAL,
                                                 ENUMERATED {supported}
    csi-SubframeSet-r12
    noResourceRestrictionForTTIBundling-r12 ENUMERATED {supported}
                                                                                    OPTIONAL,
    OPTIONAL,
                                                                                    OPTIONAL
    naics-Capability-List-r12
}
    LayerParameters-v1280 ::= SEQUENCE {
alternativeTBS-Indices-r12 ENUMERA
PhyLayerParameters-v1280 ::=
                                               ENUMERATED {supported}
                                                                                   OPTIONAL
PhyLayerParameters-v1310 ::=
                                          SEQUENCE {
    LayerParameters-v1310 ::=
aperiodicCSI-Reporting-r13
codebook-MARO-ACK-r13
                                            BIT STRING (SIZE (2))
                                                                                   OPTIONAL,
                                                                               OPTIONAL,
OPTIONAL,
OPTIONAL,
    codebook-HARQ-ACK-r13
                                                BIT STRING (SIZE (2))
    crossCarrierScheduling-B5C-r13
                                            ENUMERATED {supported}
ENUMERATED {supported}
    fdd-HARQ-TimingTDD-r13
                                               INTEGER(5..32)
    maxNumberUpdatedCSI-Proc-r13
                                                                                    OPTIONAL,
    pucch-Format4-r13
                                                 ENUMERATED {supported}
                                                                                    OPTIONAL,
                                                                                  OPTIONAL,
OPTIONAL,
OPTIONAL,
    pucch-Format5-r13
                                                ENUMERATED {supported}
    pucch-SCell-r13
                                                 ENUMERATED {supported}
    spatialBundling-HARQ-ACK-r13 ENUMERATED {supported} supported} supportedBlindDecoding-r13 SEQUENCE {
        maxNumberDecoding-r13 INTEGER(1..32)
pdcch-CandidateReductions-r13 ENUMERATED {supported}
skipMonitoringDCI-Format0-1A-r13 ENUMERATED {supported}
                                                                                         OPTIONAL,
                                                                                         OPTIONAL,
                                                                                         OPTIONAL
                                                                                    OPTIONAL.
                                               ENUMERATED {supported}
ENUMERATED {supported}
ENUMERATED {supported}
    uci-PUSCH-Ext-r13
                                                                                    OPTIONAL,
    uci-PUSCH-Ext-ris
crs-InterfMitigationTM10-r13
                                                                                     OPTIONAL,
    pdsch-CollisionHandling-r13
                                                                                    OPTIONAL
PhyLayerParameters-v1320 ::=
                                          SEQUENCE {
    mimo-UE-Parameters-r13
                                              MIMO-UE-Parameters-r13
                                   SEQUENCE {
PhyLayerParameters-v1330 ::=
    cch-InterfMitigation-RefRecTypeA-r13 ENUMERATED {supported} OPTIONAL,
```

```
PhyLayerParameters-v1430 ::= SEQUENCE { ce-PUSCH-NB-MaxTBS-r14 ENUMER.
    ce-PUSCH-NB-MaxTBS-r14 ENUMERATED {supported} ce-PDSCH-PUSCH-MaxBandwidth-r14 ENUMERATED {bw5, bw20}
                                                                                          OPTIONAL,
                                                                                         OPTIONAL,
    ce-HARQ-AckBundling-r14
ce-PDSCH-TenProcesses-r14
                                                                                      OPTIONAL,
OPTIONAL,
OPTIONAL,
                                                  ENUMERATED {supported}
ENUMERATED {supported}
                                                   ENUMERATED {n0, n1}
     ce-RetuningSymbols-r14

      CE-RETURINGSYMBOLS-114
      ENUMERATED (supported)

      ce-PDSCH-PUSCH-Enhancement-r14
      ENUMERATED (supported)

      ce-SchedulingEnhancement-r14
      ENUMERATED (supported)

      ce-SRS-Enhancement-r14
      ENUMERATED (supported)

      ce-PUCCH-Enhancement-r14
      ENUMERATED (supported)

                                                                                          OPTIONAL,
                                                                                         OPTIONAL,
                                                                                         OPTIONAL,
    ce-ClosedLoopTxAntennaSelection-r14 ENUMERATED {supported} tdd-SpecialSubframe-r14 ENUMERATED {supported} tdd-TTI-Bundling-r14 ENUMERATED {supported}
                                                                                        OPTIONAL,
    ENUMERATED {supported}

dmrs-LessUpPTS-r14 ENUMERATED {supported}

mimo-UE-Parameters-v1430 MIMO-UE-Parameters-v1430

alternativeTBS-Index-r14 ENUMERATED {supported}

feMBMS-Unicast-Parameters-r14 FeMBMS-Unicast-Parameters-v1430
                                                                                          OPTIONAL,
                                                                                         OPTIONAL,
                                                                                          OPTIONAL,
                                                                                          OPTIONAL,
                                                   FeMBMS-Unicast-Parameters-r14 OPTIONAL
}
MIMO-UE-Parameters-r13 ::= SEQUENCE {
                                                  MIMO-UE-ParametersPerTM-r13 OPTIONAL,
MIMO-UE-ParametersPerTM-r13 OPTIONAL,
ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL
    parametersTM9-r13
    parametersTM10-r13
     srs-EnhancementsTDD-r13
     srs-Enhancements-r13
     interferenceMeasRestriction-r13
}
MIMO-UE-Parameters-v1430 ::=
                                              SEQUENCE {
    parametersTM9-v1430
                                                   MIMO-UE-ParametersPerTM-v1430 OPTIONAL,
    parametersTM10-v1430
                                                    MIMO-UE-ParametersPerTM-v1430 OPTIONAL
}
MIMO-UE-ParametersPerTM-r13 ::=
                                              SEQUENCE {
    nonPrecoded-r13
                                                   MIMO-NonPrecodedCapabilities-r13 OPTIONAL,
     beamformed-r13
                                                    MIMO-UE-BeamformedCapabilities-r13 OPTIONAL,
                                                    ENUMERATED {supported}
    channelMeasRestriction-r13
                                                                                               OPTIONAL,
                                                    ENUMERATED {supported}
ENUMERATED {supported}
                                                                                               OPTIONAL,
     dmrs-Enhancements-r13
     csi-RS-EnhancementsTDD-r13
                                                                                                OPTIONAL
}
MIMO-UE-ParametersPerTM-v1430 ::= SEQUENCE {
  nzp-CSI-RS-AperiodicInfo-r14 SEQUENCE {
    nMaxProc-r14 INTEGE
                                                   INTEGER(5..32),
         nMaxProc-r14
                                                         ENUMERATED {ffs1, ffs2, ffs3, ffs4}
         nMaxResource-r14
                                                                                                OPTIONAL.
     nzp-CSI-RS-PeriodicInfo-r14 SEQUENCE {
                                                      ENUMERATED {ffs1, ffs2, ffs3, ffs4}
        nMaxResource-r14
                                                                                                OPTIONAL,
    ENUMERATED {supported}
                                                                                                OPTIONAL,
                                                                                               OPTIONAL,
    densityReductionNP-r14
densityReductionBF-r14
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
                                                  ENUMERATED {supported}
                                                                                               OPTIONAL,
    hybridCSI-r14
                                                   ENUMERATED {supported}
                                                                                               OPTIONAL,
     semiOL-r14
                                                    ENUMERATED {supported}
                                                                                                OPTIONAL,
     csi-ReportingNP-r14
                                                    ENUMERATED {supported}
                                                                                               OPTIONAL,
                                                    ENUMERATED {supported}
    csi-ReportingAdvanced-r14
                                                                                                OPTIONAL
}
MIMO-CA-ParametersPerBoBC-r13 ::=
                                                SEQUENCE {
   parametersTM9-r13
                                                  MIMO-CA-ParametersPerBoBCPerTM-r13 OPTIONAL,
    parametersTM10-r13
                                                    MIMO-CA-ParametersPerBoBCPerTM-r13
                                                                                                    OPTIONAL
}
MIMO-CA-ParametersPerBoBC-v1430 ::=
                                               SEQUENCE {
   parametersTM9-v1430
                                                 MIMO-CA-ParametersPerBoBCPerTM-v1430
                                                                                                     OPTIONAL.
    parametersTM10-v1430
                                                    MIMO-CA-ParametersPerBoBCPerTM-v1430
                                                                                                     OPTIONAL
}
MIMO-CA-ParametersPerBoBCPerTM-r13 ::= SEQUENCE {
   nonPrecoded-r13
                                                 MIMO-NonPrecodedCapabilities-r13
                                                                                               OPTIONAL,
    beamformed-r13
                                                    MIMO-BeamformedCapabilityList-r13 OPTIONAL,
     dmrs-Enhancements-r13
                                                    ENUMERATED {different}
                                                                                                OPTIONAL
MIMO-CA-ParametersPerBoBCPerTM-v1430 ::= SEQUENCE {
```

```
ENUMERATED {different}
ENUMERATED {different}
   csi-ReportingNP-r14
                                                                              OPTIONAL,
   csi-ReportingAdvanced-r14
                                                                              OPTIONAL
}
MIMO-NonPrecodedCapabilities-r13 ::=
                                    SEQUENCE {
   config1-r13
                                           ENUMERATED {supported}
   config2-r13
                                           ENUMERATED {supported}
                                                                         OPTIONAL,
                                           ENUMERATED (supported)
   config3-r13
                                                                         OPTIONAL,
   config4-r13
                                           ENUMERATED {supported}
                                                                         OPTIONAL
MIMO-UE-BeamformedCapabilities-r13 ::=
                                          SEQUENCE {
                                          ENUMERATED {supported}
                                                                    OPTIONAL,
   altCodebook-r13
   mimo-BeamformedCapabilities-r13
                                          MIMO-BeamformedCapabilityList-r13
MIMO-BeamformedCapabilityList-r13 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF MIMO-
BeamformedCapabilities-r13
MIMO-BeamformedCapabilities-r13 ::= SEQUENCE {
                                          INTEGER (1..8),
  k-Max-r13
   n-MaxList-r13
                                          BIT STRING (SIZE (1..7))
NonContiguousUL-RA-WithinCC-List-r10 ::= SEQUENCE (SIZE (1..maxBands)) OF NonContiguousUL-RA-
WithinCC-r10
NonContiguousUL-RA-WithinCC-r10 ::= SEQUENCE {
   nonContiguousUL-RA-WithinCC-Info-r10 ENUMERATED {supported}
}
RF-Parameters ::=
                                  SEQUENCE {
                                      SupportedBandListEUTRA
   supportedBandListEUTRA
RF-Parameters-v9e0 ::=
                                       SEQUENCE {
   supportedBandListEUTRA-v9e0
                                         SupportedBandListEUTRA-v9e0
RF-Parameters-v1020 ::=
                                   SEQUENCE {
   supportedBandCombination-r10
                                    SupportedBandCombination-r10
RF-Parameters-v1060 ::=
                                  SEQUENCE {
   supportedBandCombinationExt-r10
                                        SupportedBandCombinationExt-r10
}
RF-Parameters-v1090 ::=
                                      SEQUENCE {
   supportedBandCombination-v1090
                                          SupportedBandCombination-v1090
                                                                                 OPTIONAL
}
RF-Parameters-v10f0 ::=
                                      SEOUENCE {
   modifiedMPR-Behavior-r10
                                              BIT STRING (SIZE (32))
                                                                                 OPTIONAL
RF-Parameters-v10i0 ::=
                                      SEQUENCE {
   supportedBandCombination-v10i0
                                         SupportedBandCombination-v10i0
                                                                                 OPTIONAL
RF-Parameters-v10j0 ::=
                                       SEQUENCE {
   multiNS-Pmax-r10
                                          ENUMERATED {supported}
                                                                                 OPTIONAL
RF-Parameters-v1130 ::=
                                   SEQUENCE {
                                          SupportedBandCombination-v1130
   supportedBandCombination-v1130
                                                                                OPTIONAL
RF-Parameters-v1180 ::=
                                  SEQUENCE {
   fregBandRetrieval-r11
                                           ENUMERATED {supported}
                                                                         OPTIONAL,
                                          SEQUENCE (SIZE (1.. maxBands)) OF FreqBandIndicator-r11
   requestedBands-r11
                       OPTIONAL,
   supportedBandCombinationAdd-r11
                                         SupportedBandCombinationAdd-r11
}
RF-Parameters-v11d0 ::=
                                       SEQUENCE {
   supportedBandCombinationAdd-v11d0
                                          SupportedBandCombinationAdd-v11d0
```

```
RF-Parameters-v1250 ::=
                                     SEQUENCE {
    supportedBandListEUTRA-v1250
                                              SupportedBandListEUTRA-v1250
                                                                                        OPTIONAL,
    supportedBandCombination-v1250
                                              SupportedBandCombination-v1250
                                                                                        OPTIONAL,
                                                                                        OPTIONAL,
    supportedBandCombinationAdd-v1250
                                              SupportedBandCombinationAdd-v1250
    freqBandPriorityAdjustment-r12
                                              ENUMERATED {supported}
                                                                                        OPTIONAL
RF-Parameters-v1270 ::=
                                     SEOUENCE {
    supportedBandCombination-v1270
                                              SupportedBandCombination-v1270
                                                                                        OPTIONAL,
    supportedBandCombinationAdd-v1270
                                              SupportedBandCombinationAdd-v1270
                                                                                        OPTIONAL
RF-Parameters-v1310 ::=
                                      SEQUENCE {
    eNB-RequestedParameters-r13
                                         SEQUENCE {
        reducedIntNonContCombRequested-r13 ENUMERATED {true}
                                                                                        OPTIONAL,
                                              INTEGER (2..32)
        requestedCCsDL-r13
                                                                                        OPTIONAL,
                                              INTEGER (2..32)
        requestedCCsUL-r13
                                                                                        OPTIONAL.
        skipFallbackCombRequested-r13
                                              ENUMERATED {true}
                                                                                        OPTIONAL.
                                                                                        OPTIONAL,
    maximumCCsRetrieval-r13
                                              ENUMERATED {supported}
                                                                                        OPTIONAL,
                                              ENUMERATED {supported}
    skipFallbackCombinations-r13
                                                                                        OPTIONAL,
    reducedIntNonContComb-r13
                                              ENUMERATED {supported}
                                                                                        OPTIONAL,
    supportedBandListEUTRA-v1310
                                              SupportedBandListEUTRA-v1310
                                                                                        OPTIONAL,
    supportedBandCombinationReduced-r13
                                              SupportedBandCombinationReduced-r13
                                                                                        OPTIONAL
RF-Parameters-v1320 ::=
                                     SEQUENCE {
    supportedBandListEUTRA-v1320
                                              SupportedBandListEUTRA-v1320
                                                                                        OPTIONAL,
    supportedBandCombination-v1320
                                              SupportedBandCombination-v1320
                                                                                        OPTIONAL,
    supportedBandCombinationAdd-v1320
                                              SupportedBandCombinationAdd-v1320
                                                                                        OPTIONAL.
    supportedBandCombinationReduced-v1320
                                              SupportedBandCombinationReduced-v1320
                                                                                        OPTIONAL
RF-Parameters-v12b0 ::=
                                     SEQUENCE {
                                              ENUMERATED {supported}
    maxLayersMIMO-Indication-r12
                                                                                        OPTIONAL
RF-Parameters-v1430 ::=
                                     SEQUENCE {
    supportedBandCombination-v1430
                                              SupportedBandCombination-v1430
                                                                                        OPTIONAL.
                                                                                        OPTIONAL,
    supportedBandCombinationAdd-v1430
                                              SupportedBandCombinationAdd-v1430
    supportedBandCombinationReduced-v1430
                                              SupportedBandCombinationReduced-v1430
                                                                                        OPTIONAL,
    eNB-RequestedParameters-v1430
                                              SEQUENCE {
        requestedDiffFallbackCombList-r14
                                                  BandCombinationList-r14
                                                                                        OPTIONAL.
    diffFallbackCombReport-r14
                                              ENUMERATED {supported}
                                                                                        OPTIONAL
}
SupportedBandCombination-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-
SupportedBandCombinationExt-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF
BandCombinationParametersExt-r10
{\tt SupportedBandCombination-v1090} ::= {\tt SEQUENCE} \ ({\tt SIZE} \ ({\tt 1..maxBandComb-r10})) \ {\tt OF}
BandCombinationParameters-v1090
{\tt SupportedBandCombination-v10i0} ::= {\tt SEQUENCE} \ ({\tt SIZE} \ ({\tt 1..maxBandComb-r10})) \ {\tt OF}
BandCombinationParameters-v10i0
SupportedBandCombination-v1130 := SEQUENCE (SIZE (1..maxBandComb-r10)) OF
BandCombinationParameters-v1130
{\tt SupportedBandCombination-v1250} ::= {\tt SEQUENCE} \ ({\tt SIZE} \ ({\tt 1..maxBandComb-r10})) \ {\tt OF}
BandCombinationParameters-v1250
SupportedBandCombination-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF
BandCombinationParameters-v1270
{\tt SupportedBandCombination-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) \ OF}
BandCombinationParameters-v1320
SupportedBandCombination-v1430 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF
BandCombinationParameters-v1430
SupportedBandCombinationAdd-r11 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF
BandCombinationParameters-r11
```

```
SupportedBandCombinationAdd-v11d0 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF
BandCombinationParameters-v10i0
{\tt SupportedBandCombinationAdd-v1250} \; ::= \; {\tt SEQUENCE} \; ({\tt SIZE} \; ({\tt 1..maxBandComb-r11})) \; \; {\tt OF} \; \\
BandCombinationParameters-v1250
SupportedBandCombinationAdd-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF
BandCombinationParameters-v1270
{\tt SupportedBandCombinationAdd-v1320} \; ::= \; {\tt SEQUENCE} \; ({\tt SIZE} \; ({\tt 1..maxBandComb-r11})) \; \; {\tt OF} \; \\
BandCombinationParameters-v1320
SupportedBandCombinationAdd-v1430 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF
BandCombinationParameters-v1430
SupportedBandCombinationReduced-r13 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF
BandCombinationParameters-r13
SupportedBandCombinationReduced-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF
BandCombinationParameters-v1320
SupportedBandCombinationReduced-v1430 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF
BandCombinationParameters-v1430
BandCombinationParameters-r10 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-
r10
BandCombinationParametersExt-r10 ::= SEQUENCE {
    supportedBandwidthCombinationSet-r10 SupportedBandwidthCombinationSet-r10
                                                                                         OPTIONAL
BandCombinationParameters-v1090 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-
BandCombinationParameters-v10i0::= SEQUENCE {
bandParameterList-v10i0
                                 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
            BandParameters-v10i0
                                     OPTIONAL
}
BandCombinationParameters-v1130 ::= SEQUENCE {
    multipleTimingAdvance-r11ENUMERATED { supported}OPTIONAL,simultaneousRx-Tx-r11ENUMERATED { supported}OPTIONAL,bandParameterList-r11SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-
v1130 OPTIONAL,
    . . .
}
BandCombinationParameters-r11 ::= SEQUENCE {
    bandParameterList-r11
                                      SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
           BandParameters-r11,
                                              SupportedBandwidthCombinationSet-r10
    supportedBandwidthCombinationSet-r11
                                                                                         OPTIONAL,
                                                                                OPTIONAL,
    multipleTimingAdvance-rl1 ENUMERATED {supported}
    simultaneousRx-Tx-r11
                                      ENUMERATED {supported}
                                                                                 OPTIONAL,
    bandInfoEUTRA-r11
                                      BandInfoEUTRA,
}
BandCombinationParameters-v1250::= SEQUENCE {
    dc-Support-r12
                                      SEQUENCE {
                                          ENUMERATED {supported}
        asynchronous-r12
                                                                           OPTIONAL.
        supportedCellGrouping-r12
                                          CHOICE {
                 threeEntries-r12
                                                   BIT STRING (SIZE(3)),
                 fourEntries-r12
                                                   BIT STRING (SIZE(7)),
                                                   BIT STRING (SIZE(15))
                fiveEntries-r12
        }
                                                                            OPTIONAL
                                                                            OPTIONAL,
    supportedNAICS-2CRS-AP-r12
                                    BIT STRING (SIZE (1..maxNAICS-Entries-r12))
                                                                                          OPTIONAL,
    commSupportedBandsPerBC-r12
                                            BIT STRING (SIZE (1.. maxBands))
                                                                                         OPTIONAL,
BandCombinationParameters-v1270 ::= SEQUENCE {
                                   SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
    bandParameterList-v1270
            BandParameters-v1270
                                          OPTIONAL
BandCombinationParameters-r13 ::= SEQUENCE {
   differentFallbackSupported-r13 ENUMERATED {true}
                                                                        OPTIONAL,
```

```
bandParameterList-r13 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-
r13,
    supportedBandwidthCombinationSet-r13 SupportedBandwidthCombinationSet-r10
                                                                                       OPTIONAL,
    multipleTimingAdvance-r13 ENUMERATED {supported} simultaneousRx-Tx-r13 ENUMERATED {supported}
                                                                          OPTIONAL,
    simultaneousRx-Tx-r13
                                                                          OPTIONAL,
    bandInfoEUTRA-r13
                                    BandInfoEUTRA,
    dc-Support-r13
                                     SEQUENCE {
        asynchronous-r13
                                    ENUMERATED {supported}
                                                                         OPTIONAL,
        supportedCellGrouping-r13 CHOICE {
    threeEntries-r13
                                                 BIT STRING (SIZE(3)),
                fourEntries-r13
                                                 BIT STRING (SIZE(7)),
                                                 BIT STRING (SIZE(15))
                fiveEntries-r13
        }
                                                                          OPTIONAL.
                                                                          OPTIONAL
    supportedNAICS-2CRS-AP-r13 BIT STRING (SIZE (1..maxNAICS-Entries-r12)) OPTIONAL, commSupportedBandsPerBC-r13 BIT STRING (SIZE (1..maxBands)) OPTIONAL
}
BandCombinationParameters-v1320 ::= SEQUENCE {
           rameterList-v1320 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
BandParameters-v1320 OPTIONAT.
   bandParameterList-v1320
                                           ENUMERATED {supported}
    additionalRx-Tx-PerformanceReq-r13
                                                                                      OPTIONAL
BandCombinationParameters-v1430 ::= SEQUENCE {
   bandParameterList-v1430 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
BandParameters-v1430 OPTIONAL,
    v2x-SupportedTxBandCombListPerBC-r14
                                                     BIT STRING (SIZE (1.. maxBandComb-r13))
    OPTIONAL,
                                                    BIT STRING (SIZE (1.. maxBandComb-r13))
    v2x-SupportedRxBandCombListPerBC-r14
    OPTIONAL }
SupportedBandwidthCombinationSet-r10 ::= BIT STRING (SIZE (1..maxBandwidthCombSet-r10))
BandParameters-r10 ::= SEQUENCE {
    bandEUTRA-r10
                                     FreqBandIndicator,
                                   BandParametersUL-r10
    bandParametersUL-r10
                                                                               OPTIONAL,
    bandParametersDL-r10
                                    BandParametersDL-r10
                                                                              OPTIONAL
}
BandParameters-v1090 ::= SEQUENCE {
  bandEUTRA-v1090
                                     FreqBandIndicator-v9e0
                                                                             OPTIONAL,
BandParameters-v10i0::= SEQUENCE {
   bandParametersDL-v10i0 SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-
3710i0
BandParameters-v1130 ::= SEQUENCE {
    supportedCSI-Proc-r11
                                     ENUMERATED {n1, n3, n4}
BandParameters-r11 ::= SEQUENCE {
   bandEUTRA-r11
                                     FreqBandIndicator-r11,
                                     BandParametersUL-r10
    bandParametersUL-r11
                                                                              OPTIONAL,
    bandParametersDL-r11
                                     BandParametersDL-r10
                                                                              OPTIONAL,
    supportedCSI-Proc-r11
                                     ENUMERATED {n1, n3, n4}
                                                                               OPTIONAL
}
BandParameters-v1270 ::= SEQUENCE {
                                     SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-
  bandParametersDL-v1270
ParametersDL-v1270
}
BandParameters-r13 ::= SEQUENCE {
   bandEUTRA-r13
                                     FreqBandIndicator-r11,
    bandParametersUL-r13
bandParametersDL-r13
                                         BandParametersUL-r13
                                                                              OPTIONAL.
                                         BandParametersDL-r13
                                                                              OPTIONAL,
                                     ENUMERATED {n1, n3, n4} OPTIONAL
    supportedCSI-Proc-r13
}
BandParameters-v1320 ::= SEQUENCE {
    bandParametersDL-v1320
                                     MIMO-CA-ParametersPerBoBC-r13
BandParameters-v1430 ::= SEQUENCE {
```

```
bandParametersDL-v1430 MIMO-CA-ParametersPerBoBC-v1430 OPTIONAL,
   ul-2560AM-r14
                                      ENUMERATED {supported}
                                                                OPTIONAL,
   ul-256QAM-perCC-InfoList-r14
                                     SEQUENCE (SIZE (2..maxServCell-r13)) OF UL-256QAM-perCC-
              OPTIONAL,
Info-r14
   retuningTimeInfoBandList-r14
                                     SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
          RetuningTimeInfo-r14 OPTIONAL
V2X-BandParameters-r14 ::= SEQUENCE {
   v2x-FreqBandEUTRA-r14 FreqBandIndicator-r11, bandParametersTxSL-r14 BandParametersTxSL-r14
                                                                   OPTIONAL.
                                BandParametersRxSL-r14
                                                                    OPTIONAL
   bandParametersRxSL-r14
}
BandParametersTxSL-r14 ::= SEQUENCE {
   OPTIONAL.
                                                                    OPTIONAL
}
BandParametersRxSL-r14 ::= SEQUENCE {
   v2x-BandwidthClassRxSL-r14 V2X-BandwidthClassSL-r14,
   v2x-HighReception-r14
                                  ENUMERATED {supported}
                                                                    OPTIONAL
V2X-BandwidthClassSL-r14 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF V2X-BandwidthClass-r14
UL-256QAM-perCC-Info-r14 ::= SEQUENCE {
                             ENUMERATED {supported}
   ul-2560AM-perCC-r14
                                                                OPTIONAL
BandParametersUL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersUL-r10
BandParametersUL-r13 ::= CA-MIMO-ParametersUL-r10
CA-MIMO-ParametersUL-r10 ::= SEQUENCE {
   ca-BandwidthClassUL-r10
                                      CA-BandwidthClass-r10,
   supportedMIMO-CapabilityUL-r10
                                     MIMO-CapabilityUL-r10
                                                                       OPTIONAL
BandParametersDL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-r10
BandParametersDL-r13 ::= CA-MIMO-ParametersDL-r13
CA-MIMO-ParametersDL-r10 ::= SEQUENCE {
   ca-BandwidthClassDL-r10
                                     CA-BandwidthClass-r10.
   supportedMIMO-CapabilityDL-r10 MIMO-CapabilityDL-r10
                                                                       OPTIONAL.
CA-MIMO-ParametersDL-v10i0 ::= SEQUENCE {
                                     ENUMERATED {supported}
   fourLayerTM3-TM4-r10
                                                                       OPTIONAL
CA-MIMO-ParametersDL-v1270 ::= SEQUENCE {
   intraBandContiguousCC-InfoList-r12
                                           SEQUENCE (SIZE (1..maxServCell-r10)) OF
{\tt IntraBandContiguousCC-Info-r12}
CA-MIMO-ParametersDL-r13 ::= SEQUENCE {
   ca-BandwidthClassDL-r13 CA-BandwidthClass-r10, supportedMIMO-CapabilityDL-r13 MIMO-CapabilityDL-r10 fourLayerTM3-TM4-r13
                                                                            OPTIONAL,
                                           ENUMERATED {supported}
   fourLayerTM3-TM4-r13
   OPTIONAL,
IntraBandContiguousCC-Info-r12
}
IntraBandContiguousCC-Info-r12 ::= SEQUENCE {
   fourLayerTM3-TM4-perCC-r12 ENUMERATED {supported}
                                                                        OPTIONAL.
   supportedMIMO-CapabilityDL-r12
                                      MIMO-CapabilityDL-r10
                                                                        OPTIONAL,
   supportedCSI-Proc-r12
                                     ENUMERATED {n1, n3, n4}
                                                                       OPTIONAL
CA-BandwidthClass-r10 ::= ENUMERATED \{a, b, c, d, e, f, ...\}
V2X-BandwidthClass-r14 ::= ENUMERATED {a, b, c, d, e, f, ...}
MIMO-CapabilityUL-r10 ::= ENUMERATED {twoLayers, fourLayers}
```

```
MIMO-CapabilityDL-r10 ::= ENUMERATED {twoLayers, fourLayers, eightLayers}
                                           SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA
SupportedBandListEUTRA ::=
SupportedBandListEUTRA-v9e0::=
                                                SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v9e0
SupportedBandListEUTRA-v1250 ::=
                                                SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1250
SupportedBandListEUTRA-v1310 ::=
                                                 SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1310
SupportedBandListEUTRA-v1320 ::=
                                                SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1320
SupportedBandEUTRA ::=
                                           SEQUENCE {
     bandEUTRA
                                                  FreqBandIndicator,
    halfDuplex
                                                  BOOLEAN
}
SupportedBandEUTRA-v9e0 ::= SEQUENCE {
     bandEUTRA-v9e0
                                               FreqBandIndicator-v9e0
                                                                                     OPTIONAL
SupportedBandEUTRA-v1250 ::= SEQUENCE {
                                                 ENUMERATED {supported} OPTIONAL, ENUMERATED {supported} OPTIONAL
    dl-256QAM-r12
    ul-640AM-r12
}
SupportedBandEUTRA-v1310 ::= SEQUENCE {
   ue-PowerClass-5-r13 ENUMERATED {supported} OPTIONAL
}
SupportedBandEUTRA-v1320 ::= SEQUENCE {
   intraFreq-CE-NeedForGaps-r13 ENUMERATED {supported}
                                       SEQUENCE {
                                                            ENUMERATED {supported}
                                                                                                         OPTIONAL,
     ue-PowerClass-N-r13 ENUMERATED {class1, class2, class4} OPTIONAL
}
MeasParameters ::=
                                            SEQUENCE {
    bandListEUTRA
                                                BandListEUTRA
    bandCombinationListEUTRA-r10 SEQUENCE {
MeasParameters-v1020 ::=
                                             BandCombinationListEUTRA-r10
MeasParameters-v1130 ::= SEQUENCE {
    rsrqMeasWideband-r11 ENUMERATED {supported}
                                                                                             OPTIONAL
}
MeasParameters-v11a0 ::= SEQUENCE {
benefitsFromInterruption-r11 ENU
                                            ENUMERATED {true}
                                                                                 OPTIONAL
}
    alternativeTimeToTrigger-r12 ENUMERATED {supported} OPTIONAL, incMonEUTRA-r12 ENUMERATED {supported} OPTIONAL, incMonUTRA-r12 ENUMERATED {supported} OPTIONAL, extendedMaxMeacate r12
MeasParameters-v1250 ::= SEQUENCE {
    timerT312-r12
    incMonEUTRA-r12 ENUMERATED {supported}
incMonUTRA-r12 ENUMERATED {supported}
extendedMaxMeasId-r12 ENUMERATED {supported}
extendedRSRQ-LowerRange-r12 ENUMERATED {supported}
rsrq-OnAllSymbols-r12 ENUMERATED {supported}
crs-DiscoverySignalsMeas-r12 ENUMERATED {supported}
csi-RS-DiscoverySignalsMeas-r12 ENUMERATED {supported}
extendedRSRQ-LowerRange-r12 ENUMERATED {supported}
csi-RS-DiscoverySignalsMeas-r12 ENUMERATED {supported}
                                                                                     OPTIONAL,
                                                                                     OPTIONAL,
                                                                                     OPTIONAL,
                                                                                     OPTIONAL.
                                                                                     OPTIONAL
MeasParameters-v1310 ::= SEQUENCE {
    rs-SINR-Meas-r13 EN
                                              ENUMERATED {supported}
                                                                                        OPTIONAL.
                                                                                        OPTIONAL,
     whiteCellList-r13
                                                      ENUMERATED {supported}
     extendedMaxObjectId-r13
                                                       ENUMERATED {supported}
                                                                                          OPTIONAL,
    ul-PDCP-Delay-r13
                                                      ENUMERATED (supported)
                                                                                         OPTIONAL,
     extendedFreqPriorities-r13 ENUMERATED {supported}
multiBandInfoReport-r13 ENUMERATED {supported}
                                                                                         OPTIONAL.
                                                                                          OPTIONAL,
     multiBandInfoReport-r13
                                                       ENUMERATED {supported}
     rssi-AndChannelOccupancyReporting-r13 ENUMERATED {supported}
                                                                                         OPTIONAL
}
MeasParameters-v1430 ::= ceMeasurements-r14
                                           SEQUENCE {
                                                      ENUMERATED {supported}
ENUMERATED {supported}
                                                                                          OPTIONAL,
                                                                                          OPTIONAL,
     ncsq-r14
     shortMeasurementGap-r14
                                                       ENUMERATED {supported}
                                                                                                    OPTIONAL,
     perServingCellMeasurementGap-r14 ENUMERATED {supported}
                                                                                               OPTIONAL,
```

```
nonUniformGap-r14
                                         ENUMERATED {supported}
                                                                              OPTIONAL
BandListEUTRA ::=
                                   SEQUENCE (SIZE (1..maxBands)) OF BandInfoEUTRA
BandCombinationListEUTRA-r10 ::=
                                   SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandInfoEUTRA
BandInfoEUTRA ::=
                                   SEOUENCE {
   interFreqBandList
                                       InterFreqBandList,
    interRAT-BandList
                                       InterRAT-BandList
                                                              OPTIONAL
InterFreqBandList ::=
                                  SEQUENCE (SIZE (1..maxBands)) OF InterFreqBandInfo
InterFreqBandInfo ::=
                                   SEQUENCE {
   interFreqNeedForGaps
                                      BOOLEAN
InterRAT-BandList ::=
                                  SEQUENCE (SIZE (1..maxBands)) OF InterRAT-BandInfo
InterRAT-BandInfo ::=
                                   SEOUENCE {
   interRAT-NeedForGaps
                                      BOOLEAN
   supportedBandListUTRA-FDD ::= SEQUENCE {
IRAT-ParametersUTRA-FDD ::=
                                      SupportedBandListUTRA-FDD
IRAT-ParametersUTRA-v920 ::=
                                  SEQUENCE {
                                      ENUMERATED {supported}
   e-RedirectionUTRA-r9
IRAT-ParametersUTRA-v9c0 ::=
                                SEQUENCE {
                                                  ENUMERATED {supported}
   voiceOverPS-HS-UTRA-FDD-r9
                                                                              OPTIONAL.
   voiceOverPS-HS-UTRA-TDD128-r9
                                                  ENUMERATED {supported}
                                                                              OPTIONAL,
    srvcc-FromUTRA-FDD-ToUTRA-FDD-r9
                                                   ENUMERATED {supported}
                                                                               OPTIONAL,
   srvcc-FromUTRA-FDD-ToGERAN-r9
                                                  ENUMERATED {supported}
                                                                              OPTIONAL,
                                                 ENUMERATED {supported}
ENUMERATED {supported}
    srvcc-FromUTRA-TDD128-ToUTRA-TDD128-r9
                                                                              OPTIONAL,
    srvcc-FromUTRA-TDD128-ToGERAN-r9
                                                                              OPTIONAL
}
IRAT-ParametersUTRA-v9h0 ::=
                                   SEQUENCE {
   mfbi-UTRA-r9
                                       ENUMERATED {supported}
SupportedBandListUTRA-FDD ::=
                                  SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-FDD
SupportedBandUTRA-FDD ::=
                                   ENUMERATED {
                                       bandI, bandII, bandIII, bandIV, bandV, bandVI,
                                       bandVII, bandVIII, bandIX, bandX, bandXI,
                                       bandXII, bandXIII, bandXIV, bandXVI, ...,
                                       bandXVII-8a0, bandXVIII-8a0, bandXIX-8a0, bandXX-8a0,
                                       bandXXI-8a0, bandXXII-8a0, bandXXIV-8a0, bandXXIV-8a0,
                                       bandXXV-8a0, bandXXVI-8a0, bandXXVII-8a0, bandXXVIII-8a0,
                                       bandXXIX-8a0, bandXXX-8a0, bandXXXI-8a0, bandXXXII-8a0}
IRAT-ParametersUTRA-TDD128 ::=
                                   SEQUENCE {
                                      SupportedBandListUTRA-TDD128
   supportedBandListUTRA-TDD128
SupportedBandListUTRA-TDD128 ::=
                                   SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD128
SupportedBandUTRA-TDD128 ::=
                                   ENUMERATED {
                                       a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                       o, p, ...}
IRAT-ParametersUTRA-TDD384 ::=
                                   SEQUENCE {
                                      SupportedBandListUTRA-TDD384
   supportedBandListUTRA-TDD384
SupportedBandListUTRA-TDD384 ::=
                                   SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD384
SupportedBandUTRA-TDD384 ::=
                                   ENUMERATED {
                                           a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                           o, p, ...}
IRAT-ParametersUTRA-TDD768 ::=
                                   SEOUENCE {
  supportedBandListUTRA-TDD768
                                      SupportedBandListUTRA-TDD768
```

```
}
SupportedBandListUTRA-TDD768 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD768
SupportedBandUTRA-TDD768 ::=
                                       ENUMERATED {
                                         a, b, c, d, e, f, g, h, i, j, k, l, m, n,
                                           o, p, ...}
IRAT-ParametersUTRA-TDD-v1020 ::=
                                           SEQUENCE {
    e-RedirectionUTRA-TDD-r10
                                             ENUMERATED {supported}
IRAT-ParametersGERAN ::= SEQUENCE {
   supportedBandListGERAN SupportedBandListGERAN,
   interpart DS NO TECHNAN PRODUCTION
    interRAT-PS-HO-ToGERAN
                                           BOOLEAN
}
{\tt IRAT-ParametersGERAN-v920} ::= \\ {\tt SEQUENCE} \ \{
                                          ENUMERATED {supported} OPTIONAL, ENUMERATED {supported} OPTIONAL
   dtm-r9
    e-RedirectionGERAN-r9
SupportedBandListGERAN ::=
                                      SEQUENCE (SIZE (1..maxBands)) OF SupportedBandGERAN
                                       ENUMERATED {
SupportedBandGERAN ::=
                                           gsm450, gsm480, gsm710, gsm750, gsm810, gsm850,
                                            gsm900P, gsm900E, gsm900R, gsm1800, gsm1900,
                                            spare5, spare4, spare3, spare2, spare1, ...}
IRAT-ParametersCDMA2000-HRPD ::= SEQUENCE {
   supportedBandListHRPD
                                           SupportedBandListHRPD,
    tx-ConfigHRPD
                                            ENUMERATED {single, dual},
    rx-ConfigHRPD
                                           ENUMERATED {single, dual}
}
SupportedBandListHRPD ::=
                                      SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000
IRAT-ParametersCDMA2000-1XRTT ::= SEQUENCE {
    supportedBandList1XRTT
                                           SupportedBandList1XRTT,
    tx-Config1XRTT
                                            ENUMERATED {single, dual},
    rx-Config1XRTT
                                            ENUMERATED {single, dual}
}
IRAT-ParametersCDMA2000-1XRTT-v920 ::= SEQUENCE {
    e-CSFB-ConcPS-MoblXRTT-r9
   e-CSFB-1XRTT-r9
                                           ENUMERATED {supported},
                                           ENUMERATED {supported}
                                                                             OPTIONAL
}
IRAT-ParametersCDMA2000-1XRTT-v1020 ::= SEQUENCE {
                                          ENUMERATED {supported}
   e-CSFB-dual-1XRTT-r10
IRAT-ParametersCDMA2000-v1130 ::= SEQUENCE {
    cdma2000-NW-Sharing-r11
                                               ENUMERATED {supported} OPTIONAL
}
SupportedBandList1XRTT ::=
                                      SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000
IRAT-ParametersWLAN-r13 ::= SEQUENCE {
    supportedBandListWLAN-r13 SEQUEN
                                     SEQUENCE (SIZE (1..maxWLAN-Bands-r13)) OF WLAN-BandIndicator-r13
                     OPTIONAL
CSG-ProximityIndicationParameters-r9 ::= SEQUENCE {
    -ProximityIndicationParameters-r9 ::= SEQUENCE {
intraFreqProximityIndication-r9 ENUMERATED {supported}
interFreqProximityIndication-r9 ENUMERATED {supported}
utran-ProximityIndication-r9 ENUMERATED {supported}
                                                                        OPTIONAL,
                                                                        OPTIONAL.
                                                                           OPTIONAL
}
NeighCellSI-AcquisitionParameters-r9 ::= SEQUENCE {
    intraFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL, interFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,
                                          ENUMERATED {supported}
    utran-SI-AcquisitionForHO-r9
                                                                             OPTIONAL
}
SON-Parameters-r9 ::= SEQUENCE {
    rach-Report-r9
                                          ENUMERATED {supported}
                                                                             OPTIONAL
```

```
UE-BasedNetwPerfMeasParameters-r10 ::= SEQUENCE {
    loggedMeasurementsIdle-r10 ENUMERATED {supported} OPTIONAL, standaloneGNSS-Location-r10 ENUMERATED {supported} OPTIONAL.
    standaloneGNSS-Location-r10
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL
UE-BasedNetwPerfMeasParameters-v1250 ::= SEQUENCE {
    loggedMBSFNMeasurements-r12
                                                 ENUMERATED {supported}
}
UE-BasedNetwPerfMeasParameters-v1430 ::= SEQUENCE {
                                                  ENUMERATED {supported} OPTIONAL
    locationReport-r14
OTDOA-PositioningCapabilities-r10 ::= SEQUENCE {
    interFreqRSTD-Measurement-r10 ENUMERATED {supported},
   otdoa-UE-Assisted-r10
                                                 ENUMERATED {supported}
                                                                                  OPTIONAL
}
Other-Parameters-r11 ::=
                                             SEQUENCE {
                                                 ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL.
   inDeviceCoexInd-r11
                                              ENUMERATED {supported}
    powerPrefInd-r11
    ue-Rx-TxTimeDiffMeasurements-r11
}
                                           SEQUENCE {
Other-Parameters-v11d0 ::=
   inDeviceCoexInd-UL-CA-r11
                                                ENUMERATED {supported} OPTIONAL
Other-Parameters-v1360 ::= SEQUENCE {
    inDeviceCoexInd-HardwareSharingInd-r13 ENUMERATED {supported}
                                                                                     OPTIONAL
Other-Parameters-v1430 ::=
                                   SEQUENCE {
ENUMERATED {supported}
                                                                         OPTIONAL.
    bwPrefInd-r14
    rlm-ReportSupport-r14
                                        ENUMERATED {supported}
                                                                         OPTIONAL
MBMS-Parameters-r11 ::= SEQUENCE {
                                                 ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL
    mbms-SCell-r11
    mbms-NonServingCell-r11
                                                  ENUMERATED {supported}
                                                                                  OPTIONAL
}
MBMS-Parameters-v1250 ::= SEQUENCE {
    mbms-AsyncDC-r12
                                                 ENUMERATED {supported} OPTIONAL
}
                                      SEQUENCE {
ENUMERATED {supported}
ENUMERATED {supported}
MBMS-Parameters-v1430 ::=
    ENUMERATED {supported} OPTIONAL, subcarrierSpacingMBMS-khz7dot5-r14 ENUMERATED {supported} OPTIONAL, subcarrierSpacingMBMS-khz1dot25-r14 ENUMERATED {supported} OPTIONAL, OPTIONAL
}
FeMBMS-Unicast-Parameters-r14 ::= unicast-fembmsMixedSCell-r14
                                            SEQUENCE {
                                                 ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL
    emptyUnicastRegion-r14
SCPTM-Parameters-r13 ::=
    scptm-ParallelReception-r13
                                           SEQUENCE {
                                                      ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL
    scptm-SCell-r13
    scptm-NonServingCell-r13
    scptm-AsyncDC-r13
}
CE-Parameters-r13 ::=
                              SEQUENCE {
   ce-ModeA-r13
                                             ENUMERATED {supported}
ENUMERATED {supported}
                                                                                     OPTIONAL,
                                             ENUMERATED (supported)
    ce-ModeB-r13
                                                                                     OPTIONAL
}
CE-Parameters-v1320 ::=
                              SEQUENCE {
   intraFreqA3-CE-ModeA-r13
                                                 ENUMERATED {supported}
                                                                                          OPTIONAL,
                                                 ENUMERATED {supported}
    intraFreqA3-CE-ModeB-r13
                                                                                          OPTIONAL,
    intraFreqHO-CE-ModeA-r13
                                                 ENUMERATED {supported}
                                                                                           OPTIONAL,
    intraFreqHO-CE-ModeB-r13
                                                  ENUMERATED {supported}
                                                                                           OPTIONAL
}
```

```
CE-Parameters-v1350 ::= SEQUENCE {
                                                  ENUMERATED {supported}
    unicastFrequencyHopping-r13
                                                                                            OPTIONAL
}
CE-Parameters-v1370 ::=
                              SEQUENCE {
                                                   ENUMERATED {supported} OPTIONAL, ENUMERATED {supported} OPTIONAL
   tm9-CE-ModeA-r13
    tm9-CE-ModeB-r13
}
CE-Parameters-v1430 ::=
                              SEQUENCE {
   ce-SwitchWithoutHO-r14
                                                  ENUMERATED {supported}
                                                                                           OPTIONAL
LAA-Parameters-r13 ::=
                                        SEQUENCE {
                                                     ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL
   crossCarrierSchedulingLAA-DL-r13
                                            ENUMERATED {supported}
                                                       ENUMERATED {supported}
    csi-RS-DRS-RRM-MeasurementsLAA-r13
    downlinkLAA-r13
    endingDwPTS-r13
    secondSlotStartingPosition-r13
    tm9-LAA-r13
    tm10-LAA-r13
LAA-Parameters-v1430 ::=
                                            SEQUENCE {
    crossCarrierSchedulingLAA-UL-r14 ENUMERATED {supported} OPTIONAL, uplinkLAA-r14 ENUMERATED {supported} OPTIONAL,
    uplinkLAA-r14 ENUMERATED {Supported} Office Label twoStepSchedulingTimingInfo-r14 ENUMERATED {nPlus1, nPlus2, nPlus3} OPTIONAL, uss-BlindDecodingAdjustment-r14 ENUMERATED {supported} OPTIONAL, uss-BlindDecodingReduction-r14 ENUMERATED {supported} OPTIONAL, optional.
    outOfSequenceGrantHandling-r14
                                                     ENUMERATED {supported}
}
WLAN-IW-Parameters-r12 ::= SEQUENCE {
                                      ENUMERATED {supported} OPTIONAL,
    wlan-IW-RAN-Rules-r12
    wlan-IW-ANDSF-Policies-r12
                                                        ENUMERATED {supported} OPTIONAL
}
LWA-Parameters-v1430 ::= SEQUENCE {
    OPTIONAL,
    lwa-UL-r14ENUMERATED { supported}wlan-PeriodicMeas-r14ENUMERATED { supported}wlan-ReportAnyWLAN-r14ENUMERATED { supported}wlan-SupportedDataRate-r14INTEGER (1..2048)
                                                                             OPTIONAL.
                                                                          OPTIONAL,
OPTIONAL,
OPTIONAL,
}
LWA-Parameters-v1440 ::= SEQUENCE {
    lwa-RLC-UM-r14
                                             ENUMERATED {supported} OPTIONAL
}
WLAN-IW-Parameters-v1310 ::= SEQUENCE {
                                                          ENUMERATED {supported}
   rclwi-r13
LWIP-Parameters-r13 ::= SEQUENCE {
                                 ENUMERATED {supported}
    lwip-r13
                                                                            OPTIONAL
LWIP-Parameters-v1430 ::= SEQUENCE { lwip-Aggregation-DL-r14
                                                   ENUMERATED {supported}
                                                                                            OPTIONAL,
                                                   ENUMERATED (supported)
    lwip-Aggregation-UL-r14
                                                                                            OPTIONAL
NAICS-Capability-List-r12 ::= SEQUENCE (SIZE (1..maxNAICS-Entries-r12)) OF NAICS-Capability-Entry-
NAICS-Capability-Entry-r12 ::= SEQUENCE {
    numberOfNAICS-CapableCC-r12
                                                   INTEGER(1..5),
    numberOfAggregatedPRB-r12
                                                   ENUMERATED
                                                       n50, n75, n100, n125, n150, n175,
                                                       n200, n225, n250, n275, n300, n350,
```

```
n400, n450, n500, spare},
    . . .
}
SL-Parameters-r12 ::=
                                          SEQUENCE {
                                        ENUMERATED {supported} OPTIONAL,
   commSimultaneousTx-r12
    commSupportedBands-r12
discSupportedBands-r12
                                                   FregBandIndicatorListEUTRA-r12 OPTIONAL,
                                                  SupportedBandInfoList-r12 OPTIONAL,
    discScheduledResourceAlloc-r12
                                                  ENUMERATED {supported} OPTIONAL,
    disc-ScheduledResourceAlloc-r12
disc-UE-SelectedResourceAlloc-r12
disc-SLSS-r12
                                                   ENUMERATED (supported)
ENUMERATED (supported)
ENUMERATED (n50, n400)
                                                                                    OPTIONAL,
                                                                                   OPTIONAL,
    discSupportedProc-r12
                                                                                   OPTIONAL
}
                                         SEQUENCE {
SL-Parameters-v1310 ::=
   Parameters-v1310 ::=
discSysInfoReporting-r13
                                                        ENUMERATED {supported}
                                                                                        OPTIONAL,
                                                        ENUMERATED {supported} OPTIONAL ENUMERATED {supported} OPTIONAL ENUMERATED {supported} OPTIONAL
    commMultipleTx-r13
                                                                                         OPTIONAL,
    discInterFreqTx-r13
                                                                                         OPTIONAL,
    discPeriodicSLSS-r13
}
    zoneBasedPoolSelection-r14 SEQUENCE {
ue-Autonomous-Vision
SL-Parameters-v1430 ::=
    zoneBasedPoolSelection-r14 ENUMERATED {supported} ue-AutonomousWithFullSensing-r14 ENUMERATED {supported}
                                                                                              OPTIONAL,
                                                                                              OPTIONAL,
    ue-AutonomousWithPartialSensing-r14 ENUMERATED {supported} sl-CongestionControl-r14 ENUMERATED {supported}
                                                                                              OPTIONAL,
                                                                                              OPTIONAL,
    sl-CongestionControl-r14 ENUMERATED {supported} v2x-TxWithShortResvInterval-r14 ENUMERATED {supported}
                                                                                              OPTIONAL,
                                                   INTEGER(1..16)
    v2x-numberTxRxTiming-r14
    v2x-numberTxRxTiming-r14 INIEGER(1..10)
v2x-nonAdjacentPSCCH-PSSCH-r14 ENUMERATED {supported}
                                                                                             OPTIONAL,
                                                   ENUMERATED {supported}
    slss-TxRx-r14
                                                                                              OPTIONAL.
    v2x-SupportedBandCombinationList-r14
                                                   V2X-SupportedBandCombination-r14
                                                                                              OPTIONAL
V2X-SupportedBandCombination-r14 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF V2X-
BandCombinationParameters-r14
V2X-BandCombinationParameters-r14 ::= SEQUENCE (SIZE (1.. maxSimultaneousBands-r10)) OF V2X-
BandParameters-r14
SupportedBandInfoList-r12 ::=
                                        SEQUENCE (SIZE (1..maxBands)) OF SupportedBandInfo-r12
SupportedBandInfo-r12 ::=
                                          SEQUENCE {
    support-r12
                                                   ENUMERATED {supported} OPTIONAL
FreqBandIndicatorListEUTRA-r12 ::=
                                             SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11
MMTEL-Parameters-r14 ::=
                                        SEQUENCE {
    delayBudgetReporting-r14
                                                        ENUMERATED {supported}
                                                                                         OPTIONAL,
                                                        ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL,
ENUMERATED {supported} OPTIONAL
    pusch-Enhancements-r14
    recommendedBitRate-r14
    recommendedBitRateQuery-r14
}
RetuningTimeInfo-r14 ::= SEQUENCE {
   retuningInfo
                                   SEQUENCE {
        rf-RetuningTimeDL-r14
                                              ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3,
                                                             n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5,
        n7, spare1 OPTIONAL, rf-RetuningTimeUL-r14 ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3,
                                                             n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5, n7, spare1} OPTIONAL
    }
HighSpeedEnhParameters-r14 ::= SEQUENCE {
    measurementEnhancements-r14 ENUMERATED {supported} demodulationEnhancements-r14 ENUMERATED {supported}
                                                                           OPTIONAL,
                                                                           OPTIONAL,
                                      ENUMERATED {supported}
    prach-Enhancements-r14
                                                                           OPTIONAL
-- ASN1STOP
```

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
accessStratumRelease	-
Set to rel14 in this version of the specification. NOTE 7.	
additionalRx-Tx-PerformanceReq	-
Indicates whether the UE supports the additional Rx and Tx performance requirement for a	
given band combination as specified in TS 36.101 [42]. alternativeTBS-Indices	
Indicates whether the UE supports alternative TBS indices I_{TBS} 26A and 33B as specified in TS	-
36.213 [23].	
alternativeTBS-Index	_
Indicates whether the UE supports alternative TBS index I _{TBS} 33B as specified in TS 36.213	
[23].	
alternativeTimeToTrigger	No
Indicates whether the UE supports alternativeTimeToTrigger.	
aperiodicCSI-Reporting	No
Indicates whether the UE supports aperiodic CSI reporting with 3 bits of the CSI request field	
size as specified in TS 36.213 [23, 7.2.1] and/or aperiodic CSI reporting mode 1-0 and mode 1-	
1 as specified in TS 36.213 [23, 7.2.1]. The first bit is set to "1" if the UE supports the aperiodic	
CSI reporting with 3 bits of the CSI request field size. The second bit is set to "1" if the UE	
supports the aperiodic CSI reporting mode 1-0 and mode 1-1.	
bandCombinationListEUTRA One entry corresponding to each supported band combination listed in the same order as in	-
supportedBandCombination.	
BandCombinationParameters-v1090, BandCombinationParameters-v10i0,	_
BandCombinationParameters-v1270	
If included, the UE shall include the same number of entries, and listed in the same order, as in	
BandCombinationParameters-r10.	
BandCombinationParameters-v1130	-
The field is applicable to each supported CA bandwidth class combination (i.e. CA configuration	
in TS 36.101 [42, Section 5.6A.1]) indicated in the corresponding band combination. If	
included, the UE shall include the same number of entries, and listed in the same order, as in	
BandCombinationParameters-r10.	
bandEUTRA	-
E-UTRA band as defined in TS 36.101 [42]. In case the UE includes bandEUTRA-v9e0 or	
bandEUTRA-v1090, the UE shall set the corresponding entry of bandEUTRA (i.e. without suffix) or bandEUTRA-r10 respectively to maxFBI.	
bandListEUTRA	_
One entry corresponding to each supported E-UTRA band listed in the same order as in	
supportedBandListEUTRA.	
bandParametersDL, bandParametersDL	-
Indicates the supported parameters for the band. Each of CA-MIMO-ParametersUL and CA-	
MIMO-ParametersDL can be included only once for one band in a single band combination	
entry.	
beamformed (in MIMO-CA-ParametersPerBoBCPerTM)	-
If signalled, the field indicates for a particular transmission mode, the UE capabilities	
concerning beamformed EBF/ FD-MIMO operation (class B) applicable for the concerned band	
combination.	TOO
beamformed (in MIMO-UE-ParametersPerTM)	TBD
Indicates for a particular transmission mode, the UE capabilities concerning beamformed EBF/FD-MIMO operation (class B) applicable for band combinations for which the concerned	
capabilities are not signalled.	
benefitsFromInterruption	No
Indicates whether the UE power consumption would benefit from being allowed to cause	
interruptions to serving cells when performing measurements of deactivated SCell carriers for	
measCycleSCell of less than 640ms, as specified in TS 36.133 [16].	
bwPrefInd	-
Indicates whether the UE supports maximum PDSCH/PUSCH bandwidth preference indication.	
ca-BandwidthClass	-
The CA bandwidth class supported by the UE as defined in TS 36.101 [42, Table 5.6A-1].	
The UE explicitly includes all the supported CA bandwidth class combinations in the band	
combination signalling. Support for one CA bandwidth class does not implicitly indicate support	
for another CA bandwidth class.	

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
cch-InterfMitigation-RefRecTypeA, cch-InterfMitigation-RefRecTypeB, cch-	-
InterfMitigation-MaxNumCCs The field cch-InterfMitigation-RefRecTypeA defines whether the UE supports Type A downlink control channel interference mitigation (CCH-IM) receiver "LMMSE-IRC + CRS-IC" for PDCCH/PCFICH/PHICH/EPDCCH receive processing (Enhanced downlink control channel performance requirements Type A in the TS 36.101 [6]). The field cch-InterfMitigation-RefRecTypeB defines whether the UE supports Type B downlink CCH-IM receiver "E-LMMSE-IRC + CRS-IC" for PDCCH/PCFICH/PHICH receive processing in synchronous networks (Enhanced downlink control channel performance requirements Type B in the TS 36.101 [6]). The UE supporting the capability defined by cch-InterfMitigation-RefRecTypeB-r13 shall also support the capability defined by cch-InterfMitigation-RefRecTypeA-r13.	
If the UE sets one or more of the fields <i>cch-InterfMitigation-RefRecTypeA</i> and <i>cch-InterfMitigation-RefRecTypeB</i> to "supported", the UE shall include the parameter <i>cch-InterfMitigation-MaxNumCCs</i> to indicate that the UE supports CCH-IM on at least one arbitrary downlink CC for up to <i>cch-InterfMitigation-MaxNumCCs</i> downlink CC CA configuration. The UE shall not include the parameter <i>cch-InterfMitigation-MaxNumCCs</i> if neither <i>cch-InterfMitigation-RefRecTypeA</i> nor <i>cch-InterfMitigation-RefRecTypeB</i> is present. The UE may not perform CCH-IM on more than 1 DL CCs. For example, the UE sets " <i>cch-InterfMitigation-MaxNumCCs</i> = 3" to indicate that UE supports CCH-IM on at least one DL CC for supported non-CA, 2DL CA and 3DL CA configurations. For CA scenarios, the CCH-IM is guaranteed to be supported on at least one arbitrary component carrier.	
cdma2000-NW-Sharing	-
Indicates whether the UE supports network sharing for CDMA2000.	Vaa
ce-ClosedLoopTxAntennaSelection Indicates whether the UE supports UL closed-loop Tx antenna selection in CE mode A, as specified in TS 36.212 [22].	Yes
ce-HARQ-AckBundling Indicates whether the UE supports HARQ-ACK bundling in half duplex FDD in CE mode A, as specified in TS 36.212 [22] and TS 36.213 [23].	-
ce-ModeA, ce-ModeB Indicates whether the UE supports operation in CE mode A and/or B, as specified in TS 36.211 [21] and TS 36.213 [23].	-
ceMeasurements Indicates whether the UE supports intra-frequency RSRQ measurements and inter-frequency RSRP and RSRQ measurements in RRC_CONNECTED, as specified in TS 36.133 [16] and TS 36.304 [4].	-
ce-PDSCH-PUSCH-Enhancement Indicates whether the UE supports new numbers of repetitions for PUSCH and modulation restrictions for PDSCH/PUSCH in CE mode A as specified in TS 36.212 [22] and TS 36.213 [23].	No
ce-PDSCH-PUSCH-MaxBandwidth Indicates the maximum supported PDSCH/PUSCH channel bandwidth in CE mode A and B, as specified in TS 36.212 [22] and TS 36.213 [23]. Value bw5 corresponds to 5 MHz and value bw20 corresponds to 20 MHz. If the field is absent the maximum PDSCH/PUSCH channel bandwidth in CE mode A and B is 1.4 MHz. If the setting of this parameter is 20 MHz, the max supported PUSCH channel bandwidth in CE mode A is 5 MHz. The maximum PUSCH channel bandwidth in CE mode B is 1.4 MHz regardless of the setting of this parameter. Parameter: transmission bandwidth configuration, see TS 36.101 [42, table 5.6-1].	Yes
ce-PDSCH-TenProcesses Indicates whether the UE supports 10 DL HARQ processes in FD FDD in CE mode A.	-
ec-PUCCH-Enhancement	No
Indicates whether the UE supports repetition levels 64 and 128 for PUCCH in CE Mode B, as specified in TS 36.211 [21] and in TS 36.213 [23]. ce-PUSCH-NB-MaxTBS	Yes
Indicates whether the UE supports 2984 bits max UL TBS in 1.4 MHz in CE mode A operation, as specified in TS 36.212 [22] and TS 36.213 [23].	1 625
ce-RetuningSymbols Indicates the number of retuning symbols in CE mode A and B as specified in TS 36.211 [21]. Value n0 corresponds to 0 retuning symbols and value n1 corresponds to 1 retuning symbol. If the field is absent the number of retuning symbols in CE mode A and B is 2.	No
ce-SchedulingEnhancement Indicates whether the UE supports dynamic HARQ-ACK delay in CE mode A as specified in TS 36.212 [22] and TS 36.213 [23].	No

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
ce-srsEnhancement Indicates whether the UE supports SRS coverage enhancement in TDD as specified in TS 36.213 [23].	-
ce-SwitchWithoutHO Indicate whether the UE supports switching between normal mode and enhanced coverage mode without handover.	-
channelMeasRestriction Indicates for a particular transmission mode whether the UE supports channel measurement restriction.	TBD
codebook-HARQ-ACK Indicates whether the UE supports determining HARQ ACK codebook size based on the DAI-ased solution and/or the number of configured CCs. The first bit is set to "1" if the UE supports the DAI-based codebook size determination. The second bit is set to "1" if the UE supports the codebook determination based on the number of configured CCs.	No
commMultipleTx Indicates whether the UE supports multiple transmissions of sidelink communication to different destinations in one SC period. If commMultipleTx-r13 is set to supported then the UE support 8 transmitting sidelink processes.	-
commSimultaneousTx Indicates whether the UE supports simultaneous transmission of EUTRA and sidelink communication (on different carriers) in all bands for which the UE indicated sidelink support in a band combination (using commSupportedBandsPerBC).	-
commSupportedBands Indicates the bands on which the UE supports sidelink communication, by an independent list of bands i.e. separate from the list of supported E UTRA band, as indicated in supportedBandListEUTRA.	-
commSupportedBandsPerBC Indicates, for a particular band combination, the bands on which the UE supports simultaneous reception of EUTRA and sidelink communication. If the UE indicates support simultaneous transmission (using commSimultaneousTx), it also indicates, for a particular band combination, the bands on which the UE supports simultaneous transmission of EUTRA and sidelink communication. The first bit refers to the first band included in commSupportedBands, with value 1 indicating sidelink is supported.	-
configN (in MIMO-CA-ParametersPerBoBCPerTM) If signalled, the field indicates for a particular transmission mode whether the UE supports non-precoded EBF/ FD-MIMO (class A) related configuration N for the concerned band combination.	-
configN (in MIMO-UE-ParametersPerTM) Indicates for a particular transmission mode whether the UE supports non-precoded EBF/FD-MIMO (class A) related configuration N for band combinations for which the concerned capabilities are not signalled.	TBD
crossCarrierScheduling	Yes
crossCarrierScheduling-B5C	No
Indicates whether the UE supports cross carrier scheduling beyond 5 DL CCs. crossCarrierSchedulingLAA-DL Indicates whether the UE supports cross-carrier scheduling from a licensed carrier for LAA cell(s) for downlink. This field can be included only if downlinkLAA is included.	-
crossCarrierSchedulingLAA-UL Indicates whether the UE supports cross-carrier scheduling from a licensed carrier for LAA cell(s) for uplink. This field can be included only if uplinkLAA is included.	-
crs-DiscoverySignalsMeas Indicates whether the UE supports CRS based discovery signals measurement, and PDSCH/EPDCCH RE mapping with zero power CSI-RS configured for discovery signals.	FFS
crs-InterfHandI Indicates whether the UE supports CRS interference handling.	No
crs-InterfMitigationTM10 The field defines whether the UE supports CRS interference mitigation in transmission mode 10. The UE supporting the crs-InterfMitigationTM10 capability shall also support the crs-InterfHandl capability.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
crs-InterfMitigationTM1toTM9	-
Indicates whether the UE supports CRS interference mitigation (IM) while operating in the following transmission modes (TM): TM 1, TM 2,, TM 8 and TM 9. The UE shall not include the field if it does not support CRS IM in TMs 1-9. If the field is present, the UE supports CRS-IM on at least one arbitrary downlink CC for up to crs-InterfMitigationTM1toTM9-r13 downlink	
CC CA configuration. The UE signals <i>crs-InterfMitigationTM1toTM9-r13</i> value to indicate the maximum <i>crs-InterfMitigationTM1toTM9-r13</i> downlink CC CA configuration where UE may apply CRS IM. For example, the UE sets " <i>crs-InterfMitigationTM1toTM9-r13</i> = 3" to indicate that the UE supports CRS-IM on at least one DL CC for supported non-CA, 2DL CA and 3DL	
CA configurations. The UE supporting the <i>crs-InterfMitigationTM1toTM9-r13</i> capability shall also support the <i>crs-InterfHandl-r11</i> capability.	
csi-RS-DiscoverySignalsMeas	FFS
Indicates whether the UE supports CSI-RS based discovery signals measurement. If this field is included, the UE shall also include <i>crs-DiscoverySignalsMeas</i> .	
csi-RS-DRS-RRM-MeasurementsLAA Indicates whether the UE supports performing RRM measurements on LAA cell(s) based on CSI-RS-based DRS. This field can be included only if downlinkLAA is included.	-
csi-RS-EnhancementsTDD Indicates for a particular transmission mode whether the UE supports CSI-RS enhancements applicable for TDD.	No
csi-SubframeSet Indicates whether the UE supports REL-12 DL CSI subframe set configuration, REL-12 DL CSI subframe set dependent CSI measurement/feedback, configuration of up to 2 CSI-IM resources for a CSI process with no more than 4 CSI-IM resources for all CSI processes of one frequency if the UE supports tm10, configuration of two ZP-CSI-RS for tm1 to tm9, PDSCH RE mapping with two ZP-CSI-RS configurations, and EPDCCH RE mapping with two ZP-CSI-RS	-
configurations if the UE supports EPDCCH. This field is only applicable for UEs supporting TDD.	
dataInactMon Indicates whether the UE supports the data inactivity monitoring as specified in TS 36.321 [6].	-
dc-Support Including this field indicates that the UE supports synchronous DC and power control mode 1. Including this field for a band combination entry comprising of single band entry indicates that the UE supports intra-band contiguous DC. Including this field for a band combination entry comprising of two or more band entries, indicates that the UE supports DC for these bands and that the serving cells corresponding to a band entry shall belong to one cell group (i.e. MCG or SCG). Including field asynchronous indicates that the UE supports asynchronous DC and power control mode 2. Including this field for a TDD/FDD band combination indicates that the	-
UE supports TDD/FDD DC for this band combination. delayBudgetReporting Indicates whether the UE supports delay budget reporting.	No
demodulationEnhancements This field defines whether the UE supports advanced receiver in SFN scenario as specified in TS 36.101 [42].	-
deviceType UE may set the value to "noBenFromBatConsumpOpt" when it does not foresee to particularly benefit from NW-based battery consumption optimisation. Absence of this value means that the device does benefit from NW-based battery consumption optimisation.	-
diffFallbackCombReport Indicates that the UE supports reporting of UE radio access capabilities for the CA band combinations asked by the eNB as well as, if any, reporting of different UE radio access capabilities for their fallback band combination as specified in TS 36.331 [5]. The UE does not report fallback combinations if their UE radio access capabilities are the same as the ones for	-
the CA band combination asked by the eNB. differentFallbackSupported Indicates that the UE supports different capabilities for at least one fallback case of this band combination.	-
discInterFreqTx Indicates whether the UE support sidelink discovery announcements either a) on the primary frequency only or b) on other frequencies also, regardless of the UE configuration (e.g. CA, DC). The UE may set discInterFreqTx to supported when having a separate transmitter or if it can request sidelink discovery transmission gaps.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
discoverySignalsInDeactSCell	FFS
Indicates whether the UE supports the behaviour on DL signals and physical channels when SCell is deactivated and discovery signals measurement is configured as specified in TS 36.211 [21, 6.11A]. This field is included only if UE supports carrier aggregation and includes crs-DiscoverySignalsMeas.	
discPeriodicSLSS Indicates whether the UE supports periodic (i.e. not just one time before sidelink discovery announcement) Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink discovery.	-
discScheduledResourceAlloc Indicates whether the UE supports transmission of discovery announcements based on network scheduled resource allocation.	-
disc-UE-SelectedResourceAlloc Indicates whether the UE supports transmission of discovery announcements based on UE autonomous resource selection.	-
disc-SLSS Indicates whether the UE supports Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink discovery.	-
discSupportedBands Indicates the bands on which the UE supports sidelink discovery. One entry corresponding to each supported E UTRA band, listed in the same order as in supportedBandListEUTRA.	-
discSupportedProc Indicates the number of processes supported by the UE for sidelink discovery.	-
discSysInfoReporting Indicates whether the UE supports reporting of system information for inter-frequency/PLMN sidelink discovery.	-
dI-256QAM Indicates whether the UE supports 256QAM in DL on the band.	-
dmrs-Enhancements (in MIMO-CA-ParametersPerBoBCPerTM) If signalled, the field indicates for a particular transmission mode, that for the concerned band combination the DMRS enhancements are different than the value indicated by field dmrs-Enhancements in MIMO-UE-ParametersPerTM.	-
dmrs-Enhancements (in MIMO-UE-ParametersPerTM) Indicates for a particular transmission mode whether the UE supports DMRS enhancements for the indicated transmission mode.	TBD
dmrs-LessUpPTS Indicates whether the UE supports not to transmit DMRS for PUSCH in UpPTS.	No
downlinkLAA Presence of the field indicates that the UE supports downlink LAA operation including identification of downlink transmissions on LAA cell(s) for full downlink subframes, decoding of common downlink control signalling on LAA cell(s), CSI feedback for LAA cell(s), RRM measurements on LAA cell(s) based on CRS-based DRS.	-
drb-TypeSCG Indicates whether the UE supports SCG bearer.	-
drb-TypeSplit Indicates whether the UE supports split bearer except for PDCP data transfer in UL.	-
dtm Indicates whether the UE supports DTM in GERAN.	-
e-CSFB-1XRTT Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT or not.	Yes
e-CSFB-ConcPS-Mob1XRTT Indicates whether the UE supports concurrent enhanced CS fallback to CDMA2000 1xRTT and PS handover/ redirection to CDMA2000 HRPD.	Yes
e-CSFB-dual-1XRTT Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT for dual Rx/Tx configuration. This bit can only be set to supported if tx-Config1XRTT and rx-Config1XRTT are both set to dual.	Yes
e-HARQ-Pattern-FDD Indicates whether the UE supports enhanced HARQ pattern for TTI bundling operation for FDD.	-
emptyUnicastRegion Indicates whether the UE supports unicast reception in subframes with empty unicast control region as described in TS 36.213 [23] Section 12. This field can be included only if unicast-fembmsMixedSCell and crossCarrierScheduling are included.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
endingDwPTS Indicates whether the UE supports reception ending with a subframe occupied for a DwPTS-duration as described in TS 36.211 [21] and TS 36.213 [23]. This field can be included only if downlinkLAA is included.	-
Enhanced-4TxCodebook Indicates whether the UE supports enhanced 4Tx codebook.	No
enhancedDualLayerTDD Indicates whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD or not.	-
ePDCCH Indicates whether the UE can receive DCI on UE specific search space on Enhanced PDCCH.	Yes
e-RedirectionUTRA	Yes
e-RedirectionUTRA-TDD Indicates whether the UE supports enhanced redirection to UTRA TDD to multiple carrier frequencies both with and without using related SIB provided by <i>RRCConnectionRelease</i> or not.	Yes
extendedFreqPriorities Indicates whether the UE supports extended E-UTRA frequency priorities indicated by cellReselectionSubPriority field.	-
extendedLongDRX Indicates whether the UE supports extended long DRX cycle values of 5.12s and 10.24s in RRC_CONNECTED.	-
extendedMaxMeasId Indicates whether the UE supports extended number of measurement identies as defined by maxMeasId-r12.	No
extendedMaxObjectId Indicates whether the UE supports extended number of measurement object identies as defined by maxObjectId-r13.	No
extendedPollByte Indicates whether the UE supports extended pollByte values as defined by pollByte-r14.	-
extended-RLC-LI-Field Indicates whether the UE supports 15 bit RLC length indicator.	-
extendedRLC-SN-SO-Field Indicates whether the UE supports 16 bits of RLC sequence number and segmentation offset.	-
extendedRSRQ-LowerRange Indicates whether the UE supports the extended RSRQ lower value range from -34dB to -	No
19.5dB in measurement configuration and reporting as specified in TS 36.133 [16]. fdd-HARQ-TimingTDD Indicates whether UE supports FDD HARQ timing for TDD SCell when configured with TDD PCell.	-
featureGroupIndicators, featureGroupIndRel9Add, featureGroupIndRel10 The definitions of the bits in the bit string are described in Annex B.1 (for featureGroupIndicators and featureGroupIndRel9Add) and in Annex C.1 (for featureGroupIndRel10).	Yes
fembmsMixedCell Indicates whether the UE in RRC_CONNECTED supports MBMS reception with 15 kHz subcarrier spacings via MBSFN from FeMBMS/Unicast mixed cells on a frequency indicated in an MBMSInterestIndication message.	
fembmsDedicatedCell Indicates whether the UE in RRC_CONNECTED supports MBMS reception with 15 kHz subcarrier spacings via MBSFN from MBMS-dedicated cells on a frequency indicated in an MBMSInterestIndication message.	
fourLayerTM3-TM4 Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4. fourLayerTM3-TM4-perCC	-
Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4 for the component carrier.	
freqBandPriorityAdjustment Indicates whether the UE supports the prioritization of frequency bands in multiBandInfoList over the band in freqBandIndicator as defined by freqBandIndicatorPriority-r12.	-
freqBandRetrieval Indicates whether the UE supports reception of requestedFrequencyBands.	-
halfDuplex If halfDuplex is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
incMonEUTRA	No
Indicates whether the UE supports increased number of E-UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].	
incMonUTRA	No
Indicates whether the UE supports increased number of UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].	
inDeviceCoexInd	Yes
Indicates whether the UE supports in-device coexistence indication as well as autonomous denial functionality.	
inDeviceCoexInd-HardwareSharingInd	_
Indicates whether the UE supports indicating hardware sharing problems when sending the InDeviceCoexIndication, as well as omitting the TDM assistance information. A UE that supports hardware sharing indication shall also indicate support of LAA operation.	
inDeviceCoexInd-UL-CA	_
Indicates whether the UE supports UL CA related in-device coexistence indication. This field can be included only if <i>inDeviceCoexInd</i> is included. The UE supports <i>inDeviceCoexInd-UL-CA</i> in the same duplexing modes as it supports <i>inDeviceCoexInd</i> .	
interBandTDD-CA-WithDifferentConfig	_
Indicates whether the UE supports inter-band TDD carrier aggregation with different UL/DL configuration combinations. The first bit indicates UE supports the configuration combination of SCell DL subframes are a subset of PCell and PSCell by SIB1 configuration and the configuration combination of SCell DL subframes are a superset of PCell and PSCell by SIB1 configuration; the second bit indicates UE supports the configuration combination of SCell DL subframes are neither superset nor subset of PCell and PSCell by SIB1 configuration. This	
field is included only if UE supports inter-band TDD carrier aggregation.	TDD
interferenceMeasRestriction	TBD
Indicates whether the UE supports interference measurement restriction.	
interFreqBandList	-
One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.	
interFreqNeedForGaps Indicates need for measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the E-UTRA band given by the entry in interFreqBandList.	-
interFreqProximityIndication Indicates whether the UE supports proximity indication for inter-frequency E-UTRAN CSG member cells.	-
interFreqRSTD-Measurement Indicates whether the UE supports inter-frequency RSTD measurements for OTDOA positioning [54].	Yes
interFreqSI-AcquisitionForHO Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring inter-frequency cell.	Yes
interRAT-BandList	
	_
One entry corresponding to each supported band of another RAT listed in the same order as in the <i>interRAT-Parameters</i> .	
interRAT-NeedForGaps Indicates need for DL measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the inter-RAT band given by the entry in the interRAT bandList.	-
interRAT-ParametersWLAN Indicates whether the UE supports WLAN measurements configured by MeasObjectWLAN with corresponding quantity and report configuration in the supported WLAN bands.	-
interRAT-PS-HO-ToGERAN Indicates whether the UE supports inter-RAT PS handover to GERAN or not.	Yes

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
intraBandContiguousCC-InfoList Indicates, per serving carrier of which the corresponding bandwidth class includes multiple	-
serving carriers (i.e. bandwidth class B, C, D and so on), the maximum number of supported layers for spatial multiplexing in DL and the maximum number of CSI processes supported.	
The number of entries is equal to the number of component carriers in the corresponding	
bandwidth class. The UE shall support the setting indicated in each entry of the list regardless	
of the order of entries in the list. The UE shall include the field only if it supports 4-layer spatial	
multiplexing in transmission mode3/4 for a subset of component carriers in the corresponding	
bandwidth class, or if the maximum number of supported layers for at least one component	
carrier is higher than supportedMIMO-CapabilityDL-r10 in the corresponding bandwidth class,	
or if the number of CSI processes for at least one component carrier is higher than	
supportedCSI-Proc-r11 in the corresponding band.	
This field may also be included for bandwidth class A but in such a case without including any	
sub-fields in IntraBandContiguousCC-Info-r12 (see NOTE 6).	
intraFreqA3-CE-ModeA	-
Indicates whether the UE when operating in CE Mode A supports eventA3 for intra-frequency	
neighbouring cells.	
intraFreqA3-CE-ModeB	-
Indicates whether the UE when operating in CE Mode B supports <i>eventA3</i> for intra-frequency	
neighbouring cells.	
intraFreq-CE-NeedForGaps	
Indicates need for measurement gaps when operating in CE on the E-UTRA band given by the	
entry in supportedBandListEUTRA. intraFreqHO-CE-ModeA	_
Indicates whether the UE when operating in CE Mode A supports intra-frequency handover.	_
intraFreqHO-CE-ModeB	
Indicates whether the UE when operating in CE Mode B supports intra-frequency handover.	-
intraFreqProximityIndication	_
Indicates whether the UE supports proximity indication for intra-frequency E-UTRAN CSG	
member cells.	
intraFreqSI-AcquisitionForHO	Yes
Indicates whether the UE supports, upon configuration of si-RequestForHO by the network,	
acquisition and reporting of relevant information using autonomous gaps by reading the SI from	
a neighbouring intra-frequency cell.	
k-Max (in MIMO-CA-ParametersPerBoBCPerTM)	-
If signalled, the field indicates for a particular transmission mode the maximum number of NZP	
CSI RS resource configurations supported within a CSI process applicable for the concerned	
band combination.	TDD
k-Max (in MIMO-UE-ParametersPerTM)	TBD
Indicates for a particular transmission mode the maximum number of NZP CSI RS resource configurations supported within a CSI process applicable for band combinations for which the	
concerned capabilities are not signalled.	
locationReport	_
Indicates whether the UE supports reporting of its geographical location information to eNB.	
loggedMBSFNMeasurements	-
Indicates whether the UE supports logged measurements for MBSFN. A UE indicating support	
for logged measurements for MBSFN shall also indicate support for logged measurements in	
Idle mode.	
loggedMeasurementsIdle	-
Indicates whether the UE supports logged measurements in Idle mode.	
logicalChannelSR-ProhibitTimer	-
Indicates whether the UE supports the <i>logicalChannelSR-ProhibitTimer</i> as defined in TS	
36.321 [6].	
longDRX-Command	-
Indicates whether the UE supports Long DRX Command MAC Control Element.	
Iwa	-
Indicates whether the UE supports LTE-WLAN Aggregation (LWA). The UE which supports	
LWA shall also indicate support of interRAT-ParametersWLAN-r13.	
Iwa-BufferSize	-
Indicates whether the UE supports the layer 2 buffer sizes for "with support for split bearers" as	
defined in Table 4.1-3 and 4.1A-3 of TS 36.306 [5] for LWA.	
lwa-HO-WithoutWT-Change	-
Indicates whether the LIE supports handover where LWA configuration is retained without WT	
Indicates whether the UE supports handover where LWA configuration is retained without WT change and using LWA end-marker for PDCP key change indication for LWA operation	
Indicates whether the UE supports handover where LWA configuration is retained without WT change and using LWA end-marker for PDCP key change indication for LWA operation. Iwa-RLC-UM	

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
Iwa-SplitBearer Indicates whether the UE supports the split LWA bearer (as defined in TS 36.300 [9]).	-
Iwa-UL Indicates whether the UE supports UL transmission over WLAN for LWA bearer.	-
Iwip Indicates whether the UE supports LTE/WLAN Radio Level Integration with IPsec Tunnel (LWIP). The UE which supports LWIP shall also indicate support of interRAT-ParametersWLAN-r13.	-
Iwip-Aggregation-DL, Iwip-Aggregation-UL Indicates whether the UE supports aggregation of LTE and WLAN over DL/UL LWIP. The UE that indicates support of LWIP aggregation over DL or UL shall also indicate support of Iwip.	-
makeBeforeBreak Indicates whether the UE supports intra-frequency Make-Before-Break handover, and whether the UE which indicates dc-Parameters supports intra-frequency Make-Before-Break SeNB change, as defined in TS 36.300 [9].	-
maximumCCsRetrieval Indicates whether UE supports reception of requestedMaxCCsDL and requestedMaxCCsUL.	-
maxLayersMIMO-Indication Indicates whether the UE supports the network configuration of maxLayersMIMO. If the UE supports fourLayerTM3-TM4 or intraBandContiguousCC-InfoList, UE supports the configuration of maxLayersMIMO for these two cases regardless of indicating maxLayersMIMO-Indication.	-
maxNumberDecoding Indicates the maximum number of blind decodes in UE-specific search space per UE in one subframe for CA with more than 5 CCs as defined in TS 36.213 [23] which is supported by the UE. The number of blind decodes supported by the UE is the field value * 32. Only values 5 to 32 can be used in this version of the specification.	No
maxNumberROHC-ContextSessions Set to the maximum number of concurrently active ROHC contexts supported by the UE, excluding context sessions that leave all headers uncompressed. cs2 corresponds with 2 (context sessions), cs4 corresponds with 4 and so on. The network ignores this field if the UE supports none of the ROHC profiles in supportedROHC-Profiles. If the UE indicates both maxNumberROHC-ContextSessions and maxNumberROHC-ContextSessions-r14, same value shall be indicated.	-
maxNumberUpdatedCSI-Proc	No
Indicates the maximum number of CSI processes to be updated across CCs. mbms-AsyncDC Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination) the carriers that are or can be configured as serving cells in the MCG and the SCG are not synchronized. If this field is included, the UE shall also include mbms-SCell and mbms-NonServingCell. The field indicates that the UE supports the feature for xDD if mbms-SCell and mbms-NonServingCell are supported for xDD.	-
mbms-NonServingCell Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination and to network synchronization properties) a serving cell may be additionally configured. If this field is included, the UE shall also include the mbms-SCell field.	Yes
mbms-SCell Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, when an SCell is configured on that frequency (regardless of whether the SCell is activated or deactivated).	Yes
measurementEnhancements This field defines whether UE supports measurement enhancements in high speed scenario as specified in TS 36.133 [16].	-
mfbi-UTRA It indicates if the UE supports the signalling requirements of multiple radio frequency bands in a UTRA FDD cell, as defined in TS 25.307 [65].	-
MIMO-BeamformedCapabilityList A list of pairs of {k-Max, n-MaxList} values with the n th entry indicating the values that the UE supports for each CSI process in case n CSI processes would be configured.	-
MIMO-CapabilityDL The number of supported layers for spatial multiplexing in DL. The field may be absent for category 0 and category 1 UE in which case the number of supported layers is 1.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
MIMO-CapabilityUL The number of supported layers for spatial multiplexing in UL. Absence of the field means that	-
the number of supported layers is 1. MIMO-CA-ParametersPerBoBC A set of MIMO parameters provided per band of a band combination. In case a subfield is	-
absent, the concerned capabilities are the same as indicated at the per UE level (i.e. by MIMO-UE-ParametersPerTM). modifiedMPR-Behavior	_
Field encoded as a bit map, where at least one bit N is set to "1" if UE supports modified MPR/A-MPR behaviour N, see TS 36.101 [42]. All remaining bits of the field are set to "0". The leading / leftmost bit (bit 0) corresponds to modified MPR/A-MPR behaviour 0, the next bit corresponds to modified MPR/A-MPR behaviour 1 and so on.	
Absence of this field means that UE does not support any modified MPR/A-MPR behaviour.	
multiACK-CSIreporting Indicates whether the UE supports multi-cell HARQ ACK and periodic CSI reporting and SR on PUCCH format 3.	Yes
multiBandInfoReport Indicates whether the UE supports the acquisition and reporting of multi band information for reportCGI.	-
multiClusterPUSCH-WithinCC	Yes
multiNS-Pmax Indicates whether the UE supports the mechanisms defined for cells broadcasting NS- PmaxList.	-
multipleTimingAdvance Indicates whether the UE supports multiple timing advances for each band combination listed in supportedBandCombination. If the band combination comprised of more than one band entry (i.e., inter-band or intra-band non-contiguous band combination), the field indicates that the same or different timing advances on different band entries are supported. If the band combination comprised of one band entry (i.e., intra-band contiguous band combination), the field indicates that the same or different timing advances across component carriers of the band entry are supported.	-
multipleUplinkSPS Indicates whether the UE supports multiple uplink SPS and reporting SPS assistance information. A UE indicating multipleUplinkSPS shall also support V2X communication via Uu, as defined in TS 36.300 [9].	-
 naics-Capability-List Indicates that UE supports NAICS, i.e. receiving assistance information from serving cell and using it to cancel or suppress interference of neighbouring cell(s) for at least one band combination. If not present, UE does not support NAICS for any band combination. The field numberOfNAICS-CapableCC indicates the number of component carriers where the NAICS processing is supported and the field numberOfAggregatedPRB indicates the maximum aggregated bandwidth across these of component carriers (expressed as a number of PRBs) with the restriction that NAICS is only supported over the full carrier bandwidth. The UE shall indicate the combination of {numberOfNAICS-CapableCC, numberOfNAICS-CapableCC} for every supported numberOfNAICS-CapableCC, e.g. if a UE supports {x CC, y PRBs} and {x-n CC, y-m PRBs} where n>=1 and m>=0, the UE shall indicate both. For numberOfNAICS-CapableCC = 1, UE signals one value for numberOfAggregatedPRB from the range {50, 75, 100}; For numberOfNAICS-CapableCC = 2, UE signals one value for numberOfAggregatedPRB from the range {50, 75, 100, 125, 150, 175, 200}; For numberOfNAICS-CapableCC = 3, UE signals one value for numberOfAggregatedPRB from the range {50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300}; For numberOfNAICS-CapableCC = 4, UE signals one value for numberOfAggregatedPRB from the range {50, 100, 150, 200, 250, 300, 350, 400}; For numberOfNAICS-CapableCC = 5, UE signals one value for numberOfAggregatedPRB from the range {50, 100, 150, 200, 250, 300, 350, 400, 450, 500}. 	-
ncsg Indicates whether the UE supports measurement NCSG Pattern Id 0, 1, 2 and 3, as specified in TS 36.133 [16]. If this field is included and the UE supports asynchronous DC, the UE shall support NCSG Pattern Id 0, 1, 2 and 3. If this field is included but the UE does not support asynchronous DC, only NCSG Pattern Id 0 and 1 shall be supported	No

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
n-MaxList (in MIMO-UE-ParametersPerTM)	TBD
Indicates for a particular transmission mode the maximum number of NZP CSI RS ports	
supported within a CSI process applicable for band combinations for which the concerned	
capabilities are not signalled. For k-Max values exceeding 1, the UE shall include the field and	
signal <i>k-Max</i> minus 1 bits. The first bit indicates <i>n-Max2</i> , with value 0 indicating 8 and value 1	
indicating 16. The second bit indicates <i>n-Max3</i> , with value 0 indicating 8 and value 1 indicating	
16. The third bit indicates <i>n-Max4</i> , with value 0 indicating 8 and value 1 indicating 32. The	
fourth bit indicates <i>n-Max5</i> , with value 0 indicating 16 and value 1 indicating 32. The fifth bit	
indicates <i>n-Max6</i> , with value 0 indicating 16 and value 1 indicating 32. The sixt bit indicates <i>n-</i>	
Max7, with value 0 indicating 16 and value 1 indicating 32. The seventh bit indicates n-Max8,	
with value 0 indicating 16 and value 1 indicating 64.	
n-MaxList (in MIMO-CA-ParametersPerBoBCPerTM)	-
If signalled, the field indicates for a particular transmission mode the maximum number of NZP	
CSI RS ports supported within a CSI process applicable for band the concerned combination.	
Further details are as indicated for <i>n-MaxList</i> in <i>MIMO-UE-ParametersPerTM</i> .	
NonContiguousUL-RA-WithinCC-List	No
One entry corresponding to each supported E-UTRA band listed in the same order as in	
supportedBandListEUTRA.	
nonPrecoded (in MIMO-UE-ParametersPerTM)	TBD
Indicates for a particular transmission mode the UE capabilities concerning non-precoded EBF/	
FD-MIMO operation (class A) for band combinations for which the concerned capabilities are	
not signalled.	
nonPrecoded (in MIMO-CA-ParametersPerBoBCPerTM)	-
If signalled, the field indicates for a particular transmission mode, the UE capabilities	
concerning non-precoded EBF/ FD-MIMO operation (class A) applicable for the concerned	
band combination.	

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
nonUniformGap	No
Indicates whether the UE supports measurement non uniform Pattern Id 1, 2, 3 and 4 as specified in TS 36.133 [16].	
noResourceRestrictionForTTIBundling	-
Indicate wheter the UE supports TTI bundling operation without resource allocation restriction.	
otdoa-UE-Assisted	Yes
Indicates whether the UE supports UE-assisted OTDOA positioning [54].	
outOfSequenceGrantHandling	-
Indicates whether the UE supports PUSCH transmissions with out of sequence UL grants as defined in TS 36.213 [22]. This field can be included only if uplinkLAA is included.	
pdcch-CandidateReductions	No
Indicates whether the UE supports PDCCH candidate reduction on UE specific search space as specified in TS 36.213 [23, 9.1.1].	
pdcp-SN-Extension	-
Indicates whether the UE supports 15 bit length of PDCP sequence number.	
pdcp-SN-Extension-18bits Indicates whether the UE supports 18 bit length of PDCP sequence number.	-
pdcp-TransferSplitUL	_
Indicates whether the UE supports PDCP data transfer split in UL for the <i>drb-TypeSplit</i> as specified in TS 36.323 [8].	
pdsch-CollisionHandling	-
Indicates whether the UE supports PDSCH collision handling as specified in TS 36.213 [23].	
perServingCellMeasurementGap	-
Indicates whether the UE supports per serving cell measurement gap indication, as specified in TS 36.133 [16].	
phy-TDD-ReConfig-FDD-PCell	-
Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via	
monitoring PDCCH with eIMTA-RNTI on a FDD PCell, and HARQ feedback according to UL	
and DL HARQ reference configurations. This bit can only be set to supported only if the UE	
supports FDD PCell and phy-TDD-ReConfig-TDD-PCell is set to supported.	
phy-TDD-ReConfig-TDD-PCell	-
Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via monitoring PDCCH with eIMTA-RNTI on a TDD PCell, and HARQ feedback according to UL	
and DL HARQ reference configurations, and PUCCH format 3.	
pmi-Disabling	Yes
powerPrefind	No
Indicates whether the UE supports power preference indication.	
prach-Enhancements This field defines whether the UE supports random access preambles generated from	-
restricted set type B in high speed scenoario as specified in TS 36.211 [21].	Voo
pucch-Format4 Indicates whether the UE supports PUCCH format 4.	Yes
	Voo
pucch-Format5	Yes
Indicates whether the UE supports PUCCH format 5.	No
pucch-SCell Indicates whether the UE supports PUCCH on SCell.	INO
pusch-Enhancements	Yes
Indicates whether the UE supports the PUSCH enhancement mode as specified in TS 36.211	169
[21] and TS 36.213 [23].	
pusch-FeedbackMode	No
Indicates whether the UE supports PUSCH feedback mode 3-2.	110
pusch-SRS-PowerControl-SubframeSet	-
Indicates whether the UE supports subframe set dependent UL power control for PUSCH and SRS. This field is only applicable for UEs supporting TDD.	
rach-Less	-
Indicates whether the UE supports RACH-less handover, and whether the UE which indicates <i>dc-Parameters</i> supports RACH-less SeNB change, as defined in TS 36.300 [9].	
rach-Report	-
Indicates whether the UE supports delivery of rachReport.	Na
rai-Support	No
Defines whether the UE supports release assistance indication (RAI) as specified in TS 36.321	

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
Indicates whether the UE supports RCLWI, i.e. reception of rclwi-Configuration. The UE which supports RLCWI shall also indicate support of interRAT-ParametersWLAN-r13. The UE which supports RCLWI and wlan-IW-RAN-Rules shall also support applying WLAN identifiers received in rclwi-Configuration for the access network selection and traffic steering rules when in RRC_IDLE.	-
recommendedBitRate Indicates whether the UE supports the bit rate recommendation message from the eNB to the UE as specified in TS 36.321 [6, 6.1.3.13].	No
recommendedBitRateQuery Indicates whether the UE supports the bit rate recommendation query message from the UE to the eNB as specified in TS 36.321 [6, 6.1.3.13]. If this field is included, the UE shall also include the recommendedBitRate field.	No
reducedIntNonContComb Indicates whether the UE supports receiving requestReducedIntNonContComb that requests the UE to exclude supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].	-
reducedIntNonContCombRequested Indicates that the UE excluded supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].	-
retuningTimeInfoBandList Indicates, for a particular pair of bands, the RF retuning time when switching between the band pair to transmit SRS on a PUSCH-less SCell as specified in 36.212 [22] and 36.213 [23]. If included, the UE shall include a number of entries as indicated in the following, and listed in the same order, as in bandParameterList for the concerned band combination: - For the first band, the UE shall include the same number of entries as in bandParameterList i.e. first entry corresponds to first band in bandParameterList and so	
on, - For the second band, the UE shall include one entry less i.e. first entry corresponds to the second band in bandParameterList and so on - And so on	
requestedBands Indicates the frequency bands requested by E-UTRAN.	-
requestedCCsDL, requestedCCsUL Indicates the maximum number of CCs requested by E-UTRAN.	-
requestedDiffFallbackCombList Indicates the CA band combinations for which report of different UE capabilities is requested by E-UTRAN.	-
rf-RetuningTimeDL Indicates the interruption time on DL reception within a band pair during the RF retuning for switching between the band pair to transmit SRS on a PUSCH-less SCell. n0 represents 0 OFDM symbols, n0dot5 represents 0.5 OFDM symbols, n1 represents 1 OFDM symbol and so on.	-
rf-RetuningTimeUL Indicates the interruption time on UL transmission within a band pair during the RF retuning for switching between the band pair to transmit SRS on a PUSCH-less SCell. n0 represents 0 OFDM symbols, n0dot5 represents 0.5 OFDM symbols, n1 represents 1 OFDM symbol and so on.	-
rlm-ReportSupport Indicates whether the UE supports RLM event and information reporting.	
rsrqMeasWideband Indicates whether the UE can perform RSRQ measurements with wider bandwidth.	Yes
rsrq-OnAllSymbols Indicates whether the UE can perform RSRQ measurement on all OFDM symbols and also support the extended RSRQ upper value range from -3dB to 2.5dB in measurement configuration and reporting as specified in TS 36.133 [16].	No
rs-SINR-Meas Indicates whether the UE can perform RS-SINR measurements in RRC_CONNECTED as specified in TS 36.214 [48].	-
rssi-AndChannelOccupancyReporting Indicates whether the UE supports performing measurements and reporting of RSSI and channel occupancy. This field can be included only if downlinkLAA is included.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
scptm-AsyncDC Indicates whether the UE in RRC_CONNECTED supports MBMS reception via SC-MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination) the carriers that are or can be configured as serving cells in the MCG and the SCG are not synchronized. If this field is included, the UE shall also include scptm-SCell and scptm-NonServingCell.	Yes
scptm-NonServingCell Indicates whether the UE in RRC_CONNECTED supports MBMS reception via SC-MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination and to network synchronization properties) a serving cell may be additionally configured. If this field is included, the UE shall also include the scptm-SCell field.	Yes
scptm-Parameters Presence of the field indicates that the UE supports SC-PTM reception as specified in TS 36.306 [5].	Yes
scptm-SCell Indicates whether the UE in RRC_CONNECTED supports MBMS reception via SC-MRB on a frequency indicated in an MBMSInterestIndication message, when an SCell is configured on that frequency (regardless of whether the SCell is activated or deactivated).	Yes
scptm-ParallelReception Indicates whether the UE in RRC_CONNECTED supports parallel reception in the same subframe of DL-SCH transport blocks transmitted using C-RNTI/Semi-Persistent Scheduling C-RNTI and using SC-RNTI/G-RNTI as specified in TS 36.306 [5].	Yes
secondSlotStartingPosition Indicates whether the UE supports reception of subframes with second slot starting position as described in TS 36.211 [21] and TS 36.213 [23]. This field can be included only if downlinkLAA is included.	-
shortMeasurementGap Indicates whether the UE supports 3ms measurement gap lengths as specified in TS 36.133 [16].	No
shortSPS-IntervalFDD Indicates whether the UE supports uplink SPS intervals shorter than 10 subframes in FDD mode.	-
shortSPS-IntervalTDD Indicates whether the UE supports uplink SPS intervals shorter than 10 subframes in TDD mode.	-
simultaneousPUCCH-PUSCH	Yes
simultaneousRx-Tx Indicates whether the UE supports simultaneous reception and transmission on different bands for each band combination listed in supportedBandCombination. This field is only applicable for inter-band TDD band combinations. A UE indicating support of simultaneousRx-Tx and dc-Support-r12 shall support different UL/DL configurations between PCell and PSCell.	-
skipFallbackCombinations Indicates whether UE supports receiving reception of requestSkipFallbackComb that requests UE to exclude fallback band combinations from capability signalling.	-
skipFallbackCombRequested Indicates whether requestSkipFallbackComb is requested by E-UTRAN.	-
skipMonitoringDCI-Format0-1A Indicates whether UE supports blind decoding reduction on UE specific search space by not monitoring DCI Format 0 and 1A as specified in TS 36.213 [23, 9.1.1].	No
skipUplinkDynamic Indicates whether the UE supports skipping of UL transmission for an uplink grant indicated on PDCCH if no data is available for transmission as described in TS 36.321 [6].	-
skipUplinkSPS Indicates whether the UE supports skipping of UL transmission for a configured uplink grant if no data is available for transmission as described in TS 36.321 [6].	-
sI-CongestionControl Indicates whether the UE supports Channel Busy Ratio measurement and reporting of Channel Busy Ratio measurement results to eNB for V2X sidelink communication. sIss-TxRx	-
Indicates whether the UE supports SLSS/PSBCH transmission and reception in UE autonomous resource selection mode and eNB scheduled mode in a band for V2X sidelink communication.	-
spatialBundling-HARQ-ACK Indicates whether UE supports HARQ-ACK spatial bundling on PUCCH or PUSCH as specified in TS 36.213 [23, 7.3.1 and 7.3.2].	No

UE-EUTRA-Capability field descriptions	FDD/ TDD dit
srs-Enhancements	TBD
Indicates whether the UE supports SRS enhancements.	Nia
srs-EnhancementsTDD Indicates whether the UE supports TDD specific SRS enhancements.	No
srvcc-FromUTRA-FDD-ToGERAN	_
Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to GERAN CS.	
srvcc-FromUTRA-FDD-ToUTRA-FDD	-
Indicates whether UE supports SRVCC handover from UTRA FDD PS HS to UTRA FDD CS.	
srvcc-FromUTRA-TDD128-ToGERAN	-
Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to	
GERAN CS. srvcc-FromUTRA-TDD128-ToUTRA-TDD128	
Indicates whether UE supports SRVCC handover from UTRA TDD 1.28Mcps PS HS to UTRA	-
TDD 1.28Mcps CS.	
ss-CCH-InterfHandl	Yes
Indicates whether the UE supports synchronisation signal and common channel interference	
handling.	
standaloneGNSS-Location	-
Indicates whether the UE is equipped with a standalone GNSS receiver that may be used to	
provide detailed location information in RRC measurement report and logged measurements.	
subcarrierSpacingMBMS-khz7dot5, subcarrierSpacingMBMS-khz1dot25 Indicates the supported subcarrier spacings for MBSFN subframes in addition to 15 kHz	
subcarrier spacing. subcarrierSpacingMBMS-khz1dot25 and subcarrierSpacingMBMS-	
khz7dot5 indicates that the UE supports 1.25 and 7.5 kHz respectively for MBSFN subframes	
as described in TS36.211 [21, 6.12]. This field is included only if fembmsMixedCell or	
fembmsDedicatedCell is included.	
supportedBandCombination	-
Includes the supported CA band combinations, if any, and may include all the supported non-	
CA bands.	
supportedBandCombinationAdd-r11 Includes additional supported CA band combinations in case maximum number of CA band	-
combinations of supportedBandCombination is exceeded.	
SupportedBandCombinationAdd-v11d0, SupportedBandCombinationAdd-v1250,	-
SupportedBandCombinationAdd-v1270, SupportedBandCombinationAdd-v1320,	
SupportedBandCombinationAdd-v1430	
If included, the UE shall include the same number of entries, and listed in the same order, as in	
SupportedBandCombinationAdd-r11.	
SupportedBandCombinationExt, SupportedBandCombination-v1090, SupportedBandCombination-v10i0, SupportedBandCombination-v1130,	-
SupportedBandCombination-v1250, SupportedBandCombination-v1270,	
SupportedBandCombination-v1320, SupportedBandCombination-v1430	
If included, the UE shall include the same number of entries, and listed in the same order, as in	
supportedBandCombination-r10.	
supportedBandCombinationReduced	
Includes the supported CA band combinations, and may include the fallback CA combinations	
specified in TS 36.101 [42, 4.3A]. This field also indicates whether the UE supports reception of requestReducedFormat.	
SupportedBandCombinationReduced-v1320, SupportedBandCombinationReduced-	_
v1430	-
If included, the UE shall include the same number of entries, and listed in the same order, as in	
supportedBandCombinationReduced-r13.	
SupportedBandGERAN	No
GERAN band as defined in TS 45.005 [20].	
SupportedBandList1XRTT	-
One entry corresponding to each supported CDMA2000 1xRTT band class.	
SupportedBandListEUTRA Includes the supported E-UTRA bands. This field shall include all bands which are indicated in	_
BandCombinationParameters.	
SupportedBandListEUTRA-v9e0, SupportedBandListEUTRA-v1250,	_
SupportedBandListEUTRA-v1310, SupportedBandListEUTRA-v1320	
If included, the UE shall include the same number of entries, and listed in the same order, as in	
supportedBandListEUTRA (i.e. without suffix).	
SupportedBandListGERAN	No
SupportedBandListHRPD	-
One entry corresponding to each supported CDMA2000 HRPD band class.	1

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
supportedBandListWLAN	-
Indicates the supported WLAN bands by the UE. SupportedBandUTRA-FDD	_
UTRA band as defined in TS 25.101 [17].	
SupportedBandUTRA-TDD128	-
UTRA band as defined in TS 25.102 [18].	
SupportedBandUTRA-TDD384 UTRA band as defined in TS 25.102 [18].	-
SupportedBandUTRA-TDD768	-
UTRA band as defined in TS 25.102 [18].	
supportedBandwidthCombinationSet The supportedBandwidthCombinationSet indicated for a band combination is applicable to all	-
bandwidth classes indicated by the UE in this band combination.	
Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set	
N for this band combination, see 36.101 [42]. The leading / leftmost bit (bit 0) corresponds to	
the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set	
1 and so on. The UE shall neither include the field for a non-CA band combination, nor for a CA band combination for which the UE only supports Bandwidth Combination Set 0.	
supportedCellGrouping	_
This field indicates for which mapping of serving cells to cell groups (i.e. MCG or SCG) the UE	_
supports asynchronous DC. This field is only present for a band combination with more than	
two but less than six band entries where the UE supports asynchronous DC. If this field is not	
present but asynchronous operation is supported, the UE supports all possible mappings of	
serving cells to cell groups for the band combination. The bitmap size is selected based on the number of entries in the combinations, i.e., in case of three entries, the bitmap corresponding	
to threeEntries is selected and so on.	
A bit in the bit string set to 1 indicates that the UE supports asynchronous DC for the cell	
grouping option represented by the concerned bit position. Each bit position represents a	
different cell grouping option, as illustrated by a table, see NOTE 5. A cell grouping option is	
represented by a number of bits, each representing a particular band entry in the band	
combination with the left-most bit referring to the band listed first in the band combination, etc. Value 0 indicates that the carriers of the corresponding band entry are mapped to a first cell	
group, while value 1 indicates that the carriers of the corresponding band entry are mapped to	
a second cell group.	
It is noted that the mapping table does not include entries with all bits set to the same value (0	
or 1) as this does not represent a DC scenario (i.e. indicating that the UE supports that all	
carriers of the corresponding band entry are in one cell group). supportedCSI-Proc	
Indicates the maximum number of CSI processes supported on a component carrier within a	_
band. Value n1 corresponds to 1 CSI process, value n3 corresponds to 3 CSI processes, and	
value n4 corresponds to 4 CSI processes. If this field is included, the UE shall include the same	
number of entries listed in the same order as in <i>BandParameters</i> . If the UE supports at least 1	
CSI process on any component carrier, then the UE shall include this field in all bands in all	
band combinations. supportedNAICS-2CRS-AP	_
If included, the UE supports NAICS for the band combination. The UE shall include a bitmap of	
the same length, and in the same order, as in <i>naics-Capability-List</i> , to indicate 2 CRS AP	
NAICS capability of the band combination. The first/ leftmost bit points to the first entry of	
naics-Capability-List, the second bit points to the second entry of naics-Capability-List, and so	
on. For band combinations with a single component carrier, UE is only allowed to indicate	
{numberOfNAICS-CapableCC, numberOfAggregatedPRB} = {1, 100} if NAICS is supported.	
supportRohcContextContinue	-
Indicates whether the UE supports ROHC context continuation operation where the UE does	
not reset the current ROHC context upon handover.	
supportedROHC-Profiles Indicates the ROHC profiles that UE supports in both uplink and downlink.	-
supportedUplinkOnlyROHC-Profiles	-
Indicates the ROHC profiles that UE supports in uplink and not in downlink, see TS 36.323 [8]	
switchingBandA, switchingBandB	-
Indicates the two bands in the band pair for SRS transmission on a PUSCH-less SCell, as	
specified in 36.212 [22] and 36.213 [23]. switchingBandA can be equal to switchingBandB.	NI.
tdd-SpecialSubframe Indicates whether the UE supports TDD special subframe defined in TS 36.211 [21]. A UE shall	No
indicates whether the de supports 1DD special subfraine defined in 13 36.211 [21]. A de shail indicate tdd-SpecialSubframe-r11 if it supports the TDD special subframes ssp7 and ssp9. A	

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
tdd-FDD-CA-PCellDuplex The presence of this field indicates that the UE supports TDD/FDD CA in any supported band	-
combination including at least one FDD band with <i>bandParametersUL</i> and at least one TDD band with <i>bandParametersUL</i> . The first bit is set to "1" if UE supports the TDD PCell. The second bit is set to "1" if UE supports FDD PCell. This field is included only if the UE supports	
band combination including at least one FDD band with <i>bandParametersUL</i> and at least one TDD band with <i>bandParametersUL</i> . If this field is included, the UE shall set at least one of the bits as "1". If this field is included with DC, then it is applicable within a CG, and the presence of	
this field indicates the capability of the UE to support TDD/FDD CA with at least one FDD band and at least one TDD band in the same CG, with the value indicating the support for TDD/FDD PCell (PSCell).	
tdd-TTI-Bundling	No
The presence of this field indicates whether the UE supporting TDD special subframe configuration 10 also supports TTI bundling for TDD configuration 2 and 3 when PUSCH transimission in UpPTS is configured, see TS 36.213 [23, 8.0]. If this field is present, the tdd-SpecialSubframe-r14 shall be present.	
timerT312 Indicates whether the UE supports T312.	No
tm5-FDD Indicates whether the UE supports the PDSCH transmission mode 5 in FDD.	-
tm5-TDD Indicates whether the UE supports the PDSCH transmission mode 5 in TDD.	-
tm9-CE-ModeA Indicates whether the UE supports tm9 operation in CE mode A, see TS 36.213 [23, 7.2.3]. This field can be included only if ce-ModeA is included.	Yes
tm9-CE-ModeB Indicates whether the UE supports tm9 operation in CE mode B, see TS 36.213 [23, 7.2.3]. This field can be included only if ce-ModeB is included.	Yes
Indicates whether the UE supports tm9 operation on LAA cell(s). This field can be included only if downlinkLAA is included.	-
tm9-With-8Tx-FDD Indicates whether the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports for FDD when not operating in CE mode.	No
tm10-LAA Indicates whether the UE supports tm10 operation on LAA cell(s). This field can be included only if downlinkLAA is included.	-
twoAntennaPortsForPUCCH	No
twoStepSchedulingTimingInfo	-
Presence of this field indicates that the UE supports uplink scheduling using PUSCH trigger A and PUSCH trigger B (as defined in TS 36.213 [23]). This field also indicates the timing between the PUSCH trigger B and the earliest time the UE	
supports performing the associated UL transmission. For reception of PUSCH trigger B in subframe N, value <i>nPlus1</i> indicates that the UE supports performing the UL transmission in subframe N+1, value <i>nPlus2</i> indicates that the UE supports performing the UL transmission in	
subframe N+2, and so on. This field can be included only if <i>uplinkLAA</i> is included.	
txDiv-PUCCH1b-ChSelect Indicates whether the UE supports transmit diversity for PUCCH format 1b with channel selection.	Yes
uci-PUSCH-Ext Indicates whether the UE supports an extension of UCI delivering more than 22 HARQ-ACK bits on PUSCH as specified in TS 36.212 [22, 5.2.2.6] and TS 36.213 [23, 8.6.3].	No
ue-AutonomousWithFullSensing Indicates whether the UE supports transmitting PSCCH/PSSCH using UE autonomous	-
resource selection mode with full sensing (i.e., continuous channel monitoring) for V2X sidelink communication and the UE supports maximum transmit power associated with Power class 3 V2X UE, see TS 36.101 [42].	
ue-AutonomousWithPartialSensing Indicates whether the UE supports transmitting PSCCH/PSSCH using UE autonomous resource selection mode with partial sensing (i.e., channel monitoring in a limited set of subframes) for V2X sidelink communication and the UE supports maximum transmit power associated with Power class 3 V2X UE, see TS 36.101 [42].	-
ue-Category UE category as defined in TS 36.306 [5]. Set to values 1 to 12 in this version of the specification.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
ue-CategoryDL	-
UE DL category as defined in TS 36.306 [5]. Value <i>n17</i> corresponds to UE category 17, value <i>m1</i> corresponds to UE category M1, value <i>oneBis</i> corresponds to UE category 1bis, value m2 corresponds to UE category M2. For ASN.1 compatibility, a UE indicating DL category 0, m1 or	
m2 shall also indicate any of the categories (15) in <i>ue-Category</i> (without suffix), which is ignored by the eNB, a UE indicating UE category oneBis shall also indicate UE category 1 in	
ue-Category (without suffix), and a UE indicating UE category m2 shall also indicate UE category m1. The field ue-CategoryDL is set to values 0, m1, oneBis, m2, 4, 6, 7, 9 to 16, n17, 18, 19 in this version of the specification.	
ue-CategoryUL	-
UE UL category as defined in TS 36.306 [5]. Value <i>n14</i> corresponds to UE category 14, value <i>m1</i> corresponds to UE category M1, value <i>oneBis</i> corresponds to UE category 1bis. The field <i>ue-CategoryUL</i> is set to values m1, 0, oneBis, 3, 5, 7, 8, 13, n14 or 15 to 20 in this version of the specification. Value <i>n21</i> corresponds to UE category 21.	
ue-CE-NeedULGaps	
Indicates whether the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5].	
ue-PowerClass-N, ue-PowerClass-5	-
Indicates whether the UE supports UE power class 1, 2, 4 or 5 in the E-UTRA band, see TS 36.101 [42] and TS 36.307 [79]. UE includes either <i>ue-PowerClass-N</i> or <i>ue-PowerClass-5</i> . If	
neither <i>ue-PowerClass-N</i> nor <i>ue-PowerClass-5</i> is included, UE supports the default UE power class in the E-UTRA band, see TS 36.101 [42].	
ue-Rx-TxTimeDiffMeasurements	No
Indicates whether the UE supports Rx - Tx time difference measurements.	
ue-SpecificRefSigsSupported ue-SSTD-Meas	No
Indicates whether the UE supports SSTD measurements between the PCell and the PSCell as specified in TS 36.214 [48] and TS 36.133 [16].	-
ue-TxAntennaSelectionSupported	Yes
TRUE indicates that the UE is capable of supporting UE transmit antenna selection as described in TS 36.213 [23, 8.7].	
ul-CoMP Indicates whether the UE supports UL Coordinated Multi-Point operation.	No
ul-64QAM	-
Indicates whether the UE supports 64QAM in UL on the band. This field is only present when the field ue- <i>CategoryUL</i> indicates UL UE category that supports UL 64QAM, see TS 36.306 [5, Table 4.1A-2]. If the field is present for one band, the field shall be present for all bands including downlink only bands.	
ul-256QAM	-
Indicates whether the UE supports 256QAM in UL on the band in the band combination. This field is only present when the field ue- <i>CategoryUL</i> indicates UL UE category that supports 256QAM in UL, see TS 36.306 [5, Table 4.1A-2]. The UE includes this field only if the field <i>ul-256QAM-perCC-InfoList</i> is not included.	
ul-256QAM-perCC-InfoList	-
Indicates, per serving carrier of which the corresponding bandwidth class includes multiple serving carriers (i.e. bandwidth class B, C, D and so on), whether the UE supports 256QAM in	
the band combination. The number of entries is equal to the number of component carriers in the corresponding bandwidth class. The UE shall support the setting indicated in each entry of the list regardless of the order of entries in the list. This field is only present when the field <i>ue</i> -	
CategoryUL indicates UL UE category that supports 256QAM in UL, see TS 36.306 [5, Table 4.1A-2]. The UE includes this field only if the field <i>ul-256QAM</i> is not included.	
ul-PDCP-Delay	-
Indicates whether the UE supports UL PDCP Packet Delay per QCI measurement as specified in TS 36.314 [71].	
uplinkLAA Presence of the field indicates that the UE supports uplink LAA operation.	-
uss-BlindDecodingAdjustment Indicates whether the UE supports blind decoding adjustment on UE specific search space as defined in TS 36.213 [22]. This field can be included only if uplinkLAA is included.	-
uss-BlindDecodingReduction Indicates whether the UE supports blind decoding reduction on UE specific search space by not monitoring DCI format 0A/0B/4A/4B as defined in TS 36.213 [22]. This field can be included only if uplinkLAA is included.	-

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
unicastFrequencyHopping Indicates whether the UE supports frequency hopping for unicast MPDCCH/PDSCH (configured by mpdcch-pdsch-HoppingConfig) and unicast PUSCH (configured by pusch-HoppingConfig).	-
unicast-fembmsMixedSCell Indicates whether the UE supports unicast reception from FeMBMS/Unicast mixed cell. This field is included only if UE supports carrier aggregation.	-
utran-ProximityIndication Indicates whether the UE supports proximity indication for UTRAN CSG member cells.	-
utran-SI-AcquisitionForHO Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring UMTS cell.	Yes
 v2x-BandwidthClass The bandwidth class for V2X sidelink transmission supported by the UE as defined in TS 36.101 [42, Table 5.6G.1-3]. The UE explicitly includes all the supported bandwidth class combinations for V2X sidelink transmission or reception in the band combination signalling. Support for one bandwidth class 	-
does not implicitly indicate support for another bandwidth class. v2x-eNB-Scheduled Indicates whether the UE supports transmitting PSCCH/PSSCH using dynamic scheduling, SPS in eNB scheduled mode for V2X sidelink communication, reporting SPS assistance information and the UE supports maximum transmit power associated with Power class 3 V2X UE, see TS 36.101 [42] in a band.	-
v2x-HighPower Indicates whether the UE supports maximum transmit power associated with Power class 2 V2X UE for V2X sidelink transmission in a band, see TS 36.101 [42].	-
V2x-HighReception Indicates whether the UE supports reception of 20 PSCCH in a subframe and decoding of 136 RBs per subframe counting both PSCCH and PSSCH in a band for V2X sidelink communication.	-
v2x-nonAdjacentPSCCH-PSSCH Indicates whether the UE supports transmission and reception in the configuration of non-adjacent PSCCH and PSSCH for V2X sidelink communication.	-
v2x-numberTxRxTiming Indicates the number of multiple reference TX/RX timings counted over all the configured sidelink carriers for V2X sidelink communication.	-
 v2x-SupportedBandCombinationList Indicates the supported band combination list on which the UE supports simultaneous transmission and/or reception of V2X sidelink communication. 	
v2x-SupportedBandCombListPerBC Indicates, for a particular band combination of EUTRA, the supported band combination list among v2x-SupportedBandCombinationList on which the UE supports simultaneous transmission and/or reception of EUTRA and V2X sidelink communication respectively	-
V2x-TxWithShortResvInterval Indicates whether the UE supports 20 ms and 50 ms resource reservation periods for UE autonomous resource selection and eNB scheduled resource allocation for V2X sidelink communication.	-
voiceOverPS-HS-UTRA-FDD Indicates whether UE supports IMS voice according to GSMA IR.58 profile in UTRA FDD.	-
voiceOverPS-HS-UTRA-TDD128 Indicates whether UE supports IMS voice in UTRA TDD 1.28Mcps.	-
whiteCellList Indicates whether the UE supports EUTRA white cell listing to limit the set of cells applicable for measurements.	-
wlan-IW-RAN-Rules Indicates whether the UE supports RAN-assisted WLAN interworking based on access network selection and traffic steering rules.	-
wlan-IW-ANDSF-Policies Indicates whether the UE supports RAN-assisted WLAN interworking based on ANDSF policies.	-
wlan-MAC-Address Indicates the WLAN MAC address of this UE. wlan-PeriodicMeas	-
Indicates whether the UE supports periodic reporting of WLAN measurements.	

UE-EUTRA-Capability field descriptions	FDD/ TDD diff
wlan-ReportAnyWLAN	-
Indicates whether the UE supports reporting of WLANs not listed in the measObjectWLAN.	
wlan-SupportedDataRate	-
Indicates the maximum WLAN data rate supported by the UE over all LWA bearers. Actual	
value of supported data rate is field value * 10 Mbps (i.e., value 1 corresponds to 10 Mbps,	
value 2 corresponds to 20 Mbps and so on).	

- NOTE 1: The IE *UE-EUTRA-Capability* does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently AS need not provide "man-in-the-middle" protection for the security capabilities.
- NOTE 2: The column FDD/ TDD diff indicates if the UE is allowed to signal, as part of the additional capabilities for an XDD mode i.e. within *UE-EUTRA-CapabilityAddXDD-Mode-xNM*, a different value compared to the value signalled elsewhere within *UE-EUTRA-Capability* (i.e. the common value, supported for both XDD modes). A '-' is used to indicate that it is not possible to signal different values (used for fields for which the field description is provided for other reasons). Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a capability for which it indicates support within the capability signalling.
- NOTE 3: The BandCombinationParameters for the same band combination can be included more than once.
- NOTE 4: UE CA and measurement capabilities indicate the combinations of frequencies that can be configured as serving frequencies.

NOTE 5: The grouping of the cells to the first and second cell group, as indicated by *supportedCellGrouping*, is shown in the table below. The leading / leftmost bit of *supportedCellGrouping* corresponds to the Bit String Position 1.

Nr of Band Entries:	5	4	3
Length of Bit-String:	15	7	3
Bit String Position	Cell grouping option (0= first cell group, 1= second cell group)		
1	00001	0001	001
2	00010	0010	010
3	00011	0011	011
4	00100	0100	
5	00101	0101	
6	00110	0110	
7	00111	0111	
8	01000		
9	01001		
10	01010		
11	01011		
12	01100		
13	01101		
14	01110		
15	01111		

NOTE 6: UE includes the *intraBandContiguousCC-InfoList-r12* also for bandwidth class A because of the presence conditions in *BandCombinationParameters-v1270*. For example, if UE supports CA_1A_41D band combination, if UE includes the field *intraBandContiguousCC-InfoList-r12* for band 41, the UE includes *intraBandContiguousCC-InfoList-r12* also for band 1.

NOTE 7: For a UE that indicates release X in field *accessStratumRelease* but supports a feature specified in release X+ N (i.e. early UE implementation), the ASN.1 comprehension requirement are specified in Annex F.

UE-RadioPagingInfo

The UE-RadioPagingInfo IE contains UE capability information needed for paging.

UE-RadioPagingInfo information element

```
-- ASN1START
                                        SEQUENCE {
UE-RadioPagingInfo-r12 ::=
    ue-Category-v1250
                                        INTEGER (0)
                                                            OPTIONAL,
    [[ ue-CategoryDL-v1310
                                                ENUMERATED {m1}
                                                                     OPTIONAL,
                                                ENUMERATED {true}
        ce-ModeA-r13
                                                                    OPTIONAL,
        ce-ModeB-r13
                                                ENUMERATED {true} OPTIONAL
    11
-- ASN1STOP
```

UE-RadioPagingInfo field descriptions

ce-ModeA, ce-ModeB

Indicates whether the UE supports operation in CE mode A and/or B, as specified in TS 36.211 [21] and TS 36.213 [23].

ue-Category, ue-CategoryDL

UE category as defined in TS 36.306 [5]. A category M2 UE shall always include the field *ue-CategoryDL-v1310* in this version of the specification.

UE-TimersAndConstants

The IE *UE-TimersAndConstants* contains timers and constants used by the UE in either RRC_CONNECTED or RRC_IDLE.

UE-TimersAndConstants information element

```
-- ASN1START
                                    SEQUENCE {
UE-TimersAndConstants ::=
                                        ENUMERATED {
    t.300
                                            ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                            ms2000},
    t301
                                        ENUMERATED {
                                           ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                            ms2000}
    +310
                                        ENUMERATED
                                           ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
    n310
                                        ENUMERATED {
                                           n1, n2, n3, n4, n6, n8, n10, n20},
    +311
                                        ENUMERATED {
                                            ms1000, ms3000, ms5000, ms10000, ms15000,
                                            ms20000, ms30000},
                                        ENUMERATED {
   n311
                                            n1, n2, n3, n4, n5, n6, n8, n10},
                                        ENUMERATED {
    [[ t300-v1310
                                            ms2500, ms3000, ms3500, ms4000, ms5000, ms6000, ms8000,
                                            ms10000}
                                                            OPTIONAL, -- Need OR
        t301-v1310
                                        ENUMERATED {
                                            ms2500, ms3000, ms3500, ms4000, ms5000, ms6000, ms8000,
                                            ms10000}
                                                            OPTIONAL
                                                                      -- Need OR
    [[ t310-v1330
                                            ENUMERATED {ms4000, ms6000}
                                                            OPTIONAL
                                                                        -- Need OR
```

}
-- ASN1STOP

UE-TimersAndConstants field descriptions

n3xy

Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

t3xv

Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms50 corresponds with 50 ms and so on. EUTRAN includes an extended value *t3xy-v1310* and *t3xy-v1330* only in the Bandwidth Reduced (BR) version of the SIB. UEs that support Coverage Enhancement (CE) mode B shall use the extended values *t3xy-v1310* and *t3xy-v1330*, if present, and ignore the value signaled by *t3xy* (without the suffix).

VisitedCellInfoList

The IE *VisitedCellInfoList* includes the mobility history information of maximum of 16 most recently visited cells or time spent outside E-UTRA. The most recently visited cell is stored first in the list. The list includes cells visited in RRC_IDLE and RRC_CONNECTED states.

VisitedCellInfoList information element

```
-- ASN1START
VisitedCellInfoList-r12 ::= SEQUENCE (SIZE (1..maxCellHistory-r12)) OF VisitedCellInfo-r12
VisitedCellInfo-r12 ::=
                                    SEQUENCE
    visitedCellId-r12
                                       CHOICE {
        cellGlobalId-r12
                                                CellGlobalIdEUTRA,
        pci-arfcn-r12
                                                SEQUENCE {
           physCellId-r12
                                                    PhysCellId,
                                                    ARFCN-ValueEUTRA-r9
            carrierFreq-r12
                                                                    OPTIONAL.
    timeSpent-r12
                                        INTEGER (0..4095),
-- ASN1STOP
```

VisitedCellInfoList field descriptions

timeSpent

This field indicates the duration of stay in the cell or outside E-UTRA approximated to the closest second. If the duration of stay exceeds 4095s, the UE shall set it to 4095s.

WLAN-OffloadConfig

The IE WLAN-OffloadConfig includes information for traffic steering between E-UTRAN and WLAN. The fields are applicable to both RAN-assisted WLAN interworking based on access network selection and traffic steering rules and RAN-assisted WLAN interworking based on ANDSF policies unless stated otherwise in the field description.

WLAN-OffloadConfig information element

```
-- ASN1START
WLAN-OffloadConfig-r12 ::=
                                        SEQUENCE {
   thresholdRSRP-r12
                                           SEOUENCE {
        thresholdRSRP-Low-r12
                                               RSRP-Range,
                                               RSRP-Range
        thresholdRSRP-High-r12
                                                                        OPTIONAL, -- Need OR
   thresholdRSRQ-r12
                                            SEQUENCE {
        thresholdRSRQ-Low-r12
                                                RSRQ-Range,
        thresholdRSRQ-High-r12
                                                RSRQ-Range
                                                                        OPTIONAL, -- Need OR
    thresholdRSRQ-OnAllSymbolsWithWB-r12 SEQUENCE {
        thresholdRSRQ-OnAllSymbolsWithWB-Low-r12
                                                            RSRQ-Range,
        thresholdRSRQ-OnAllSymbolsWithWB-High-r12
                                                            RSRO-Range
```

```
OPTIONAL, -- Need OP
    thresholdRSRQ-OnAllSymbols-r12
                                               SEQUENCE {
         thresholdRSRQ-OnAllSymbolsLow-r12
                                                                  RSRQ-Range,
         thresholdRSRQ-OnAllSymbolsHigh-r12
                                                                  RSRQ-Range
                                                                               OPTIONAL, -- Need OP
    thresholdRSRQ-WB-r12
                                                SEQUENCE {
        thresholdRSRQ-WB-Low-r12
                                                                  RSRQ-Range,
        thresholdRSRQ-WB-High-r12
                                                                  RSRQ-Range
                                                                               OPTIONAL, -- Need OP
    thresholdChannelUtilization-r12
                                              SEQUENCE {
        thresholdChannelUtilizationLow-r12 INTEGER (0..255), thresholdChannelUtilizationHigh-r12 INTEGER (0..255)
                                                                               OPTIONAL, -- Need OR
    thresholdBackhaul-Bandwidth-r12
                                               SEQUENCE {
        threshold {\tt BackhaulDL-BandwidthLow-r12} \qquad {\tt WLAN-backhaulRate-r12},
        thresholdBackhaulDL-BandwidthHigh-r12 WLAN-backhaulRate-r12, thresholdBackhaulUL-BandwidthLow-r12 WLAN-backhaulRate-r12,
        thresholdBackhaulUL-BandwidthHigh-r12 WLAN-backhaulRate-r12
                                                                               OPTIONAL, -- Need OR
    thresholdWLAN-RSSI-r12
                                                    SEQUENCE {
        thresholdWLAN-RSSI-Low-r12
                                                        INTEGER (0..255),
        thresholdWLAN-RSSI-High-r12
                                                         INTEGER (0..255)
                                                                             OPTIONAL, -- Need OR
OPTIONAL, -- Need OR
OPTIONAL, -- Need OR
                                               BIT STRING (SIZE (16))
    offloadPreferenceIndicator-r12
    t-SteeringWLAN-r12
                                                T-Reselection
WLAN-backhaulRate-r12 ::=
                                                ENTIMERATED
                                             {r0, r4, r8, r16, r32, r64, r128, r256, r512,
                                             r1024, r2048, r4096, r8192, r16384, r32768, r65536,
r131072,
                                             r262144, r524288, r1048576, r2097152, r4194304, r8388608,
                                             r16777216, r33554432, r67108864, r134217728, r268435456,
                                             r536870912, r1073741824, r2147483648, r4294967296}
-- ASN1STOP
```

WLAN-OffloadConfig field descriptions

offloadPreferenceIndicator

Indicates the offload preference indicator. Parameter: OPI in TS 24.312 [66]. Only applicable to RAN-assisted WLAN interworking based on ANDSF policies.

thresholdBackhaulDLBandwidth-High

Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: ThreshBackhRateDLWLAN, High in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

thresholdBackhaulDLBandwidth-Low

Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshBackhRateDLWLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

thresholdBackhaulULBandwidth-High

Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: Thresh_{BackhRateULWLAN, High} in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

thresholdBackhaulULBandwidth-Low

Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshBackhRateULWLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.

thresholdChannelUtilization-High

Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshohutilwLAN, High in TS 36.304 [4].

thresholdChannelUtilization-Low

Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to WLAN. Parameter: ThreshchutilWLAN, Low in TS 36.304 [4].

thresholdRSRP-High

Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to E-UTRAN. Parameter:

ThreshServingOffloadWLAN, HighP in TS 36.304 [4].

thresholdRSRP-Low

Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to WLAN. Parameter: Thresh_{ServingOffloadWLAN}, L_{LowP} in TS 36.304 [4].

thresholdRSRQ-High,thresholdRSRQ-OnAllSymbolsHigh, thresholdRSRQ-WB-High, thresholdRSRQ-OnAllSymbolsWithWB-High

Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to E-UTRAN. Parameter:

Thresh_{ServingOffloadWLAN, HighQ} in TS 36.304 [4]. The UE shall only apply one of threshold values of *thresholdRSRQ-OnAllSymbolsWithWB-High*, *thresholdRSRQ-OnAllSymbolsHigh*, *thresholdRSRQ-WB-High* and *thresholdRSRQ-High* as present in *wlan-OffloadConfigCommon* and forward this to upper layer. NOTE 1.

thresholdRSRQ-Low,thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low, thresholdRSRQ-OnAllSymbolsWithWB-Low

Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to WLAN. Parameter: Thresh_{ServingOffloadWLAN}, LowQ in TS 36.304 [4].

The UE shall only apply one of threshold values of *thresholdRSRQ-OnAllSymbolsWithWB-Low, thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low* and *thresholdRSRQ-Low* as present in *wlan-OffloadConfigCommon* and forward this to upper layer. NOTE 1.

thresholdWLAN-RSSI-High

Indicates the WLAN RSSI threshold used by the UE for traffic steering to WLAN. Parameter: Thresh_{WLANRSSI, High} in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.

thresholdWLAN-RSSI-Low

Indicates the WLAN RSSI threshold used by the UE for traffic steering to E-UTRAN. Parameter: ThreshwLANRSSI, Low in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.

t-SteeringWLAN

Indicates the timer value during which the rules should be fulfilled before starting traffic steering between E-UTRAN and WLAN. Parameter: Tsteering_{WLAN} in TS 36.304 [4]. Only applicable to RAN-assisted WLAN interworking based on access network selection and traffic steering rules.

NOTE 1: Within SIB17, E-UTRAN includes the fields corresponding to same RSRQ types as included in SIB1. E.g. if E-UTRAN includes *q-QualMinRSRQ-OnAllSymbols* in SIB1 it also includes *thresholdRSRQ-OnAllSymbols* in SIB17. Within the *RRCConnectionReconfiguration* message E-UTRAN only includes *thresholdRSRQ*, setting the value according to the RSRQ type used for E-UTRAN. The UE shall apply the RSRQ fields (RSRQ threshold, high and low) corresponding to one RSRQ type i.e. the same as it applies for E-UTRAN.

6.3.7 MBMS information elements

MBMS-NotificationConfig

The IE *MBMS-NotificationConfig* specifies the MBMS notification related configuration parameters, that are applicable for all MBSFN areas.

MBMS-NotificationConfig information element

```
-- ASN1START

MBMS-NotificationConfig-r9 ::= SEQUENCE {
    notificationRepetitionCoeff-r9 ENUMERATED {n2, n4},
    notificationOffset-r9 INTEGER (0..10),
    notificationSF-Index-r9 INTEGER (1..6)
}

MBMS-NotificationConfig-v1430 ::= SEQUENCE {
    notificationSF-Index-v1430 INTEGER (7..10)
}

-- ASN1STOP
```

MBMS-NotificationConfig field descriptions

notificationOffset

Indicates, together with the *notificationRepetitionCoeff*, the radio frames in which the MCCH information change notification is scheduled i.e. the MCCH information change notification is scheduled in radio frames for which: SFN mod notification repetition period = *notificationOffset*.

notificationRepetitionCoeff

Actual change notification repetition period common for all MCCHs that are configured= shortest modification period/ notificationRepetitionCoeff. The 'shortest modification period' corresponds with the lowest value of mcch-ModificationPeriod of all MCCHs that are configured. Value n2 corresponds to coefficient 2, and so on.

notificationSF-Index

Indicates the subframe used to transmit MCCH change notifications on PDCCH. FDD: Value 1, 2, 3, 4, 5 and 6 correspond with subframe #1, #2, #3 #6, #7, and #8 respectively. Value 7, 8, 9 and 10 correspond with subframe #0, #4, #5 and #9 respectively. If notificationSF-Index-v1430 is included, UE ignores notificationSF-Index-r9. TDD: Value 1, 2, 3, 4, and 5 correspond with subframe #3, #4, #7, #8, and #9 respectively.

– MBMS-ServiceList

The IE MBMS-ServiceList provides the list of MBMS services which the UE is receiving or interested to receive.

MBMS-ServiceList information element

MBSFN-Areald

The IE *MBSFN-Areald* identifies an MBSFN area by means of a locally unique value at lower layers i.e. it concerns parameter $N_{\rm ID}^{\rm MBSFN}$ in TS 36.211 [21, 6.10.2.1].

MBSFN-Areald information element

```
-- ASN1START
```

```
MBSFN-Areald-r12 ::= INTEGER (0..255)
-- ASN1STOP
```

MBSFN-AreaInfoList

The IE *MBSFN-AreaInfoList* contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.

MBSFN-AreaInfoList information element

```
-- ASN1START
MBSFN-AreaInfoList-r9 ::=
                                  SEQUENCE (SIZE(1..maxMBSFN-Area)) OF MBSFN-AreaInfo-r9
MBSFN-AreaInfo-r9 ::=
                                  SEQUENCE {
   mbsfn-AreaId-r9
                                      MBSFN-Areald-r12,
   non-MBSFNregionLength
                                      ENUMERATED {s1, s2},
   notificationIndicator-r9
                                      INTEGER (0..7),
   mcch-Config-r9
                                      SEQUENCE {
                                      ENUMERATED {rf32, rf64, rf128, rf256},
       mcch-RepetitionPeriod-r9
       mcch-Offset-r9
                                      INTEGER (0..10),
       mcch-ModificationPeriod-r9 ENUMERATED {rf512, rf1024},
       sf-AllocInfo-r9
                                      BIT STRING (SIZE(6)),
       signallingMCS-r9
                                      ENUMERATED {n2, n7, n13, n19}
   },
   [[ mcch-Config-r14
                                  SEQUENCE {
           mcch-RepetitionPeriod-v1430 ENUMERATED {rf1, rf2, rf4, rf8,
                                      rf16 } OPTIONAL, -- Need OR
           mcch-ModificationPeriod-v1430 ENUMERATED {rf1, rf2, rf4, rf8, rf16, rf32, rf64, rf128,
                                          rf256, spare7}
                                                                         OPTIONAL
                                                                                     -- Need OR
                                                                                    -- Need OR
                                                                         OPTIONAL,
       subcarrierSpacingMBMS-r14 ENUMERATED {khz-7dot5, khz-1dot25} OPTIONAL
                                                                                     -- Need OR
   ]]
}
-- ASN1STOP
```

MBSFN-AreaInfoList field descriptions

mcch-ModificationPeriod

Defines periodically appearing boundaries, i.e. radio frames for which SFN mod *mcch-ModificationPeriod* = 0. The contents of different transmissions of MCCH information can only be different if there is at least one such boundary inbetween them. In case *mcch-ModificationPeriod-v1430* is configured, the UE shall ignore the *mcch-ModificationPeriod-r9*.

mcch-Offset

Indicates, together with the *mcch-RepetitionPeriod*, the radio frames in which MCCH is scheduled i.e. MCCH is scheduled in radio frames for which: SFN mod *mcch-RepetitionPeriod* = *mcch-Offset*.

mcch-RepetitionPeriod

Defines the interval between transmissions of MCCH information, in radio frames, Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on. In case *mcch-RepetitionPeriod-v1430* is configured, the UE shall ignore the *mcch-RepetitionPeriod-r9*.

non-MBSFNregionLength

Indicates how many symbols from the beginning of the subframe constitute the non-MBSFN region. This value applies in all subframes of the MBSFN area used for PMCH transmissions as indicated in the MSI. The values s1 and s2 correspond with 1 and 2 symbols, respectively: see TS 36.211 [21, Table 6.7-1].

notificationIndicator

Indicates which PDCCH bit is used to notify the UE about change of the MCCH applicable for this MBSFN area. Value 0 corresponds with the least significant bit as defined in TS 36.212 [22, 5.3.3.1] and so on.

sf-AllocInfo

Indicates the subframes of the radio frames indicated by the *mcch-RepetitionPeriod* and the *mcch-Offset*, that may carry MCCH. Value "1" indicates that the corresponding subframe is allocated. The following mapping applies: FDD: The first/ leftmost bit defines the allocation for subframe #1 of the radio frame indicated by *mcch-RepetitionPeriod* and *mcch-Offset*, the second bit for #2, the third bit for #3, the fourth bit for #6, the fifth bit for #7 and the sixth bit for #8.

TDD: The first/leftmost bit defines the allocation for subframe #3 of the radio frame indicated by *mcch-RepetitionPeriod* and *mcch-Offset*, the second bit for #4, third bit for #7, fourth bit for #8, fifth bit for #9. Uplink subframes are not allocated. The last bit is not used.

signallingMCS

Indicates the MCS applicable for the subframes indicated by the field *sf-AllocInfo* and for each (P)MCH that is configured for this MBSFN area, for the first subframe allocated to the (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC). Value n2 corresponds with the value 2 for

parameter $I_{\rm MCS}$ in TS 36.213 [23, Table 7.1.7.1-1], and so on.

subcarrierSpacingMBMS

The value indicates subcarrier spacing for MBSFN subframes and khz-7dot5 refers to 7.5kHz subcarrier spacing and khz-1dot25 refers to 1.25 kHz subcarrier spacing as defined in TS36.211 [21, 6.12]. These subframes do not have non-MBSFN region. If *subcarrierSpacingMBMS* is present, then *non-MBSFNregionLength* shall be ignored. EUTRAN configures parameter *subcarrierSpacingMBMS* only when the MBSFN subframes have subcarrier spacing other than 15kHz.

MBSFN-SubframeConfig

The IE MBSFN-SubframeConfig defines subframes that are reserved for MBSFN in downlink.

MBSFN-SubframeConfig information element

```
-- ASN1START
MBSFN-SubframeConfig ::=
                                    SEQUENCE {
   radioframeAllocationPeriod
                                       ENUMERATED {n1, n2, n4, n8, n16, n32},
                                        INTEGER (0..7),
    radioframeAllocationOffset
    subframeAllocation
                                        CHOICE {
        oneFrame
                                            BIT STRING (SIZE(6)),
        fourFrames
                                            BIT STRING (SIZE(24))
}
MBSFN-SubframeConfig-v1430 ::=
    subframeAllocation-v1430
                                            CHOICE {
        oneFrame-v1430
                                            BIT STRING (SIZE(2)),
                                           BIT STRING (SIZE(8))
        fourFrames-v1430
}
-- ASN1STOP
```

MBSFN-SubframeConfig field descriptions

fourFrames

A bit-map indicating MBSFN subframe allocation in four consecutive radio frames, "1" denotes that the corresponding subframe is allocated for MBSFN. The bitmap is interpreted as follows:

FDD: Starting from the first radioframe and from the first/leftmost bit in the bitmap, the allocation applies to subframes #1, #2, #3, #6, #7, and #8 in the sequence of the four radio-frames.

TDD: Starting from the first radioframe and from the first/leftmost bit in the bitmap, the allocation applies to subframes #3, #4, #7, #8, and #9 in the sequence of the four radio-frames. The last four bits are not used. E-UTRAN allocates uplink subframes only if *eimta-MainConfig* is configured.

fourFrames-v1430

A bit-map indicating MBSFN subframe allocation in four consecutive radio frames, "1" denotes that the corresponding subframe is allocated for MBSFN. The bitmap is interpreted as follows:

FDD: Starting from the first radioframe and from the first/leftmost bit in the bitmap, the allocation applies to subframes #4 and #9 in the sequence of the four radio-frames.

oneFrame

"1" denotes that the corresponding subframe is allocated for MBSFN. The following mapping applies:

FDD: The first/leftmost bit defines the MBSFN allocation for subframe #1, the second bit for #2, third bit for #3, fourth bit for #6, fifth bit for #7, sixth bit for #8.

TDD: The first/leftmost bit defines the allocation for subframe #3, the second bit for #4, third bit for #7, fourth bit for #8, fifth bit for #9. E-UTRAN allocates uplink subframes only if eimta-MainConfig is configured. The last bit is not used.

oneFrame-v1430

"1" denotes that the corresponding subframe is allocated for MBSFN. The following mapping applies:

FDD: The first/leftmost bit defines the MBSFN allocation for subframe #4 and the second bit for #9.

radioFrameAllocationPeriod, radioFrameAllocationOffset

Radio-frames that contain MBSFN subframes occur when equation *SFN* mod *radioFrameAllocationPeriod* = *radioFrameAllocationOffset* is satisfied. Value n1 for *radioframeAllocationPeriod* denotes value 1, n2 denotes value 2, and so on. When *fourFrames* is used for *subframeAllocation*, the equation defines the first radio frame referred to in the description below. Values *n1* and *n2* are not applicable when *fourFrames* is used.

subframeAllocation

Defines the subframes that are allocated for MBSFN within the radio frame allocation period defined by the radioFrameAllocationPeriod and the radioFrameAllocationOffset.

– PMCH-InfoList

The IE *PMCH-InfoList* specifies configuration of all PMCHs of an MBSFN area, while IE *PMCH-InfoListExt* includes additional PMCHs, i.e. extends the PMCH list using the general principles specified in 5.1.2. The information provided for an individual PMCH includes the configuration parameters of the sessions that are carried by the concerned PMCH. For all PMCH that E-UTRAN includes in *PMCH-InfoList*, the list of ongoing sessions has at least one entry.

PMCH-InfoList information element

```
-- ASN1START
PMCH-InfoList-r9 ::=
                                    SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-Info-r9
                                    SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-InfoExt-r12
PMCH-InfoListExt-r12 ::=
PMCH-Info-r9 ::=
                                    SEOUENCE {
   pmch-Config-r9
                                        PMCH-Config-r9,
    mbms-SessionInfoList-r9
                                    MBMS-SessionInfoList-r9,
PMCH-InfoExt-r12 ::=
                                    SEQUENCE {
   pmch-Config-r12
                                        PMCH-Config-r12,
   mbms-SessionInfoList-r12
                                        MBMS-SessionInfoList-r9.
MBMS-SessionInfoList-r9 ::=
                                SEQUENCE (SIZE (0..maxSessionPerPMCH)) OF MBMS-SessionInfo-r9
MBMS-SessionInfo-r9 ::=
                                SEQUENCE {
    tmgi-r9
                                        TMGI-r9,
    sessionId-r9
                                        OCTET STRING (SIZE (1))
                                                                        OPTIONAL,
                                                                                     -- Need OR
    logicalChannelIdentity-r9
                                        INTEGER (0..maxSessionPerPMCH-1),
                                   SEQUENCE {
PMCH-Config-r9 ::=
```

```
INTEGER (0..1535),
    sf-AllocEnd-r9
                                        INTEGER (0..28),
    dataMCS-r9
   mch-SchedulingPeriod-r9
                                    ENUMERATED {
                                        rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
}
PMCH-Config-r12 ::=
                                    SEQUENCE {
                                        INTEGER (0..1535),
    sf-AllocEnd-r12
                                        CHOICE {
    dataMCS-r12
       normal-r12
                                            INTEGER (0..28),
       higerOrder-r12
                                            INTEGER (0..27)
    mch-SchedulingPeriod-r12
                                    ENUMERATED {
                                        rf4, rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
    [[ mch-SchedulingPeriod-v1430
                                        ENUMERATED {rf1, rf2}
                                                                        OPTIONAL
                                                                                    -- Need OR
    11
}
TMGI-r9 ::=
                                SEQUENCE {
   plmn-Id-r9
                                        CHOICE {
       plmn-Index-r9
                                            INTEGER (1..maxPLMN-r11),
        explicitValue-r9
                                            PLMN-Identity
                                        OCTET STRING (SIZE (3))
    serviceId-r9
-- ASN1STOP
```

PMCH-InfoList field descriptions

dataMCS

Indicates the value for parameter $I_{\rm MCS}$ in TS 36.213 [23], which defines the MCS applicable for the subframes of this (P)MCH as indicated by the field commonSF-Alloc. Value normal corresponds to Table 7.1.7.1-1 and value higherOrder corresponds to Table 7.1.7.1-1A. The MCS does however neither apply to the subframes that may carry MCCH i.e. the subframes indicated by the field sf-AllocInfo within SystemInformationBlockType13 nor for the first subframe allocated to this (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC).

mch-SchedulingPeriod

Indicates the MCH scheduling period i.e. the periodicity used for providing MCH scheduling information at lower layers (MAC) applicable for an MCH. Value rf8 corresponds to 8 radio frames, rf16 corresponds to 16 radio frames and so on. The *mch-SchedulingPeriod* starts in the radio frames for which: SFN mod *mch-SchedulingPeriod* = 0. E-UTRAN configures *mch-SchedulingPeriod* of the (P)MCH listed first in *PMCH-InfoList* to be smaller than or equal to *mcch-RepetitionPeriod*. In case *mch-SchedulingPeriod-v1430* is configured, the UE shall ignore *mch-SchedulingPeriod-r12*.

plmn-Index

Index of the entry across the plmn-IdentityList fields within SystemInformationBlockType1.

sessionId

Indicates the optional MBMS Session Identity, which together with TMGI identifies a transmission or a possible retransmission of a specific MBMS session: see TS 29.061 [51, Sections 20.5, 17.7.11, 17.7.15]. The field is included whenever upper layers have assigned a session identity i.e. one is available for the MBMS session in E-UTRAN.

serviceld

Uniquely identifies the identity of an MBMS service within a PLMN. The field contains octet 3- 5 of the IE Temporary Mobile Group Identity (TMGI) as defined in TS 24.008 [49]. The first octet contains the third octet of the TMGI, the second octet contains the fourth octet of the TMGI and so on.

sf-AllocEnd

Indicates the last subframe allocated to this (P)MCH within a period identified by field *commonSF-AllocPeriod*. The subframes allocated to (P)MCH corresponding with the nth entry in *pmch-InfoList* are the subsequent subframes starting from either the next subframe after the subframe identified by *sf-AllocEnd* of the (n-1)th listed (P)MCH or, for n=1, the first subframe defined by field *commonSF-Alloc*, through the subframe identified by *sf-AllocEnd* of the nth listed (P)MCH. Value 0 corresponds with the first subframe defined by field *commonSF-Alloc*.

6.3.7a SC-PTM information elements

SC-MTCH-InfoList

The IE SC-MTCH-InfoList provides the list of ongoing MBMS sessions transmitted via SC-MRB and for each MBMS session, the associated G-RNTI and scheduling information.

SC-MTCH-InfoList information element

```
-- ASN1START
SC-MTCH-InfoList-r13 ::=
                                    SEQUENCE (SIZE (0..maxSC-MTCH-r13)) OF SC-MTCH-Info-r13
SC-MTCH-Info-r13 ::=
                                    SEOUENCE
   mbmsSessionInfo-r13
                                            MBMSSessionInfo-r13,
    g-RNTI-r13
                                            BIT STRING(SIZE(16)),
    sc-mtch-schedulingInfo-r13
                                            SC-MTCH-SchedulingInfo-r13
                                                                                 OPTIONAL, -- Need
ΩP
    sc-mtch-neighbourCell-r13
                                            BIT STRING (SIZE(maxNeighCell-SCPTM-r13)) OPTIONAL, --
Need OP
    [[ p-a-r13
                                             ENUMERATED {
                                                 dB-6, dB-4dot77, dB-3, dB-1dot77,
                                                 dB0, dB1, dB2, dB3}
                                                                        OPTIONAL
    ]]
}
MBMSSessionInfo-r13 ::=
                                    SEQUENCE
                                            TMGI-r9,
    tmgi-r13
                                             OCTET STRING (SIZE (1))
                                                                        OPTIONAL
    sessionId-r13
                                                                                      -- Need OR
SC-MTCH-SchedulingInfo-r13::=
                                    SEQUENCE
   onDurationTimerSCPTM-r13
                                             ENUMERATED {
                                                 psf1, psf2, psf3, psf4, psf5, psf6,
                                                 psf8, psf10, psf20, psf30, psf40,
                                                 psf50, psf60, psf80, psf100,
                                                 psf200},
    drx-InactivityTimerSCPTM-r13
                                             ENUMERATED {
                                                 psf0, psf1, psf2, psf4, psf8,
                                                 psf10, psf20, psf40,
                                                 psf80, psf160, ps320,
                                                 psf640, psf960,
psf1280, psf1920, psf2560},
    schedulingPeriodStartOffsetSCPTM-r13
                                             CHOICE {
                                                 INTEGER(0..9),
                                                 INTEGER(0..19),
        sf20
                                                 INTEGER(0..31),
        sf32
        sf40
                                                 INTEGER(0..39),
        sf64
                                                 INTEGER(0..63),
        sf80
                                                 INTEGER(0..79),
                                                 INTEGER(0..127),
        sf128
                                                 INTEGER(0..159),
        sf160
        sf256
                                                 INTEGER(0..255),
        sf320
                                                 INTEGER(0..319),
                                                 INTEGER(0..511),
        sf512
        sf640
                                                 INTEGER(0..639),
        sf1024
                                                 INTEGER(0..1023),
        sf2048
                                                 INTEGER(0..2048),
        sf4096
                                                 INTEGER(0..4096),
        sf8192
                                                 INTEGER(0..8192)
    },
-- ASN1STOP
```

SC-MTCH-InfoList field descriptions

drx-InactivityTimerSCPTM

Timer for SC-MTCH in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

g-RNTI

G-RNTI used to scramble the scheduling and transmission of a SC-MTCH.

mbmsSessionInfo

Indicates the ongoing MBMS session in a SC-MTCH.

onDurationTimerSCPTM

Timer for SC-MTCH reception in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

p-a

Parameter: P_A'' , for the SC-MTCH per G-RNTI, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

schedulingPeriodStartOffsetSCPTM

SCPTM-SchedulingCycle and SCPTM-SchedulingOffset in TS 36.321 [6]. The value of SCPTM-SchedulingCycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. The value of SCPTM-SchedulingOffset is in number of sub-frames. The E-UTRAN does not configure a maximum value 2048 for sf2048, 4096 for sf4096 or 8192 for sf8192.

sc-mtch-neighbourCell

Indicates neighbour cells which also provide this service on SC-MTCH. The first bit is set to 1 if the service is provided on SC-MTCH in the first cell in *scptmNeighbourCellList*, otherwise it is set to 0. The second bit is set to 1 if the service is provided on SC-MTCH in the second cell in *scptmNeighbourCellList*, and so on. If this field is absent, the UE shall assume that this service is not available on SC-MTCH in any neighbour cell.

sc-mtch-schedulinalnfo

DRX information for the SC-MTCH. If this field is absent, the SC-MTCH may be scheduled in any subframe.

SC-MTCH-InfoList-BR

The IE *SC-MTCH-InfoList-BR* provides the list of ongoing MBMS sessions transmitted via SC-MRB and for each MBMS session, the associated G-RNTI and scheduling information.

SC-MTCH-InfoList-BR information element

```
-- ASN1START
SC-MTCH-InfoList-BR-r14 ::=
                            SEQUENCE (SIZE (0..maxSC-MTCH-BR-r14)) OF SC-MTCH-Info-BR-r14
SC-MTCH-Info-BR-r14 ::=
   sc-mtch-CarrierFreq-r14 ::=
                                           ARFCN-ValueEUTRA-r9,
    mbmsSessionInfo-r14
                                           MBMSSessionInfo-r13.
    q-RNTI-r14
                                           BIT STRING(SIZE(16))
    sc-mtch-schedulingInfo-r14
                                   SC-MTCH-SchedulingInfo-BR-r14
                                                                                   OPTIONAL,
Need OP
   sc-mtch-neighbourCell-r14
                                           BIT STRING (SIZE(maxNeighCell-SCPTM-r13)) OPTIONAL, --
Need OP
    mpdcch-Narrowband-SC-MTCH-r14
                                               INTEGER (1.. maxAvailNarrowBands-r13),
                                                ENUMERATED {r1, r2, r4, r8, r16,
    mpdcch-NumRepetition-SC-MTCH-r14
                                                           r32, r64, r128, r256},
   mpdcch-StartSF-SC-MTCH-r14
                                   CHOICE {
           fdd-r14
                                                ENUMERATED {v1, v1dot5, v2, v2dot5, v4,
                                                               v5, v8, v10},
            tdd-r14
                                                ENUMERATED {v1, v2, v4, v5, v8, v10,
                                                               v20}
    mpdcch-PDSCH-HoppingConfig-SC-MTCH-r14
                                               ENUMERATED {on, off},
    mpdcch-PDSCH-CEmodeConfig-SC-MTCH-r14
                                               ENUMERATED {ce-ModeA, ce-ModeB},
                                               ENUMERATED (bwldot4, bw5),
    mpdcch-PDSCH-MaxBandwidth-SC-MTCH-r14
    mpdcch-Offset-SC-MTCH-r14
                                               ENUMERATED {zero, oneEighth, oneQuarter,
                                                            threeEighth, oneHalf, fiveEighth,
                                                           threeQuarter, sevenEighth},
                                                ENUMERATED { dB-6, dB-4dot77, dB-3,
    p-a-r14
                                                            dB-1dot77, dB0, dB1, dB2,
                                                                               OPTIONAL, -- Need OR
SC-MTCH-SchedulingInfo-BR-r14::= SEQUENCE
```

```
ENUMERATED {
    psf300, psf400, psf500, psf600,
    psf800, psf1000, psf1200, psf1600},
    ENUMERATED {
   onDurationTimerSCPTM-r14
    drx-InactivityTimerSCPTM-r14
                                                     psf0, psf1, psf2, psf4, psf8, psf16,
                                                     psf32, psf64, psf128, psf256, ps512,
                                                     psf1024, psf2048, psf4096, psf8192, psf16384},
    schedulingPeriodStartOffsetSCPTM-r14
                                                CHOICE {
        sf10
                                                     INTEGER(0..9),
         sf20
                                                     INTEGER(0..19),
        sf32
                                                     INTEGER(0..31),
                                                     INTEGER(0..39),
        sf40
                                                     INTEGER(0..63),
        sf64
         sf80
                                                     INTEGER(0..79),
         sf128
                                                     INTEGER(0..127),
                                                    INTEGER(0..159),
        sf160
        sf256
                                                    INTEGER(0..255),
        sf320
                                                     INTEGER(0..319),
        sf512
                                                    INTEGER(0..511),
        sf640
                                                     INTEGER(0..639),
                                                    INTEGER(0..1023),
        sf1024
                                                    INTEGER(0..2047),
        sf2048
        sf4096
                                                     INTEGER(0..4095),
        sf8192
                                                     INTEGER(0..8191)
    },
}
-- ASN1STOP
```

SC-MTCH-InfoList-BR field descriptions

drx-InactivityTimerSCPTM

Timer for SC-MTCH in TS 36.321 [6]. Value in number of MPDCCH sub-frames. Value psf0 corresponds to 0 MPDCCH sub-frame and behaviour as specified in 7.3.2 applies, psf1 corresponds to 1 MPDCCH sub-frame, psf2 corresponds to 2 MPDCCH sub-frames and so on.

g-RNTI

G-RNTI used to scramble the scheduling and transmission of a SC-MTCH

mbmsSessionInfo

Indicates the ongoing MBMS session in a SC-MTCH.

mpdcch-Narrowband-SC-MTCH

Narrowband for MPDCCH for SC-MTCH, see TS 36.213 [23].

mpdcch-NumRepetitions-SC-MTCH

The maximum number of MPDCCH repetitions the UE needs to monitor for SC-MTCH, see TS 36.213 [23].

mpdcch-Offset-SC-MTCH

Fractional period offset of starting subframes for MPDCCH search space for SC-MTCH, see TS 36.213 [23].

mpdcch-PDSCH-CEmodeConfig-SC-MTCH

Coverage enhancement mode configuration for MPDCCH/PDSCH for SC-MTCH, see TS 36.213 [23].

mpdcch-PDSCH-HoppingConfig-SC-MTCH

Frequency hopping configuration for MPDCCH/PDSCH for SC-MTCH, see TS 36.213 [23].

mpdcch-PDSCH-MaxBandwidth-SC-MTCH

Maximum PDSCH channel bandwidth for SC-MTCH, see TS 36.213 [23]. Value *bw1dot4* corresponds to 1.4 MHz channel bandwidth and value *bw5* corresponds to 5 MHz channel bandwidth. Corresponding maximum TBS are specified in TS 36.213 [23, 7.1.7.2].

mpdcch-StartSF-SC-MTCH

Starting subframes configuration of the MPDCCH search space for SC-MTCH, see TS 36.213 [23].

onDurationTimerSCPTM

Timer for SC-MTCH reception in TS 36.321 [6]. Value in number of MPDCCH sub-frames. Value psf300 corresponds to 300 MPDCCH sub-frames, psf400 corresponds to 400 MPDCCH sub-frames and so on.

schedulingPeriodStartOffsetSCPTM

SCPTM-SchedulingCycle and SCPTM-SchedulingOffset in TS 36.321 [6]. The value of SCPTM-SchedulingCycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. The value of SCPTM-SchedulingOffset is in number of sub-frames.

sc-mtch-CarrierFreq

Downlink carrier used for multicast SC-MTCH transmissions.

sc-mtch-neiahbourCell

Indicates neighbour cells which also provide this service on SC-MTCH. The first bit is set to 1 if the service is provided on SC-MTCH in the first cell in *scptmNeighbourCellList*, otherwise it is set to 0. The second bit is set to 1 if the service is provided on SC-MTCH in the second cell in *scptmNeighbourCellList*, and so on. If this field is absent, the UE shall assume that this service is not available on SC-MTCH in any neighbour cell.

sc-mtch-schedulingInfo

DRX information for the SC-MTCH. If this field is absent, DRX is not used for SC-MTCH reception.

p-a

Parameter: P_A'' for the SC-MTCH per G-RNTI, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.

SCPTM-NeighbourCellList

The IE *SCPTM-NeighbourCellList* indicates a list of neighbour cells where ongoing MBMS sessions provided via SC-MRB in the current cells are also provided.

```
-- ASN1START

SCPTM-NeighbourCellList-r13 ::= SEQUENCE (SIZE (1..maxNeighCell-SCPTM-r13)) OF PCI-ARFCN-r13

PCI-ARFCN-r13 ::= SEQUENCE {
    physCellId-r13 PhysCellId,
    carrierFreq-r13 ARFCN-ValueEUTRA-r9 OPTIONAL
}

-- ASN1STOP
```

SCPTM-NeighbourCellList field description

carrierFrea

Indicates the frequency of the neighbour cell indicated by *physCellId*. Absence of the IE means that the neighbour cell is on the same frequency as the current cell.

6.3.8 Sidelink information elements

SL-AnchorCarrierFreqList-V2X

The IE *SL-AnchorCarrierFreqList-V2X* specifies the SL V2X anchor frequencies i.e. frequencies that include intercarrier resource configuration for V2X sidelink communication.

SL-AnchorCarrierFreqList-V2X information element

```
-- ASN1START

SL-AnchorCarrierFreqList-V2X-r14 ::= SEQUENCE (SIZE (1..maxFreqV2X-r14)) OF ARFCN-ValueEUTRA-r9

-- ASN1STOP
```

SL-CBR-CommonTxConfigList

The IE *SL-CBR-CommonTxConfigList* indicates the list of PSSCH transmission parameters (such as MCS, sub-channel number, retransmission number, CR limit) in *sl-CBR-PSSCH-TxConfigList*, and the list of CBR ranges in *cbr-RangeCommonConfigList*, to configure congestion control to the UE for V2X sidelink communication.

SL-CBR-CommonTxConfigList information element

```
-- ASN1START
SL-CBR-CommonTxConfigList-r14 ::=
                                    SEQUENCE +
    cbr-RangeCommonConfigList-r14
                                    SEQUENCE (SIZE (1..maxSL-V2X-CBRConfig-r14)) OF SL-CBR-Levels-
Config-r14,
   sl-CBR-PSSCH-TxConfigList-r14
                                   SEQUENCE (SIZE (1..maxSL-V2X-TxConfig-r14)) OF SL-CBR-PSSCH-
TxConfig-r14
SL-CBR-Levels-Config-r14 ::=
                                    SEQUENCE (SIZE (1..maxCBR-Level-r14)) OF SL-CBR-r14
SL-CBR-PSSCH-TxConfig-r14 ::=
                                    SEQUENCE {
                                    INTEGER(0..10000),
    cr-Limit-r14
                                    SL-PSSCH-TxParameters-r14
    tx-Parameters-r14
SL-CBR-r14 ::=
                                    INTEGER(0..100)
-- ASN1STOP
```

SL-CBR-CommonTxConfigList field descriptions

cbr-RangeCommonConfigList

Indicates the list of CBR ranges. Each entry of the list indicates in *SL-CBR-Levels-Config* the upper bound of the CBR range for the respective entry. The upper bounds of the CBR ranges are configured in ascending order for consecutive entries of *cbr-RangeCommonConfigList*. For the first entry of *cbr-RangeCommonConfigList* the lower bound of the CBR range is 0.

cr-Limit

Indicates the maximum limit on the occupancy ratio. Value 0 corresponds to 0, value 1 to 0.0001, value 2 to 0.0002, and so on (i.e. in steps of 0.0001) until value 10000, which corresponds to 1.

sI-CBR-PSSCH-TxConfigList

Indicates the list of available PSSCH transmission parameters (such as MCS, sub-channel number, retransmission number and CR limit) configurations.

SL-CBR

Value 0 corresponds to 0, value 1 to 0.01, value 2 to 0.02, and so on.

tx-Parameters

Indicates PSSCH transmission parameters.

SL-CBR-PPPP-TxConfigList

The IE *SL-CBR-PPPP-TxConfigList* indicates the mapping between PSSCH transmission parameter (such as MCS, PRB number, retransmission number, CR limit) sets by using the indexes of the configurations provided in *sl-CBR-PSSCH-TxConfigList*, CBR ranges by an index to the entry of the CBR range configuration in *cbr-RangeCommonConfigList*, and PPPP ranges. It also indicates the default PSSCH transmission parameters to be used when CBR measurement results are not available.

SL-CBR-PPPP-TxConfigList information element

```
-- ASN1START

SL-CBR-PPPP-TxConfigList-r14 ::= SEQUENCE (SIZE (1..8)) OF SL-PPPP-TxConfigIndex-r14

SL-PPPP-TxConfigIndex-r14 ::= SEQUENCE {
    priorityThreshold-r14 SL-Priority-r13,
    defaultTxConfigIndex-r14 INTEGER(0..maxCBR-Level-1-r14),
    cbr-ConfigIndex-r14 INTEGER(0..maxSL-V2X-CBRConfig-1-r14),
    tx-ConfigIndexList-r14 SEQUENCE (SIZE (1..maxCBR-Level-r14)) OF Tx-ConfigIndex-r14
}

Tx-ConfigIndex-r14 ::= INTEGER(0..maxSL-V2X-TxConfig-1-r14)
```

SL-CBR-PPPP-TxConfigList field descriptions

cbr-ConfigIndex

Indicates the CBR ranges to be used by an index to the entry of the CBR range configuration in *cbr-RangeCommonConfigList*.

defaultTxConfigIndex

Indicates the PSSCH transmission parameters to be used by the UEs which do not have available CBR measurement results, by means of an index to the corresponding entry in *tx-ConfigIndexList*. Value 0 indicates the first entry in *tx-ConfigIndexList*. The field is ignored if the UE has available CBR measurement results.

priorityThreshold

Indicates the upper bound of PPPP range which is associated with the configurations in *cbr-ConfigIndex* and in *tx-ConfigIndexList*. The upper bounds of the PPPP ranges are configured in ascending order for consecutive entries of *SL-PPPP-TxConfigIndex* in *SL-CBR-PPPP-TxConfigList*. For the first entry of *SL-PPPP-TxConfigIndex*, the lower bound of the PPPP range is 1.

tx-ConfigIndexList

Indicates the list of the PSSCH transmission parameters and CR limit by the indexes to the entries of the configurations in *sl-CBR-PSSCH-TxConfigList*. Each index in *tx-ConfigIndexList* sequentially maps to each CBR range indicated by *cbr-ConfigIndex*.

SL-CommConfig

The IE *SL-CommConfig* specifies the dedicated configuration information for sidelink communication. In particular it concerns the transmission resource configuration for sidelink communication on the primary frequency.

SL-CommConfig information element

```
-- ASN1START
SL-CommConfig-r12 ::=
                                   SEQUENCE
    commTxResources-r12
                                       CHOICE {
       release
                                          NULL.
                                           CHOICE {
        setup
           scheduled-r12
                                           SEQUENCE {
               sl-RNTI-r12
                                               C-RNTI.
                                               MAC-MainConfigSL-r12,
               mac-MainConfig-r12
               sc-CommTxConfig-r12
                                               SL-CommResourcePool-r12,
               mcs-r12
                                               INTEGER (0..28)
                                                                                           -- Need
OP
           ue-Selected-r12
                                          SEQUENCE {
                -- Pool for normal usage
               commTxPoolNormalDedicated-r12 SEQUENCE {
                   poolToReleaseList-r12 SL-TxPoolToReleaseList-r12 OPTIONAL,
ON
                   poolToAddModList-r12
                                                 SL-CommTxPoolToAddModList-r12 OPTIONAL -- Need
ON
           }
    }
                                                                           OPTIONAL,
                                                                                     -- Need ON
                                                   CHOICE {
    [ commTxResources-v1310
                                               NULL,
           release
           setup
                                               CHOICE {
               scheduled-v1310
                                                  SEQUENCE {
                                                       LogicalChGroupInfoList-r13,
                   logicalChGroupInfoList-r13
                   multipleTx-r13
                                                       BOOLEAN
               ue-Selected-v1310
                                                   SEQUENCE {
                   commTxPoolNormalDedicatedExt-r13 SEQUENCE {
                                                         SL-TxPoolToReleaseListExt-r13 OPTIONAL.
                       poolToReleaseListExt-r13
    -- Need ON
                       poolToAddModListExt-r13
                                                          SL-CommTxPoolToAddModListExt-r13
    OPTIONAL
                -- Need ON
                                                                      OPTIONAL,
                                                                                   -- Need ON
        commTxAllowRelayDedicated-r13
                                           BOOLEAN
                                                          OPTIONAL
                                                                      -- Need ON
    ]]
}
LogicalChGroupInfoList-r13 ::=
                                  SEQUENCE (SIZE (1..maxLCG-r13)) OF SL-PriorityList-r13
SL-CommTxPoolToAddModList-r12 ::=
                                       SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-
CommTxPoolToAddMod-r12
SL-CommTxPoolToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-
CommTxPoolToAddModExt-r13
SL-CommTxPoolToAddMod-r12 ::=
                                   SEQUENCE
   poolIdentity-r12
                                       SL-TxPoolIdentity-r12,
    pool-r12
                                       SL-CommResourcePool-r12
SL-CommTxPoolToAddModExt-r13 ::=
                                      SEQUENCE
   poolIdentity-v1310
                                       SL-TxPoolIdentity-v1310,
    pool-r13
                                       SL-CommResourcePool-r12
MAC-MainConfigSL-r12 ::=
                               SEQUENCE
    periodic-BSR-TimerSL
                                           PeriodicBSR-Timer-r12
                                                                      OPTIONAL.
                                                                                 -- Need ON
    retx-BSR-TimerSL
                                           RetxBSR-Timer-r12
-- ASN1STOP
```

SL-CommConfig field descriptions

commTxAllowRelayDedicated

Indicates whether the UE is allowed to transmit relay related sidelink communication using the configured dedicated transmission resources i.e. either via scheduled or via UE selected resources.

commTxPoolNormalDedicated

Indicates a pool of transmission resources the UE is allowed to use while in RRC_CONNECTED.

IogicalChGroupInfoList

Indicates for each logical channel group the list of associated priorities, used as specified in TS 36.321 [6], in order of increasing logical channel group identity.

mcs

Indicates the MCS as defined in TS 36.212 [23, 14.2.1]. If not configured, the selection of MCS is up to UE implementation.

multipleTx

Indicates whether the UE should perform multiple transmissions to different destinations in one SC period in accordance with TS 36.321 [6, 5.14.1.1]. Value TRUE indicates that multiple transmissions should be performed.

sc-CommTxConfig

Indicates a pool of resources for SC when E-UTRAN schedules Tx resources (i.e. when indices included in DCI format 5 indicate the actual data resources to be used as specified in TS 36.212 [22, 5.3.3.1.9]).

scheduled

Indicates the configuration for the case E-UTRAN schedules the transmission resources based on sidelink specific BSR from the UE.

ue-Selected

Indicates the configuration for the case the UE selects the transmission resources from a pool of resources configured by E-UTRAN.

SL-CommResourcePool

The IE *SL-CommResourcePool* and *SL-CommResourcePoolV2X* specifies the configuration information for an individual pool of resources for sidelink communication and V2X sidelink communication respectively. The IE covers the configuration of both the sidelink control information and the data.

SL-CommResourcePool information element

```
-- ASN1START
SL-CommTxPoolList-r12 ::=
                                SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-CommResourcePool-r12
SL-CommTxPoolListExt-r13 ::=
                                SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-CommResourcePool-r12
SL-CommTxPoolListV2X-r14 ::=
                                    SEQUENCE (SIZE (1..maxSL-V2X-TxPool-r14)) OF SL-
CommResourcePoolV2X-r14
SL-CommRxPoolList-r12 ::=
                                SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-CommResourcePool-r12
SL-CommRxPoolListV2X-r14 ::=
                                    SEQUENCE (SIZE (1..maxSL-V2X-RxPool-r14)) OF SL-
CommResourcePoolV2X-r14
SL-CommResourcePool-r12 ::=
                                SEOUENCE {
    sc-CP-Len-r12
                                        SL-CP-Len-r12,
    sc-Period-r12
                                        SL-PeriodComm-r12,
    sc-TF-ResourceConfig-r12
                                        SL-TF-ResourceConfig-r12,
    data-CP-Len-r12
                                        SL-CP-Len-r12,
       data-TF-ResourceConfig-r12
trpt-Subset-r12
    dataHoppingConfig-r12
                                       SL-HoppingConfigComm-r12,
    ue-SelectedResourceConfig-r12
                                            SEOUENCE -
                                               SL-TF-ResourceConfig-r12,
                                           SL-TRPT-Subset-r12 OPTIONAL
                                                                    OPTIONAL, -- Need OR
    rxParametersNCell-r12
                                       SEOUENCE {
                                       TDD-Config
        tdd-Config-r12
                                                                    OPTIONAL,
                                                                                -- Need OP
        syncConfigIndex-r12 INTEGER (0..15)
                                                                    OPTIONAL,
                                                                                -- Need OR
    txParameters-r12
                                        SEQUENCE {
        sc-TxParameters-r12
                                        SL-TxParameters-r12,
        dataTxParameters-r12
                                       SL-TxParameters-r12
                                                                    OPTIONAL,
                                                                                -- Cond Tx
    [[ priorityList-r13
                                        SL-PriorityList-r13
                                                                                -- Cond Tx
                                                                    OPTIONAL
```

```
SL-CommResourcePoolV2X-r14 ::= SEQUENCE {
    sl-OffsetIndicator-r14 SL-Offs
    sl-Subframe-r14 Subframe adjacencyPSCCH-PSSCH-r14 BOOLEAN
    circSubghappal-r14 ENIMER;
                                                              SL-OffsetIndicator-r12 OPTIONAL, -- Need OR
                                                                     SubframeBitmapSL-r14,
                                                                BOOLEAN,
ENUMERATED {
       sizeSubchannel-r14
                                                                    n4, n5, n6, n8, n9, n10, n12, n15, n16, n18, n20, n25, n30,
                                                                     n48, n50, n72, n75, n96, n100, spare13, spare12, spare11,
                                                                     spare10, spare9, spare8, spare7, spare6, spare5, spare4,
                                                                   spare3, spare2, spare1},
ENUMERATED {n1, n3, n5, n8, n10, n15, n20, spare1},
      numSubchannel-r14
      numSubchannel-r14
startRB-Subchannel-r14
startRB-PSCCH-Pool-r14
rxParametersNCell-r14
std-Config-r14
syncConfigIndex-r14
INTEGER (0..99)
rXParametersNCell-r14
syncConfigIndex-r14
INTEGER (0..15)
                                                                                                                       OPTIONAL, -- Need OR
                                                                                                                     OPTIONAL, -- Need OP
                                                                                                                     OPTIONAL, -- Need OR
                                                                  SL-TxParameters-r12 OPTIONAL,
INTEGER (0..7) OPTIONAL,
INTEGER (0..45) OPTION
                                                                                                                       OPTIONAL, -- Cond Tx
OPTIONAL, -- Need OR
       dataTxParameters-r14
      dataTxParameters-11
zoneID-r14
INTEGER (0../)
threshS-RSSI-CBR-r14
poolReportId-r14
cbr-pssch-TxConfigList-r14
resourceSelectionConfigP2X-r14
symcallowed-r14

INTEGER (0../)
INTEGER (0../)
SL-V2X-TxPoolReportIdentity-r14
SL-V2X-TxPoolReportIdentity-r14
SL-CBR-PPPP-TxConfigList-r14
OPTIONAL, -- Need OR
SL-P2X-ResourceSelectionConfig-r14
OPTIONAL, -- Cond P2X
SL-SyncAllowed-r14
OPTIONAL, -- Need OR
SL-P2X-ResourceSelectionConfig-r14
OPTIONAL, -- Need OR
       OPTIONAL, -- Need OR
SL-TRPT-Subset-r12 ::= BIT STRING (SIZE (3..5))
{\tt SL-V2X-TxPoolReportIdentity-r14::=} \qquad {\tt INTEGER} \ ({\tt 1..maxSL-PoolToMeasure-r14})
-- ASN1STOP
```

SL-CommResourcePool field descriptions

adjacencyPSCCH-PSSCH

Indicates whether a UE shall always transmit PSCCH and PSSCH in adjacent RBs (indicated by TRUE) or in non-adjacent RBs (indicated by FALSE) (see TS 36.213 [23]).

cbr-pssch-TxConfigList

Indicates the mapping between PPPPs, CBR ranges by using indexes of the entry in cbr-RangeCommonConfigList, and PSSCH transmission parameters and CR limit by using indexes of the entry in sl-CBR-PSSCH-TxConfigList. If SL-CommResourcePoolV2X is included in MobilityControlInfoV2X, it refers to cbr-MobilityTxConfigList for cbr-RangeCommonConfigList and sl-CBR-PSSCH-TxConfigList. If SL-CommResourcePoolV2X is included in SL-V2X-ConfigDedicated, it refers to cbr-DedicatedTxConfigList for cbr-RangeCommonConfigList and sl-CBR-PSSCH-TxConfigList. Otherwise, it refers to cbr-CommonTxConfigList included in the SystemInformationBlockType21 of the serving cell / PCell for cbr-RangeCommonConfigList and sl-CBR-PSSCH-TxConfigList.

numSubchannel

indicates the number of subchannels in the corresponding resource pool (see TS 36.213 [23]).

poolReportId

The identity of the transmission resource pool used for CBR measurement reporting, which is corresponding to the poolIdentity reported in measResultListCBR. This field is only present in the transmission pools configured in RRCConnectionReconfiguration and v2x-CommTxPoolExceptional, p2x-CommTxPoolNormalCommon, v2x-CommTxPoolNormalCommon, v2x-CommTxPoolNormal in SystemInformationBlockType21. Otherwise, the field is absent.

resourceSelectionConfigP2X

Indicates the allowed resource selection mechanism(s), i.e. partial sensing and/or random selection, for P2X related V2X sidelink communication.

restrictResourceReservationPeriod

If configured, the field restrictResourceReservationPeriod configured in v2x-ResourceSelectionConfig shall be ignored for transmission on this pool.

sc-Period

Indicates the period over which resources are allocated in a cell for SC and over which scheduled and UE selected data transmissions occur, see PSCCH period in TS 36.213 [23]. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf80 corresponds to 80 subframes and so on. E-UTRAN configures values sf40, sf160 and sf320 for FDD and for TDD config 1 to 5, values sf70, sf140 and sf280 for TDD config 0, and finally values sf60, sf120 and sf240 for TDD config 6.

sizeSubchannel

Indicates the number of PRBs of each subchannel in the corresponding resource pool (see TS 36.213 [23]). The value n5 denotes 5 PRBs; n6 denotes 6 PRBs and so on. E-UTRAN configures values n5, n6, n10, n15, n20, n25, n50, n75 and n100 in the case of *adjacencyPSCCH-PSSCH* set to TRUE; otherwise, E-UTRAN configures values n4, n5, n6, n8, n9, n10, n12, n15, n16, n18, n20, n30, n48, n72 and n96 in the case of *adjacencyPSCCH-PSSCH* set to FALSE,

sl-OffsetIndicator

Indicates the offset of the first subframe of a resource pool, i.e., the starting subframe of the repeating bitmap *sl-Subframe*, within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0.

sl-Subframe

Indicates the bitmap of the resource pool, which is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]).

startRB-PSCCH-Pool

Indicates the lowest RB index of the PSCCH pool (see TS 36.213 [23]). This field is absent when a pool is (pre)configured such that a UE always transmits SC and data in adjacent RBs in the same subframe.

startRB-Subchannel

Indicates the lowest RB index of the subchannel with the lowest index (see TS 36.213 [23]).

syncAllowed

Indicates the allowed synchronization reference(s) which is (are) allowed to use the configured resource pool.

syncConfigIndex 4 6 1

Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry of *commSyncConfig* in *SystemInformationBlockType18* for sidelink communication, *or* by means of an index to the corresponding entry of *v2x-SyncConfig* in *SystemInformationBlockType21* for V2X sidelink communication.

tdd-Config

TDD configuration associated with the reception pool of the cell indicated by *syncConfigIndex*. Absence of the field indicates the same duplex mode as the cell providing this field and the same UL/DL configuration as indicated by *subframeAssignment* in *SystemInformationBlockType1* in case of TDD.

threshS-RSSI-CBR

Indicates the S-RSSI threshold for determining the contribution of a sub-channel to the CBR measurement, as specified in TS 36.214 [48]. Value 0 corresponds to -112 dBm, value 1 to -110 dBm, value n to (-112 + n*2) dBm, and so on.

trpt-Subset

Indicates the subset of T-RPT available (see TS 36.213 [23, 14.1.1.1.1]). Consists of a bitmap which is used to indicate the set of available 'k' values to be used for sidelink communication (see TS 36.213 [23, 14.1.1.3]). If T-RPT subset configuration is not signaled/ preconfigured then UE assumes the whole T-RPT set is available.

SL-CommResourcePool field descriptions

adjacencyPSCCH-PSSCH

Indicates whether a UE shall always transmit PSCCH and PSSCH in adjacent RBs (indicated by TRUE) or in non-adjacent RBs (indicated by FALSE) (see TS 36.213 [23]).

zoneID

Indicates the zone ID for which the UE shall use this resource pool as described in 5.10.13.2. The field is absent in v2x-CommTxPoolExceptional, p2x-CommTxPoolNormalCommon and v2x-CommRxPool in SIB21 or in mobilityControlInfoV2X.

Conditional presence	Explanation
Tx	The field is mandatory present when included in commTxPoolNormalDedicated, commTxPoolNormalDedicatedExt, commTxPoolNormalCommon, commTxPoolNormalCommonExt, commTxPoolExceptional, sc-CommTxConfig, v2x-CommTxPoolNormalCommon, v2x-CommTxPoolExceptional, v2x-CommTxPoolNormalDedicated, p2x-CommTxPoolNormalCommon or v2x-CommTxPoolNormal and p2x-CommTxPoolNormal in v2x-InterFreqInfoList. Otherwise the field is not present.
P2X	The field is mandatory present when included in p2x-CommTxPoolNormalCommon, v2x-CommTxPoolNormalDedicated in sl-V2X-ConfigDedicated for P2X related V2X sidelink communication or p2x-CommTxPoolNormal in v2x-InterFreqInfoList. Otherwise the field is not present.

SL-CommTxPoolSensingConfig

The IE *SL-CommTxPoolSensingConfig* specifies V2X sidelink communication configurations used for UE autonomous resource selection.

SL-CommTxPoolSensingConfig information element

```
-- ASN1START
SL-CommTxPoolSensingConfig-r14 ::=
                                          SEQUENCE {
    pssch-TxConfigList-r14
                                               SL-PSSCH-TxConfigList-r14,
    thresPSSCH-RSRP-List-r14
                                               SL-ThresPSSCH-RSRP-List-r14,
    {\tt restrictResourceReservationPeriod-r14} \qquad {\tt SL-RestrictResourceReservationPeriodList-r14}
    OPTIONAL,
                -- Need OR
    probResourceKeep-r14
                                          ENUMERATED {v0, v0dot2, v0dot4, v0dot6, v0dot8,
                                                        spare3,spare2, spare1},
                                               SEQUENCE {
    p2x-SensingConfig-r14
        minNumCandidateSF-r14
                                               INTEGER (1..13),
        gapCandidateSensing-r14
                                               BIT STRING (SIZE (10))
         OPTIONAL, -- Need OR
                                          ENUMERATED {n1, n2, n3, n4, n5, n6, n7, n8, n9, spare7, spare6, spare5, spare4, spare3, spare2,
    sl-ReselectAfter-r14
                                                   spare1}
                                                                        OPTIONAL
-- ASN1STOP
```

SL-CommTxPoolSensingConfig field descriptions

gapCandidateSensing

Indicates which subframe should be sensed when a certain subframe is considered as a candidate resource (see TS 36.213 [23]).

minNumCandidateSF

Indicates the minimum number of subframes that are included in the possible candidate resources.

p2x-SensingConfig

Indicates the sensing configuration for P2X related V2X sidelink communication transmission only.

probResourceKeep

Indicates the probability with which the UE keeps the current resource when the resource reselection counter reaches zero for sensing based UE autonomous resource selection (see TS 36.321 [6]).

pssch-TxConfigList

Indicates PSSCH TX parameters such as MCS, PRB number, retransmission number, associated to different UE absolute speeds and different synchronization reference types for UE autonomous resource selection (see TS 36.213 [23]).

restrictResourceReservationPeriod

Indicates which values are allowed for the signaling of the resource reservation period in PSCCH.

sI-ReselectAfter

Indicates the number of consecutive skipped transmissions before triggering resource reselection for V2X sidelink communication (see TS 36.321 [6]).

thresPSSCH-RSRP-List

Indicates a list of 64 thresholds, and the threshold should be selected based on the priority in the decoded SCI and the priority in the SCI to be transmitted (see TS 36.213 [23]). A resource is excluded if it is indicated or reserved by a decoded SCI and PSSCH RSRP in the associated data resource is above a threshold.

SL-CP-Len

The IE SL-CP-Len indicates the cyclic prefix length, see TS 36.211 [21].

SL-CP-Len information element

```
-- ASN1START

SL-CP-Len-r12 ::= ENUMERATED {normal, extended}

-- ASN1STOP
```

SL-DiscConfig

The IE SL-DiscConfig specifies the dedicated configuration information for sidelink discovery.

SL-DiscConfig information element

```
-- ASN1START
SL-DiscConfig-r12 ::=
                                       SEQUENCE {
                                           CHOICE {
   discTxResources-r12
                                           NULL,
       release
                                           CHOICE {
       setup
           scheduled-r12
                                           SEOUENCE {
               discTxConfig-r12
                                                   SL-DiscResourcePool-r12 OPTIONAL, -- Need ON
               discTF-IndexList-r12
                                                   SL-TF-IndexPairList-r12
                                                                              OPTIONAL, -- Need ON
               discHoppingConfig-r12
                                                   SL-HoppingConfigDisc-r12
                                                       OPTIONAL
                                                                 -- Need ON
           },
                                           SEQUENCE {
           ue-Selected-r12
               discTxPoolDedicated-r12
                                           SEQUENCE {
                                                  SL-TxPoolToReleaseList-r12 OPTIONAL,
                   poolToReleaseList-r12
ON
                                                  SL-DiscTxPoolToAddModList-r12 OPTIONAL -- Need
                   poolToAddModList-r12
ON
                                                                   OPTIONAL
                                                                              -- Need ON
           }
                                                                   OPTIONAL,
                                                                              -- Need ON
    [[ discTF-IndexList-v1260
                                           CHOICE {
           release
                                               NULL,
```

```
SEQUENCE {
               discTF-IndexList-r12b
                                              SL-TF-IndexPairList-r12b
                                                                OPTIONAL -- Need ON
       }
    11.
    [[ discTxResourcesPS-r13
                                    CHOICE {
           release
                                             NULL,
                                             CHOICE {
           setup
               scheduled-r13
                                                SL-DiscTxConfigScheduled-r13,
               ue-Selected-r13
                                                SEQUENCE {
                  discTxPoolPS-Dedicated-r13
                                                   SL-DiscTxPoolDedicated-r13
                                                                OPTIONAL, -- Need ON
       discTxInterFreqInfo-r13
                                     CHOICE {
                                             NULL,
          release
                                             SEOUENCE {
           setup
                                                 ARFCN-ValueEUTRA-r9 OPTIONAL, -- Need
               discTxCarrierFreq-r13
OR
              discTxRefCarrierDedicated-r13
                                                SL-DiscTxRefCarrierDedicated-r13 OPTIONAL, --
Need OR
               discTxInfoInterFreqListAdd-r13
                                                    SL-DiscTxInfoInterFreqListAdd-r13 OPTIONAL
    -- Need ON
                                                                            -- Need ON
                                                                OPTIONAL.
       gapRequestsAllowedDedicated-r13 BOOLEAN
                                                        OPTIONAL, -- Need ON
       discRxGapConfig-r13
                                          CHOICE {
           release
                                             NULL,
           setup
                                             SL-GapConfig-r13
                                                                OPTIONAL. -- Need ON
       discTxGapConfig-r13
                                          CHOICE {
          release
                                             NULL,
                                             SL-GapConfig-r13
           setup
                                                                OPTIONAL.
                                                                            -- Need ON
       discSysInfoToReportConfig-r13
                                         CHOICE {
                                             NULL,
           release
           setup
                                             SL-DiscSysInfoToReportFreqList-r13
                                                                OPTIONAL -- Need ON
   11
}
SL-DiscSysInfoToReportFreqList-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF ARFCN-ValueEUTRA-r9
SL-DiscTxInfoInterFreqListAdd-r13 ::= SEQUENCE {
   discTxFreqToAddModList-r13
                                      SEQUENCE (SIZE (1..maxFreq)) OF SL-
DiscTxResourceInfoPerFreq-r13
                             OPTIONAL,
                                         -- Need ON
                                        SEQUENCE (SIZE (1..maxFreq)) OF ARFCN-ValueEUTRA-r9
   discTxFreqToReleaseList-r13
   OPTIONAL,
              -- Need ON
}
SL-DiscTxResourceInfoPerFreq-r13 ::= SEQUENCE
   discTxCarrierFreq-r13 ARFCN-ValueEUTRA-r9,
                                         SL-DiscTxResource-r13 OPTIONAL, -- Need OR SL-DiscTxResource-r13 OPTIONAL, -- Need OR
   discTxResources-r13
   discTxResourcesPS-r13
   discTxRefCarrierDedicated-r13
                                        SL-DiscTxRefCarrierDedicated-r13 OPTIONAL, -- Need
OR
   discCellSelectionInfo-r13
                                            CellSelectionInfoNFreq-r13
                                                                               OPTIONAL,
Need OR
}
SL-DiscTxResource-r13 ::=
                                     CHOICE {
   release
                                      NULL,
                                     CHOICE {
   setup
       scheduled-r13
                                     SL-DiscTxConfigScheduled-r13,
       ue-Selected-r13
                                     SL-DiscTxPoolDedicated-r13
}
SL-DiscTxPoolToAddModList-r12 ::=
                                    SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-
DiscTxPoolToAddMod-r12
SL-DiscTxPoolToAddMod-r12 ::=
                                  SEOUENCE
   poolIdentity-r12
                                     SL-TxPoolIdentity-r12,
   pool-r12
                                     SL-DiscResourcePool-r12
}
```

```
SL-DiscTxConfigScheduled-r13 ::= SEQUENCE {
discTxConfig-r13 SL-DiscResourcePool-r12 OPTIONAL, -- Need ON
discTE-IndexList-r13 SL-TF-IndexPairList-r12b OPTIONAL, -- Need ON
configDisc-r12 OPTIONAL, -- Need ON
}
-- Need ON
                                    SL-DiscTxPoolToAddModList-r12 OPTIONAL -- Need ON
SL-TF-IndexPairList-r12 ::= SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12)) OF SL-TF-IndexPair-r12
SL-TF-IndexPair-r12 ::=
                           SEOUENCE
                                        {
INTEGER (1.. 200)
                                                                OPTIONAL, -- Need ON
   discSF-Index-r12
    discPRB-Index-r12
                                        INTEGER (1.. 50)
                                                                OPTIONAL
                                                                           -- Need ON
SL-TF-IndexPairList-r12b ::=
                                    SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12)) OF SL-TF-IndexPair-
SL-TF-IndexPair-r12b ::=
                                SEQUENCE
                                        INTEGER (0..209) OPTIONAL,
    discSF-Index-r12b
                                                                              -- Need ON
    discPRB-Index-r12b
                                        INTEGER (0..49)
                                                                 OPTIONAL
                                                                              -- Need ON
}
SL-DiscTxRefCarrierDedicated-r13 ::=
   pCell
                                        SCellIndex-r10
    sCell
-- ASN1STOP
```

SL-DiscConfig field descriptions

discCellSelectionInfo

Parameters that may be used by the UE to select/ reselect a cell on the concerned non serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency. See TS 36.304 [4, 11.4].

discSysInfoToReportConfig

Indicates the request to start a *SidelinkUEInformation* procedure for reporting system information acquired during an inter-frequency discovery procedure.

discTF-IndexList

Indicates a list of time-frequency resource indices pair where each pair of indices corresponds to one discovery message. E-UTRAN only configures *discTF-IndexList-r12b* when configuring the UE with scheduled SL discovery Tx resources. When receiving *discTF-IndexList-r12b*, the UE shall only consider this field (and hence ignore *discTF-IndexList-r12*, if included or previously configured).

discTxConfig

Indicates the resources configuration used when E-UTRAN schedules Tx resources (i.e. the fields *discSF-Index* and *discPRB-Index* indicate the actual resources to be used).

discTxInterFreaInfo

Indicates frequency applicable for the resources indicated by *discTxResources-r12* (i.e. original resource field may cover first inter-frequency), and possibly resource allocations on additional frequencies as may be indicated by field *discTxInfoInterFreqListAdd*.

discTxRefCarrierDedicated

Indicates if the PCell or an SCell is to be used as reference for DL measurements and synchronization, instead of the DL frequency paired with the one used to transmit sidelink discovery announcements on, see TS 36.213 [23, 14.3.1].

discTxResources

Indicates the resources assigned to the UE for discovery announcements, which can either be a pool from which the UE may select or a set of resources specifically assigned for use by the UE.

discTxResourcesPS

Indicates the resources assigned to the UE for PS discovery announcements, which can either be a pool from which the UE may select or a set of resources specifically assigned for use by the UE.

SL-TF-IndexPair

A pair of indices, one for the time domain and one for the frequency domain, indicating the start of resources within the pool covered by *discTxConfig*, see TS 36.211 [21, 9.5.6] for one discovery message. The upper limits of *discSF-Index* and *discPRB-Index* are defined in TS 36.213 [23, 14.3.1].

SL-DiscResourcePool

The IE *SL-DiscResourcePool* specifies the configuration information for an individual pool of resources for sidelink discovery.

SL-DiscResourcePool information element

```
-- ASN1START
                               SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-DiscResourcePool-r12
SL-DiscTxPoolList-r12 ::=
                               SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-DiscResourcePool-r12
SL-DiscRxPoolList-r12 ::=
SL-DiscResourcePool-r12 ::=
                               SEQUENCE
                                           {
                                  SL-CP-Len-r12,
    cp-Len-r12
                               ENUMERATED {rf32, rf64, rf128,
    discPeriod-r12
                                           rf256, rf512, rf1024, rf16-v1310, spare},
   numRetx-r12 INTEGER (0...),
numRepetition-r12 INTEGER (1..50),
tf-ResourceConfig-r12 SL-TF-ResourceConfig-r12,
SEGUIENCE {
                               INTEGER (0..3),
   numRetx-r12
       arameters-r12 SEQUENCE { txParametersGeneral-r12 SL-TxParameters-r12,
        CHOICE {
           poolSelection-r12
               rsrpBased-r12
                                               SL-PoolSelectionConfig-r12,
               random-r12
                                               NULL
           txProbability-r12
                                     ENUMERATED {p25, p50, p75, p100}
       }
                                                                   OPTIONAL
                                                                               -- Need OR
                                                                   OPTIONAL,
                                                                              -- Cond Tx
    rxParameters-r12
       tdd-Config-r12
                                   SEQUENCE {
                                       TDD-Config
                                                                  OPTIONAL,
                                                                               -- Need OR
       syncConfigIndex-r12
                                  INTEGER (0..15)
    }
                                                                   OPTIONAL,
                                                                              -- Need OR
    [[ discPeriod-v1310
                                       CHOICE {
           release
                                               NULL.
                                               ENUMERATED {rf4, rf6, rf7, rf8,
           setup
                                                  rf12, rf14, rf24, rf28}
                                                                  OPTIONAL,
       rxParamsAddNeighFreq-r13
                                       CHOICE {
           release
                                           NIII.I.
           setup
                                           SEQUENCE {
               physCellId-r13
                                              PhysCellIdList-r13
                                                                  OPTIONAL, -- Need ON
        txParamsAddNeighFreq-r13
                                      CHOICE {
           release
                                           NULL,
                                           SEQUENCE {
           setup
               physCellId-r13
                                               PhysCellIdList-r13,
               p-Max
                                                                     OPTIONAL, -- Need OP
                                               P-Max
                                                                      OPTIONAL, -- Cond TDD-OR
               tdd-Config-r13
                                               TDD-Config
                                               TDD-Config-v1130
               tdd-Config-v1130
                                                                      OPTIONAL,
                                                                                  -- Cond TDD-OR
                                                 SEQUENCE {
               freqInfo
                   ul-CarrierFreq
                                                       ARFCN-ValueEUTRA
                                                                        OPTIONAL,
                                                                                      -- Need OP
                                                       ENUMERATED {n6, n15, n25, n50, n75, n100}
                   ul-Bandwidth
                                                                          OPTIONAL, -- Need OP
               additionalSpectrumEmission
                                                  AdditionalSpectrumEmission
                                                   INTEGER (-60..50),
               referenceSignalPower
                                             INTEGER (0..15)
               syncConfigIndex-r13
                                                                     OPTIONAL -- Need OR
           }
       }
                                                                  OPTIONAL -- Need ON
    1],
    [[ txParamsAddNeighFreq-v1370
                                       CHOICE {
           release
                                           NULL,
                                           SEQUENCE {
           setup
                                              SEQUENCE {
               fregInfo-v1370
                   additionalSpectrumEmission-v1370
                                                          AdditionalSpectrumEmission-v1010
           }
        }
                                                                   OPTIONAL -- Need ON
    ]]
PhysCellIdList-r13 ::=
                          SEQUENCE (SIZE (1.. maxSL-DiscCells-r13)) OF PhysCellId
```

```
SL-PoolSelectionConfig-r12 ::= SEQUENCE {
    threshLow-r12 RSRP-RangeSL2-r12,
    threshHigh-r12 RSRP-RangeSL2-r12
}
```

SL-DiscResourcePool field descriptions

discPeriod

Indicates the period over which resources are allocated in a cell for discovery message transmission/reception, see PSDCH period in TS 36.213 [23]. Value in number of radio frames. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on. The extended values apply for PS discovery (not only for sidelink relaying). When broadcasting an extended value, E-UTRAN sets the original field to spare to ensure legacy UEs ignore the concerned pool entry.

numRepetition

Indicates the number of times *subframeBitmap* is repeated for mapping to subframes that occurs within a *discPeriod*. The highest value E-UTRAN uses is value 5 for FDD and TDD configuration 0, value 13 for TDD configuration 1, value 25 for TDD configuration 2, value 17 for TDD configuration 3, value 25 for TDD configuration 4, value 50 for TDD configuration 5 and value 7 for TDD configuration 6. E-UTRAN configures *numRepetition* and *subframeBitmap* such that the mapped subframes do not exceed the *discPeriod*.

poolSelection

Indicates the mechanism for selecting a (transmission) pool when multiple candidates are provided. E-UTRAN configures the same value (i.e. a pool selection method) for all candidate pools within one pool list (discTxPoolCommon or discTxPoolDedicated) but the pool selection method in different pool lists may or may not be the same.

syncConfigIndex

Indicates the synchronisation configuration that is associated with a reception or transmission pool, by means of an index to the corresponding entry of *discSyncConfig* in *SystemInformationBlockType19*.

threshLow, threshHigh

Specifies the thresholds used to select a resource pool in RSRP based pool selection. The E-UTRAN should configure *threshLow* and *threshHigh* such that the UE selects only one resource pool upon RSRP based pool selection.

txProbability

Indicates the probability of transmitting announcement in a discovery period when configured with a pool of resources, see TS 36.321 [6].

Conditional presence	Explanation
TDD-OR	The field is optional present for TDD, need OR; it is not present for FDD.
Tx	The field is mandatory present when included in discTxPoolDedicated or
	discTxPoolCommon. Otherwise the field is not present.

SL-DiscSysInfoReport

The IE *SL-DiscSysInfoReport* contains the parameters related to sidelink discovery acquired from system information of inter-frequency cells (including inter-PLMN).

SL-DiscSysInfoReport information element

```
-- ASN1START
SL-DiscSysInfoReport-r13 ::=
                                  SEQUENCE {
    plmn-IdentityList-r13
                                   PLMN-IdentityList
                                                                           OPTIONAL,
                                       ARFCN-ValueEUTRA-r9 OPTIONAL,
SL-DiscRxPoolList-r12 OPTIONAL,
SL-DiscTxPowerInfinity
SL-DiscTxPowerInfinity
    cellIdentity-13
    carrierFreqInfo-13
    discRxResources-r13
    discTxPoolCommon-r13
discTxPowerInfo-r13
discSyncConfig-r13
discCellSelectionInfo-r13
                                        SL-SyncConfigNFreq-r13
                                                                          OPTIONAL,
                                        SEQUENCE {
         q-RxLevMin-r13
                                              Q-RxLevMin,
                                              INTEGER (1..8)
         g-RxLevMinOffset-r13
                                                                          OPTIONAL
                                                                          OPTIONAL.
    cellReselectionInfo-r13
                                        SEQUENCE {
        q-Hyst-r13
                                             ENUMERATED {
                                                       dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                                       dB12, dB14, dB16, dB18, dB20, dB22, dB24},
                                              O-RxLevMin,
        q-RxLevMin-r13
```

```
t-ReselectionEUTRA-r13
                                    T-Reselection
                                                           OPTIONAL,
   tdd-Config-r13
                               TDD-Config
                                                           OPTIONAL,
                               SEQUENCE {
   freqInfo-r13
       ul-CarrierFreq-r13
                                    ARFCN-ValueEUTRA
                                                                   OPTIONAL
       ul-Bandwidth-r13
                                    ENUMERATED {n6, n15, n25, n50, n75, n100}
       additionalSpectrumEmission-rl3 AdditionalSpectrumEmission OPTIONAL,
                                                               OPTIONAL,
                                 P-Max OPTIONAL,
                                INTEGER (-60..50)
   referenceSignalPower-r13
                                                   OPTIONAL,
   ГΓ
   freqInfo-v1370
                                SEQUENCE {
       additionalSpectrumEmission-v1370 AdditionalSpectrumEmission-v1010
                                                               OPTIONAL
   11
-- ASN1STOP
```

SL-DiscSysInfoReport field descriptions

carrierFreqInfo

Indicates the frequency of the cell from which the UE acquired the system information relevant for discovery

cellIdentity

Indicated the identity of the cell from which the UE acquired the system information relevant for discovery

plmn-IdentityList

Indicates the list of PLMN identity of the cell from which the UE acquired the system information relevant for discovery

SL-DiscTxPowerInfo

The IE SL-DiscTxPowerInfo specifies power control parameters for one or more power classes.

SL-DiscTxPowerInfo information element

SL-DiscTxPowerInfo field descriptions

discMaxTxPower

Indicates the P-Max parameter used to calculate the maximum transmit power a UE configured with the concerned range class, see TS 24.333 [70, 4.2.11]. The first entry in *SL-DiscTxPowerInfoList* corresponds to UE range class 'short', the second entry corresponds to 'medium' and the third entry corresponds to 'long'.

SL-GapConfig

The IE *SL-GapConfig* indicates the gaps, requested or assigned, to enable the UE to receive or transmit sidelink discovery, intra or inter frequency (includings inter-PLMN).

SL-GapConfig information element

```
-- ASN1START

SL-GapConfig-r13 ::= SEQUENCE {
    gapPatternList-r13 SL-GapPatternList-r13 }

SL-GapPatternList-r13 ::= SEQUENCE (SIZE (1..maxSL-GP-r13)) OF SL-GapPattern-r13
```

SL-GapConfig field descriptions

gapOffset

Indicates the offset from the start of SFN 0 to the start of the first *gapPeriod*. If the SFN period is not an integer multiple of *gapPeriod*, no subframes within this period (i.e. from SFN 0 to offset) are considered part of the gap.

gapPeriod

Indicates the period by which gapSubframeBitmap is repeated.

gapSubframeBitmap

Indicates the subframes of one or more individual gaps, not only covering the subframes of the associated discovery resources but also including e.g. re-tuning and synchronisation delays. The UE and E-UTRAN signal bit strings of valid sizes only i.e. sizes equal to or less than *gapPeriod*. Value 1 indicates that the UE is allowed to use the subframe for sidelink discovery.

SL-GapRequest

The IE *SL-GapRequest* indicates the gaps requested by the UE to receive or transmit sidelink discovery, intra or inter frequency (includings inter-PLMN).

SL-GapRequest information element

```
-- ASN1START

SL-GapRequest-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-GapFreqInfo-r13

SL-GapFreqInfo-r13 ::= SEQUENCE {
    carrierFreq-r13 ARFCN-ValueEUTRA-r9 OPTIONAL,
        gapPatternList-r13 SL-GapPatternList-r13
}

-- ASN1STOP
```

SL-HoppingConfig

The IE *SL-HoppingConfig* indicates the hopping configuration used for sidelink.

SL-HoppingConfig information element

```
-- ASN1START
SL-HoppingConfigComm-r12 ::=
                                      SEOUENCE
    hoppingParameter-r12
                                          INTEGER (0..504),
    numSubbands-r12
                                           ENUMERATED {ns1, ns2, ns4},
                                           INTEGER (0..110)
    rb-Offset-r12
}
SL-HoppingConfigDisc-r12 ::=
                                  SEQUENCE
   a-r12
                                               INTEGER (1..200),
                                               INTEGER (1..10),
ENUMERATED {n1, n5}
    b-r12
    c-r12
-- ASN1STOP
```

```
 \begin{array}{c} \textit{SL-HoppingConfig} \ \text{field descriptions} \\ \textit{a} \\ \\ \textit{Per cell parameter:} \ N_{PSDCH}^{(1)} \ \text{ see TS 36.213 [23, 14.3.1].} \\ \textit{b} \\ \\ \textit{Per UE parameter:} \ N_{PSDCH}^{(2)} \ \text{ see TS 36.213 [23, 14.3.1].} \\ \textit{c} \\ \\ \textit{Per cell parameter:} \ N_{PSDCH}^{(3)} \ \text{ see TS 36.213 [23, 14.3.1].} \\ \textit{hoppingParameter} \\ \textit{Affects the hopping performed as specificed in TS 36.213 [23, 14.1.1.2 and 14.1.1.4]. In case value 504 is received, the value used by the UE is 510. \\ \textit{numSubbands} \\ \textit{Parameter:} \ N_{\text{sb}} \ \text{see TS 36.211 [21, 9.3.6].} \\ \textit{rb-Offset} \\ \textit{Parameter:} \ N_{\text{RB}}^{\text{HO}} \ \text{, see TS 36.211 [21, 9.3.6].} \\ \end{array}
```

SL-InterFreqInfoListV2X

The IE *SL-InterFreqInfoListV2X* indicates synchronization and resource allocation configurations of the neighboring frequency for V2X sidelink communication.

SL-InterFreqInfoListV2X information element

```
-- ASN1START
SL-InterFreqInfoListV2X-r14 ::= SEQUENCE (SIZE (0..maxFreqV2X-1-r14)) OF SL-InterFreqInfoV2X-r14
                                     SEQUENCE {
SL-InterFreqInfoV2X-r14 ::=
    plmn-IdentityList-r14
                                         OPTIONAL,
                                                                                       -- Need OP
    v2x-CommCarrierFreq-r14
    sl-MaxTxPower-r14
                                                                              -- Need OR
                                         ENUMERATED {n6, n15, n25, n50, n75, n100} OPTIONAL,
    sl-Bandwidth-r14
Need OR
    v2x-SchedulingPool-r14
                                         SL-CommResourcePoolV2X-r14
                                                                                               -- Need
    v2x-UE-ConfigList-r14
                               SL-V2X-UE-ConfigList-r14
                                                             OPTIONAL,
                                                                         -- Need OR
      additionalSpectrumEmissionV2X-r14
additionalSpectrumEmission-r14
                                               CHOICE {
            additionalSpectrumEmission-r14 AdditionalSpectrumEmission,

AdditionalSpectrumEmission,

OPTIONAL
                                                     AdditionalSpectrumEmission-v1010
                        OPTIONAL
                                        -- Need ON
    ]]
}
-- ASN1STOP
```

SL-InterFreqInfoListV2X field descriptions

plmn-IdentityList

Indicates PLMN identities of this frequency for reception of V2X sidelink communication. If this field is not present, the UE considers this frequency for reception of V2X sidelink communication concerns the first PLMN entry in the *plmn-ldentityList* in *SystemInformationBlockType1*.

sl-MaxTxPower

Indicates the maximum transmission power for transmitting V2X sidelink communication on the corresponding frequency.

additionalSpectrumEmissionV2X

Indicates the additional Spectrum Emission value defined in TS 36.101 [42, 6.2.4] for V2X sidelink communication.

v2x-SchedulingPool

Indicates the resource pool for inter-carrier scheduled resource allocation. This field is configured in RRC dedicated signalling only when *scheduled* is configured in IE *SL-V2X-ConfigDedicated*.

v2x-UE-ConfigList

Indicates the inter-carrier resource configuration. If there is only one entry in the list without *physCellId* configured, the configuration is applied to the frequency identified by *v2x-CommCarrierFreq* (i.e. carrier specific configuration); if the entry of this field includes *physCellIdList*, the configuration is applied to the cell(s) identified by *physCellIdList* (i.e. cell specific configuration).

SL-V2X-UE-ConfigList

The IE SL-V2X-UE-ConfigList indicates inter-frequency resource configuration per-carrier or per-cell.

SL-V2X-UE-ConfigList information element

```
-- ASN1START
SL-V2X-UE-ConfigList-r14 ::=
                             SEQUENCE (SIZE (1.. maxCellIntra)) OF SL-V2X-InterFreqUE-Config-r14
                                        SEQUENCE {
SL-V2X-InterFreqUE-Config-r14 ::=
    physCellIdList-r14
                                        PhysCellIdList-r13
                                                                            OPTIONAL,
                                                                                        -- Need OR
                                                                                       -- Need OR
-- Need OR
                                                                            OPTIONAL,
    typeTxSync-r14
                                        SL-TypeTxSync-r14
    v2x-SyncConfig-r14
                                        SL-SyncConfigListNFreqV2X-r14
                                                                            OPTIONAL,
    v2x-CommRxPool-r14
                                        SL-CommRxPoolListV2X-r14
                                                                                OPTIONAL,
                                                                                           -- Need
OR
    v2x-CommTxPoolNormal-r14
                                            SL-CommTxPoolListV2X-r14
                                                                                    OPTIONAL,
Need OR
   p2x-CommTxPoolNormal-r14
                                            SL-CommTxPoolListV2X-r14
                                                                                    OPTIONAL,
Need OR
    v2x-CommTxPoolExceptional-r14
                                      SL-CommResourcePoolV2X-r14
                                                                            OPTIONAL,
                                                                                        -- Need OR
    v2x-ResourceSelectionConfig-r14
                                        SL-CommTxPoolSensingConfig-r14
                                                                            OPTIONAL,
                                                                                        -- Need OR
                                                                            OPTIONAL,
                                        SL-ZoneConfig-r14
                                                                                        -- Need OR
    zoneConfig-r14
    offsetDFN-r14
                                        INTEGER (0..1000)
                                                                            OPTIONAL,
                                                                                       -- Need OR
-- ASN1STOP
```

SL-V2X-UE-ConfigList field descriptions

offsetDFN

Indicates the timing offset for the UE to determine DFN timing when GNSS is used for timing reference. Value 0 corresponds to 0 milliseconds, value 1 corresponds to 0.001 milliseconds, value 2 corresponds to 0.002 milliseconds, and so on.

p2x-CommTxPoolNormal

Indicates the resources on a carrier frequency by which the UE may transmit P2X related V2X sidelink communication.

physCellIdList

If configured, the resource configuration is applicable for the cell(s) identified by this field. Otherwise, the resource configuration is for a given carrier frequency.

typeTxSync

Indicates the prioritized synchronization type (i.e. eNB or GNSS) for performing V2X sidelink communication on a carrier frequency.

v2x-CommRxPool

Indicates the resources on a carrier frequency by which the UE may receive V2X sidelink communication.

v2x-CommTxPoolExceptional

Indicates the resources on a carrier frequency by which the UE may transmit V2X sidelink communication in exceptional conditions, as specified in 5.10.13.

v2x-CommTxPoolNormal

Indicates the resources on a carrier frequency by which the UE may transmit V2X sidelink communication.

v2x-SyncConfig

Indicates the synchronization configuration used for transmission/reception of SLSS on the given frequency.

SL-OffsetIndicator

The IE *SL-OffsetIndicator* indicates the offset of the pool of resources relative to SFN 0 of the cell from which it was obtained or, when out of coverage, relative to DFN 0.

SL-OffsetIndicator information element

SL-OffsetIndicator field descriptions

SL-OffsetIndicator

In sc-TF-ResourceConfig, it indicates the offset of the first period of pool of resources within a SFN cycle. For data-TF-ResourceConfig, it corresponds to the offsetIndicator as defined in TS 36.213 [23, 14.1.3].

SL-OffsetIndicatorSync

For sidelink discovery and sidelink communication, synchronisation resources are present in those SFN and subframes which satisfy the relation: (SFN*10+ *Subframe Number*) mod 40 = *SL-OffsetIndicatorSync*. For V2X sidelink communication, synchronisation resources are present in those SFN and subframes which satisfy the relation: (SFN*10+ *Subframe Number*) mod 160 = *SL-OffsetIndicatorSync*.

SL-P2X-ResourceSelectionConfig

The IE *SL-P2X-ResourceSelectionConfig* includes the configuration of resource selection for P2X related V2X sidelink communication. E-UTRAN configures at least one resource selection mechanism.

SL-P2X-ResourceSelectionConfig information element

```
-- ASN1START
```

SL-P2X-ResourceSelectionConfig field descriptions

partialSensing

Indicates that partial sensing is allowed for UE autonomous resource selection in a resource pool.

randomSelection

Indicates that random selection is allowed for UE autonomous resource selection in a resource pool.

SL-PeriodComm

The IE SL-PeriodComm indicates the period over which resources allocated in a cell for sidelink communication.

SL-PeriodComm information element

– SL-Priority

The IE *SL-Priority* indicates the one or more priorities of resource pool used for sidelink communication, or of a logical channel group used in case of scheduled sidelink communication resources, see TS 36.321 [6].

SL-Priority information element

```
-- ASN1START

SL-PriorityList-r13 ::= SEQUENCE (SIZE (1..maxSL-Prio-r13)) OF SL-Priority-r13

SL-Priority-r13 ::= INTEGER (1..8)

-- ASN1STOP
```

SL-PSSCH-TxConfigList

The IE *SL-PSSCH-TxConfigList* indicates PSSCH transmission parameters. When lower layers select parameters from the range indicated in IE *SL-PSSCH-TxConfigList*, the UE considers both configurations in IE *SL-PSSCH-TxConfigList* and the CBR-dependent configurations represented in IE *SL-CBR-PPPP-TxConfigList*. Only one IE *SL-PSSCH-TxConfig* is provided per *typeTxSync*.

SL-PSSCH-TxConfigList information element

```
-- ASN1START
SL-PSSCH-TxConfigList-r14 ::=
                               SEQUENCE (SIZE (1..maxPSSCH-TxConfig-r14)) OF SL-PSSCH-TxConfig-r14
SL-PSSCH-TxConfig-r14 ::=
                               SEQUENCE {
    typeTxSync-r14
                               SL-TypeTxSync-r14
                                                       OPTIONAL,
                                                                   -- Need OR
                               ENUMERATED {kmph60, kmph80, kmph100, kmph120,
    thresUE-Speed-r14
                              kmph140, kmph160, kmph180, kmph200},
    parametersAboveThres-r14
                               SL-PSSCH-TxParameters-r14,
    parametersBelowThres-r14 SL-PSSCH-TxParameters-r14,
SL-PSSCH-TxParameters-r14 ::=
```

```
minMCS-PSSCH-r14 INTEGER (0..31),
maxMCS-PSSCH-r14 INTEGER (0..31),
minSubChannel-NumberPSSCH-r14 INTEGER (1..20),
maxSubchannel-NumberPSSCH-r14 INTEGER (1..20),
allowedRetxNumberPSSCH-r14 ENUMERATED {n0, n1, both, spare1},
maxTxPower-r14 SL-TxPower-r14 OPTIONAL -- Cond CBR
}
-- ASN1STOP
```

SL-PSSCH-TxConfigList field descriptions

allowedRetxNumberPSSCH

Indicates the allowed retransmission number for transmissions on PSSCH (see TS 36.213 [23]). The value n0 indicates no retransmission for a transport block allowed; the value n1 indicates that the UE shall perform one retransmission for a transport block; and the value both indicates that the UE may autonomously select no retransmission or one retransmission for a transport block.

maxTxPower

Indicates the maximum transmission power for transmission on PSSCH and PSCCH (see TS 36.213 [23]).

minMCS-PSSCH, maxMCS-PSSCH

Indicates the minimum and maximum MCS values used for transmissions on PSSCH (see TS 36.213 [23]).

minSubchannel-NumberPSSCH, maxSubchannel-NumberPSSCH

Indicates the minimum and maximum number of sub-channels which may be used for transmissions on PSSCH (see TS 36.213 [23]).

thresUE-Speed

Indicates a UE speed threshold.

typeTxSync

Indicates the synchronization reference type (see TS 36.213 [23]). For configurations by the eNB, only *gnss* and *enb* can be configured; and for pre-configuration, only *gnss* and *ue* can be configured. If the field is absent, the configuration is applicable for all synchronization reference types.

parametersAboveThres

Indicates TX parameters for the UE speed above thresUE-Speed.

parametersBelowThres

Indicates TX parameters for the UE speed below thresUE-Speed.

Conditional presence	Explanation
CBR	The field is optionally present, need OR, in IE SL-CBR-CommonTxConfigList-r14, or in IE
	SL-CBR-PreconfigTxConfigList-r14. Otherwise the field is not present. Need OR.

SL-RestrictResourceReservationPeriodList

The IE SL-RestrictResourceReservationPeriodList indicates which values are allowed for the signaling of the resource reservation period in PSCCH for V2X sidelink communication, see TS 36.321 [6].

SL-RestrictResourceReservationPeriodList information element

```
-- ASN1START

SL-RestrictResourceReservationPeriodList-r14 ::= SEQUENCE (SIZE (1..maxReservationPeriod-r14)) OF SL-RestrictResourceReservationPeriod-r14

SL-RestrictResourceReservationPeriod-r14 ::= ENUMERATED {v0dot2, v0dot5, v1, v2, v3, v4, v5, v6, v7, v8, v9, v10, spare4, spare3, spare2, spare1}

-- ASN1STOP
```

SL-RestrictResourceReservationPeriodList field descriptions

SL-RestrictResourceReservationPeriod

Value *v0dot2* means *SL-RestrictResourceReservationPeriod* is set to 0.2, value v0dot5 means *SL-RestrictResourceReservationPeriod* is set to 0.5, value v1 means SL-RestrictResourceReservationPeriod is set to 1, and so on. Value *v0dot2* and value *v0dot5* are configured in a pool-specific manner only. E-UTRAN should not set value v0dot2 and v0dot5 for transmission pool for P2X related V2X sidelink communication.

– SLSSID

The IE *SLSSID* identifies a cell and is used by the receiving UE to detect asynchronous neighbouring cells, and by transmitting UEs to extend the synchronisation signals beyond the cell's coverage area.

SLSSID information element

```
-- ASN1START

SLSSID-r12 ::= INTEGER (0..167)

-- ASN1STOP
```

SL-SyncAllowed

The IE SL-SyncAllowed indicates the allowed the synchronization references for a transmission resource pool for V2X sidelink communication.

SL-SyncAllowed information element

```
-- ASN1START
SL-SyncAllowed-r14 ::=
                             SEQUENCE {
    gnss-Sync-r14
                                         ENUMERATED {true}
                                                                          OPTIONAL,
                                                                                       -- Need OR
    enb-Sync-r14
                                         ENUMERATED {true}
                                                                          OPTIONAL,
                                                                                       -- Need OR
                                         ENUMERATED {true}
                                                                          OPTIONAL
                                                                                       -- Need OR
    ue-Sync-r14
-- ASN1STOP
```

SL-SyncAllowed field descriptions

enb-Sync

If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to eNB (i.e., synchronized to a reference UE which is directly synchronized to eNB).

gnss-Sync

If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to GNSS (i.e. synchronized to a reference UE which is directly synchronized to GNSS).

ue-Sync

If configured, the (pre-) configured resources can be used if the UE is synchronized to a reference UE which is synchronized to neither GNSS nor eNB directly or indirectly.

SL-SyncConfig

The IE *SL-SyncConfig* specifies the configuration information concerning reception of synchronisation signals from neighbouring cells as well as concerning the transmission of synchronisation signals for sidelink communication and sidelink discovery.

SL-SyncConfig information element

```
-- ASN1START
SL-SyncConfigList-r12 ::=
                                SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfig-r12
SL-SyncConfigListV2X-r14 ::=
                                SEQUENCE (SIZE (1.. maxSL-V2X-SyncConfig-r14)) OF SL-SyncConfig-r12
SL-SyncConfig-r12 ::=
                                        SEQUENCE {
    syncCP-Len-r12
                                            SL-CP-Len-r12.
    syncOffsetIndicator-r12
                                        SL-OffsetIndicatorSync-r12,
    slssid-r12
                                            SLSSID-r12,
    txParameters-r12
                                                SEQUENCE {
                                                SL-TxParameters-r12,
       syncTxParameters-r12
        syncTxThreshIC-r12
                                                RSRP-RangeSL-r12,
        syncInfoReserved-r12
                                                BIT STRING (SIZE (19)) OPTIONAL
                                                                                     -- Need OR
                                                                        OPTIONAL,
                                                                                     -- Need OR
    rxParamsNCell-r12
                                            SEQUENCE {
                                                PhysCellId,
       physCellId-r12
```

```
discSyncWindow-r12 ENUMERATED {w1, w2}
                                                                            OPTIONAL,
                                                                                         -- Need OR
    [[ syncTxPeriodic-r13
                                              ENUMERATED {true}
                                                                          OPTIONAL
                                                                                         -- Need OR
    ]],
    [[ syncOffsetIndicator-v1430 SL-OffsetIndicatorSync-v1430 OPTIONAL, -- Need OR
        gnss-Sync-r14
                                         ENUMERATED {true}
                                                                            OPTIONAL
                                                                                         -- Need OR
    11
}
                                    SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfigNFreq-
SL-SyncConfigListNFreq-r13 ::=
SL-SyncConfigListNFreqV2X-r14 ::=
                                       SEQUENCE (SIZE (1..maxSL-V2X-SyncConfig-r14)) OF SL-
SyncConfigNFreq-r13
SL-SyncConfigNFreq-r13 ::= SEQUENCE {
   asyncParameters-r13 SEQUENC
   syncCP-Len-r13 SI.
                                    SEQUENCE {
                                           SL-CP-Len-r12,
        syncCP-Len-r13
        syncOffsetIndicator-r13
                                              SL-OffsetIndicatorSync-r12,
        slssid-r13
                                              SLSSID-r12
                                                                       OPTIONAL, -- Need OR
                                        SEQUENCE {
    txParameters-r13
       arameters-r13
syncTxParameters-r13
syncTxThreshIC-r13
syncInfoReserved-r13
syncTxPeriodic-r13
                                          SL-TxParameters-r12,
                                              RSRP-RangeSL-r12,
BIT STRING (SIZE (19)) OPTIONAL, -- Need OR
                                            ENUMERATED {true} OPTIONAL -- Need OR OPTIONAL, -- Need OR
        syncTxPeriodic-r13
                                                                                    -- Need OR
                               SEQUENCE {
    rxParameters-r13
                                            ENUMERATED {w1, w2}
        discSyncWindow-r13
                                                                            OPTIONAL,
                                                                                         -- Need OR
    [[ syncOffsetIndicator-v1430 SL-OffsetIndicatorSync-v1430 OPTIONAL, gnss-Sync-r14 ENUMERATED {true} OPTIONAL
                                                                                         -- Need OR
                                                                                         -- Need OR
-- ASN1STOP
```

SL-SyncConfig field descriptions

discSyncWindow

Indicates the synchronization window over which the UE expects that SLSS or discovery resources indicated by the pool configuration (see TS 36.213 [23, 14.4]). The value w1 denotes 5 milliseconds. The value w2 denotes the length corresponding to normal cyclic prefix divided by 2.

syncCP-Len

In case of V2X sidelink communications this field is always configured to normal.

syncInfoReserved

Reserved for future use.

syncOffsetIndicator

E-UTRAN should ensure *syncOffsetIndicator* is set to the same value as *syncOffsetIndicator1* or *syncOffsetIndicator2* in *preconfigSync* within *SL-Preconfiguration*, if configured. If *syncOffsetIndicator-v1430* is configured, the UE shall ignore the field *syncOffsetIndicator-r12*. E-UTRAN should ensure *syncOffsetIndicators* is set to *syncOffsetIndicator1* in *v2x-CommPreconfigSync* within *SL-V2X-Preconfiguration*, if *syncOffsetIndicator3* is pre-configured in *SL-V2X-Preconfiguration* or if gnss-Sync is included in the corresponding entry and syncOffsetIndicator3 is not pre-configured in *SL-V2X-Preconfiguration* for a concerned frequency.

syncTxPeriodic

Indicates whether in each discovery period in which UE transmits discovery, the UE transmits SLSS once or periodically (i.e. every 40ms). In the latter case (periodic) the UE also transmits the *MasterInformationBlock-SL* message alongside. E-UTRAN configures this field only for synchronisation configurations applicable for PS discovery.

syncTxThreshIC

Indicates the threshold used while in coverage. In case the RSRP measurement of the cell chosen for transmission of sidelink communication/ discovery announcements/ V2X sidelink communication, or of the cell used as reference for DL measurements and synchronization, is below the level indicated by this field, the UE may transmit SLSS (i.e. become synchronisation reference) when performing the corresponding sidelink transmission..

txParameters

Includes parameters relevant only for transmission. E-UTRAN includes the field in one entry per list, as included in *commSyncConfig* or *discSyncConfig*.

gnss-Sync

if configured, the synchronization configuration is used for SLSS transmission/reception when the UE is synchronized to GNSS, by using slssid=0 and ignoring *slssid-r12* configured. If not configured, the synchronization configuration is used for SLSS transmission/reception when the UE is synchronized to eNB, by using the configured *slssid-r12*.

SL-TF-ResourceConfig

The IE SL-TF-ResourceConfig specifies a set of time/ frequency resources used for sidelink.

SL-TF-ResourceConfig information element

```
-- ASN1START
SL-TF-ResourceConfig-r12 ::=
                                   SEQUENCE
                                   INTEGER (1..100),
   prb-Num-r12
                                       INTEGER (0..99),
    prb-Start-r12
    prb-End-r12
                                       INTEGER (0..99),
    offsetIndicator-r12
                                       SL-OffsetIndicator-r12,
    subframeBitmap-r12
                                       SubframeBitmapSL-r12
}
SubframeBitmapSL-r12 ::=
                              CHOICE {
                                           BIT STRING (SIZE (4)),
   bs4-r12
    bs8-r12
                                           BIT STRING (SIZE (8)),
   bs12-r12
                                           BIT STRING (SIZE (12)),
   bs16-r12
                                           BIT STRING (SIZE (16)),
                                           BIT STRING (SIZE (30)),
    bs30-r12
    bs40-r12
                                           BIT STRING (SIZE (40)),
                                           BIT STRING (SIZE (42))
    bs42-r12
SubframeBitmapSL-r14 ::=
                               CHOICE {
                                           BIT STRING (SIZE (10)),
   bs10-r14
    bs16-r14
                                           BIT STRING (SIZE (16)),
                                           BIT STRING (SIZE (20)),
   bs20-r14
    bs30-r14
                                           BIT STRING (SIZE (30)),
    bs40-r14
                                           BIT STRING (SIZE (40)),
    bs50-r14
                                           BIT STRING (SIZE (50)),
    bs60-r14
                                           BIT STRING (SIZE (60)),
    bs100-r14
                                           BIT STRING (SIZE (100))
}
```

-- ASN1STOP

SL-TF-ResourceConfig field descriptions

prb-Start, prb-End, prb-Num

Sidelink transmissions on a sub-frame can occur on PRB with index greater than or equal to *prb-Start* and less than *prb-Start* + *prb-Num*, and on PRB with index greater than *prb-End* - *prb-Num* and less than or equal to *prb-End*. Even for neighbouring cells, *prb-Start* and *prb-End* are relative to PRB #0 of the cell from which it was obtained. See TS 36.213 [23, 14.1.3, 14.2.3, 14.3.3].

subframeBitmap

Indicates the subframe bitmap indicating resources used for sidelink. For sidelink communication, E-UTRAN configures value bs40 for FDD and the following values for TDD: value bs42 for configuration0, value bs16 for configuration1, value bs8 for configuration2, value bs12 for configuration3, value bs8 for configuration4, value bs40 for configuration5 and value bs30 for configuration6. For V2X sidelink communication, E-UTRAN configures value bs16, bs20 or bs100 for FDD and the following values for TDD: value bs60 for configuration0, value bs40 for configuration1, value bs20 for configuration2, value bs30 for configuration3, value bs20 for configuration4, value bs10 for configuration5 and value bs50 for configuration6.

– SL-TxPower

The IE *SL-TxPower* is used to limit the UE's sidelink transmission power on a carrier frequency. The unit is dBm. Value minusinfinity corresponds to –infinity.

SL-TxPower information element

```
-- ASN1START

SL-TxPower-r14 ::= CHOICE {
    minusinfinity-r14 NULL,
    txPower-r14 INTEGER (-41..31)
}

-- ASN1STOP
```

SL-TypeTxSync

The IE *SL-TypeTxSync* indicates the synchronization reference type.

SL-TypeTxSync information element

```
-- ASN1START

SL-TypeTxSync-r14 ::= ENUMERATED {gnss, enb, ue}

-- ASN1STOP
```

SL-ThresPSSCH-RSRP-List

IE *SL-ThresPSSCH-RSRP-List* indicates a threshold used for sensing based UE autonomous resource selection (see TS 36.213 [23]). A resource is excluded if it is indicated or reserved by a decoded SCI and PSSCH RSRP in the associated data resource is above the threshold defined by IE *SL-ThresPSSCH-RSRP-List*.

SL-ThresPSSCH-RSRP-List information element

```
-- ASN1START

SL-ThresPSSCH-RSRP-List-r14 ::= SEQUENCE (SIZE (64)) OF SL-ThresPSSCH-RSRP-r14

SL-ThresPSSCH-RSRP-r14 ::= INTEGER (0..66)

-- ASN1STOP
```

SL-ThresPSSCH-RSRP-List field descriptions

SL-ThresPSSCH-RSRP

Value 0 corresponds to minus infinity dBm, value 1 corresponds to -128dBm, value 2 corresponds to -126dBm, value n corresponds to (-128 + (n-1)*2) dBm and so on, value 66 corresponds to infinity dBm.

SL-TxParameters

The IE *SL-TxParameters* identifies a set of parameters configured for sidelink transmission, used for communication, discovery and synchronisation.

SL-TxParameters information element

```
-- ASN1START

SL-TxParameters-r12 ::= SEQUENCE {
    alpha-r12 Alpha-r12,
    p0-r12 P0-SL-r12
}

P0-SL-r12 ::= INTEGER (-126..31)

-- ASN1STOP
```

SL-TxParameters field descriptions

alpha

Parameter(s): $\alpha_{PSSCH,1}$, $\alpha_{PSSCH,2}$, $\alpha_{PSSCH,3}$, $\alpha_{PSSCH,4}$, $\alpha_{PSSCH,4}$, $\alpha_{PSCCH,1}$, $\alpha_{PSSCH,2}$, $\alpha_{PSDCH,1}$, α_{PSSSS} See TS 36.213 [23, 14.1.1.5, 14.2.1.3, 14.3.1, 14.4] where all corresponds to 0, all04 corresponds to value 0.4, all05 to 0.5, all06 to 0.6, all07 to 0.7, all08 to 0.8, all09 to 0.9 and all corresponds to 1. This field applies for sidelink power control.

D0

Parameter: $P_{\text{O_PSSCH},1}$, $P_{\text{O_PSSCH},2}$, $P_{\text{O_PSSCH},3}$, $P_{\text{O_PSSCH},4}$, $P_{\text{O_PSSCH},1}$, $P_{\text{O_PSCCH},2}$, $P_{\text{O_PSDCH},1}$, $P_{\text{O_PSSCH},1}$, see TS 36.213 [23, 14.1.1.5, 14.2.1.3, 14.3.1, 14.4], unit dBm.

SL-TxPoolIdentity

The IE SL-TxPoolIdentity identifies an individual pool entry configured for sidelink transmission, used for communication and discovery.

SL-TxPoolIdentity information element

```
-- ASN1START

SL-TxPoolIdentity-r12 ::= INTEGER (1.. maxSL-TxPool-r12)

SL-TxPoolIdentity-v1310 ::= INTEGER (maxSL-TxPool-r12Plus1-r13.. maxSL-TxPool-r13)

SL-V2X-TxPoolIdentity-r14 ::= INTEGER (1.. maxSL-V2X-TxPool-r14)

-- ASN1STOP
```

SL-TxPoolToReleaseList

The IE *SL-TxPoolToReleaseList* is used to release one or more individual pool entries used for sidelink transmission, for communication and discovery.

SL-TxPoolToReleaseList information element

```
-- ASN1START

SL-TxPoolToReleaseList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-TxPoolIdentity-r12

SL-TxPoolToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-TxPoolIdentity-v1310
```

-- ASN1STOP

SL-V2X-ConfigDedicated

The IE SL-V2X-ConfigDedicated specifies the dedicated configuration information for V2X sidelink communication.

SL-V2X-ConfigDedicated information element

```
-- ASN1START
SL-V2X-ConfigDedicated-r14 ::=
                                           SEQUENCE
   commTxResources-r14
                                       CHOICE {
       release
                                           NULL.
       setup
                                           CHOICE {
           scheduled-r14
                                           SEQUENCE {
                                   C-RNTI,
               sl-V-RNTI-r14
                                             MAC-MainConfigSL-r12,
               mac-MainConfig-r14
               v2x-SchedulingPool-r14
                                               SL-CommResourcePoolV2X-r14 OPTIONAL,
                                                                                       -- Need ON
               mcs-r14
                                               INTEGER (0..31)
                                                                          OPTIONAL, -- Need OR
                logicalChGroupInfoList-r14
                                             LogicalChGroupInfoList-r13
           ue-Selected-r14
                                           SEQUENCE {
                -- Pool for normal usage
                v2x-CommTxPoolNormalDedicated-r14 SEQUENCE {
                   poolToReleaseList-r14 SL-TxPoolToReleaseListV2X-r14 OPTIONAL, -- Need ON
                                          SL-TxPoolToAddModListV2X-r14
                                                                              OPTIONAL,
                   poolToAddModList-r14
Need ON
                   v2x-CommTxPoolSensingConfig-r14
                                                      SL-CommTxPoolSensingConfig-r14
                                                                           OPTIONAL
                                                                                       -- Need ON
           }
                                                                                     -- Need ON
-- Need ON
                                                                           OPTIONAL,
   v2x-InterFreqInfoList-r14 SL-InterFreqInfoListV2X-r14 thresSL-TxPrioritization-r14 SL-Priority-r13
                                                                           OPTIONAL,
                                                                                  OPTIONAL,
Need OR
                                                                           OPTIONAL,
    typeTxSync-r14
                                       SL-TypeTxSync-r14
                                                                                       -- Need OR
    cbr-DedicatedTxConfigList-r14
                                       SL-CBR-CommonTxConfigList-r14 OPTIONAL, -- Need OR
SL-TxPoolToAddModListV2X-r14 ::=
                                       SEQUENCE (SIZE (1.. maxSL-V2X-TxPool-r14)) OF SL-
TxPoolToAddMod-r14
SL-TxPoolToAddMod-r14 ::= SEQUENCE
   poolIdentity-r14
                                       SL-V2X-TxPoolIdentity-r14,
                                       SL-CommResourcePoolV2X-r14
   pool-r14
SL-TxPoolToReleaseListV2X-r14 ::= SEQUENCE (SIZE (1.. maxSL-V2X-TxPool-r14)) OF SL-V2X-
TxPoolIdentity-r14
-- ASN1STOP
```

SL-V2X-ConfigDedicated field descriptions

cbr-DedicatedTxConfigList

Indicates the dedicated list of CBR range division and the list of PSCCH TX configurations available to configure congestion control to the UE for V2X sidelink communication.

logicalChGroupInfoList

Indicates for each logical channel group the list of associated priorities, used as specified in TS 36.321 [6], in order of increasing logical channel group identity.

mcs

Indicates the MCS as defined in TS 36.213 [23, 14.2.1]. If not configured, the selection of MCS is up to UE implementation.

scheduled

Indicates the configuration for the case E-UTRAN schedules the transmission resources based on sidelink specific BSR from the UE.

sI-V-RNTI

Indicates the RNTI used for DCI dynamically scheduling sidelink resources for V2X sidelink communication.

thresSL-TxPrioritization

Indicates the threshold used to determine whether SL V2X transmission is prioritized over uplink transmission if they overlap in time (see TS 36.321 [6]). This value shall overwrite *thresSL-TxPrioritization* configured in *SIB21* or *SL-V2X-Preconfiguration* if any.

typeTxSync

Indicates the prioritized synchronization type (i.e. eNB or GNSS) for performing V2X sidelink communication on PCell.

ue-Selected

Indicates the configuration for the case the UE selects the transmission resources from a pool of resources configured by E-UTRAN.

v2x-InterFreqInfoList

Indicates synchronization and resource allocation configurations of other carrier frequencies than the serving carrier frequency for V2X sidelink communication. For inter-carrier scheduled resource allocation, CIF=1 in DCI-5A corresponds to the first entry in this frequency list, CIF=2 corresponds to the second entry, and so on (see TS 36.213 [23]). CIF=0 in DCI-5A corresponds to the frequency where the DCI is received.

v2x-SchedulingPool

Indicates a pool of resources when E-UTRAN schedules Tx resources for V2X sidelink communications.

SL-ZoneConfig

The IE SL-ZoneConfig indicates zone configurations used for V2X sidelink communication.

SL-ZoneConfig information element

SL-ZoneConfig field descriptions

zoneLength

Indicates the length of each geographic zone. Value m5 corresponds to 5 meters, m10 corresponds to 10 meters and so on.

zoneWidth

Indicates the width of each geographic zone. Value m5 corresponds to 5 meters, m10 corresponds to 10 meters and so on.

zoneldLongiMod

Indicates the total number of zones that is configured with respect to longitude.

zoneldLatiMod

Indicates the total number of zones that is configured with respect to latitude.

6.4 RRC multiplicity and type constraint values

Multiplicity and type constraint definitions

```
-- ASN1START
maxACDC-Cat-r13
                           INTEGER ::= 16 -- Maximum number of ACDC categories (per PLMN)
                          INTEGER ::= 16 -- Maximum number of narrowbands
maxAvailNarrowBands-r13
maxBandComb-r10
                          INTEGER ::= 128 -- Maximum number of band combinations.
maxBandComb-r11
                           INTEGER ::= 256 -- Maximum number of additional band combinations.
                          INTEGER ::= 384 -- Maximum number of band combinations in Rel-13
maxBandComb-r13
-- supported band combination
                          INTEGER ::= 16 -- Maximum number of CBR levels
maxCBR-Level-r14
maxCBR-Level-1-r14
                          INTEGER ::= 15
                          INTEGER ::= 72 -- Maximum number of CBR results in a report
maxCBR-Report-r14
maxCDMA-BandClass
                          INTEGER ::= 32 -- Maximum value of the CDMA band classes
maxCE-Level-r13
                           INTEGER ::= 4
                                          -- Maximum number of CE levels
                          INTEGER ::= 16 -- Maximum number of blacklisted physical cell identity
maxCellBlack
                                          -- ranges listed in SIB type 4 and 5 \,
                          INTEGER ::= 16 -- Maximum number of visited EUTRA cells reported
maxCellHistory-r12
maxCellInfoGERAN-r9
                          INTEGER ::= 32 -- Maximum number of GERAN cells for which system in-
                                          -- formation can be provided as redirection assistance
                           INTEGER ::= 16 -- Maximum number of UTRA cells for which system
maxCellInfoUTRA-r9
                                          -- information can be provided as redirection
                                          -- assistance
maxCombIDC-r11
                           INTEGER ::= 128 -- Maximum number of reported UL CA combinations
maxCSI-IM-r11
                           INTEGER ::= 3 -- Maximum number of CSI-IM configurations
                                          -- (per carrier frequency)
maxCSI-IM-r12
                           INTEGER ::= 4 -- Maximum number of CSI-IM configurations
                                          -- (per carrier frequency)
                           INTEGER ::= 5 -- Minimum number of CSI IM configurations from which
minCSI-IM-r13
                                          -- REL-13 extension is used
maxCST-TM-r13
                           INTEGER ::= 24 -- Maximum number of CSI-IM configurations
                                          -- (per carrier frequency)
                           INTEGER ::= 20 -- Maximum number of additional CSI-IM configurations
maxCSI-IM-v1310
                                          -- (per carrier frequency)
                           INTEGER ::= 4 -- Maximum number of CSI processes (per carrier
maxCSI-Proc-r11
                                             frequency)
                           INTEGER ::= 3 -- Maximum number of CSI RS resource
maxCSI-RS-NZP-r11
                                          -- configurations using non-zero Tx power
                                             (per carrier frequency)
minCSI-RS-NZP-r13
                           INTEGER ::= 4 -- Minimum number of CSI RS resource from which
                                          -- REL-13 extension is used
maxCSI-RS-NZP-r13
                           INTEGER ::= 24 -- Maximum number of CSI RS resource
                                          -- configurations using non-zero Tx power
                                              (per carrier frequency)
                           INTEGER ::= 21 -- Maximum number of additional CSI RS resource
maxCSI-RS-NZP-v1310
                                          -- configurations using non-zero Tx power
                                              (per carrier frequency)
                           INTEGER ::= 4
maxCSI-RS-ZP-r11
                                         -- Maximum number of CSI RS resource
                                             configurations using zero Tx power(per carrier
                                          -- frequency)
maxCOI-ProcExt-r11
                           INTEGER ::= 3
                                         -- Maximum number of additional periodic CQI
                                          -- configurations (per carrier frequency)
maxFreqUTRA-TDD-r10
                           INTEGER ::= 6 -- Maximum number of UTRA TDD carrier frequencies for
                                          -- which system information can be provided as
                                          -- redirection assistance
maxCellInter
                           INTEGER ::= 16 -- Maximum number of neighbouring inter-frequency
                                          -- cells listed in SIB type 5
maxCellIntra
                           INTEGER ::= 16 -- Maximum number of neighbouring intra-frequency
                                          -- cells listed in SIB type 4
                                          -- Maximum number of lists of GERAN cells
maxCellListGERAN
                           INTEGER ::= 3
                           INTEGER ::= 32 -- Maximum number of entries in each of the
maxCellMeas
                                          -- cell lists in a measurement object
maxCellReport
                          INTEGER ::= 8
                                          -- Maximum number of reported cells/CSI-RS resources
                           INTEGER ::= 8
maxConfigSPS-r14
                                          -- Maximum number of simultaneous SPS configurations
                          INTEGER ::= 96 -- Maximum number of entries in the CSI-RS list
maxCSI-RS-Meas-r12
                                          -- in a measurement object
                           INTEGER ::= 11 -- Maximum number of Data Radio Bearers
                          INTEGER ::= 5
                                          -- Maximum number of subframes in a discovery signals
maxDS-Duration-r12
                                          -- occasion
                                         -- Maximum number of zero transmission power CSI-RS for
maxDS-ZTP-CSI-RS-r12
                          INTEGER ::= 5
                                          -- a serving cell concerning discovery signals
```

```
INTEGER ::= 65535 -- Maximum value of EUTRA carrier frequency
INTEGER ::= 65536 -- Lowest value extended EARFCN range
maxEARFCN
                            INTEGER ::= 65536 -- Lowest value extended EARFCN range
INTEGER ::= 262143 -- Highest value extended EARFCN range
maxEARFCN-Plus1
maxEARFCN2
maxEPDCCH-Set-r11
                            INTEGER ::= 2 -- Maximum number of EPDCCH sets
INTEGER ::= 64 -- Maximum value of fequency band indicator
maxFBI
maxFBI-Plus1
                                INTEGER ::= 65 -- Lowest value extended FBI range
maxFBT2
                             INTEGER ::= 256 -- Highest value extended FBI range
                             INTEGER ::= 8 -- Maximum number of carrier frequencies
maxFreq
                            INTEGER ::= 32 -- Maximum number of carrier frequencies that are
maxFreqIDC-r11
                                              -- affected by the IDC problems
                                             -- Maximum number of carrier frequencies for which an
maxFreqMBMS-r11
                            INTEGER ::= 5
                                             -- MBMS capable UE may indicate an interest
                                            -- Maximum number of carrier frequencies for which V2X
                            INTEGER ::= 8
maxFreqV2X-r14
                                             -- sidelink communication can be configured
maxFreqV2X-1-r14
                                INTEGER ::= 7
                                                -- Highest index of frequencies
                            INTEGER ::= 10 -- Maximum number of GERAN SI blocks that can be
maxGERAN-SI
                                             -- provided as part of NACC information
                            INTEGER ::= 16 -- Maximum number of GERAN neighbour freq groups
maxGNFG
maxLCG-r13
                            INTEGER ::= 4
                                             -- Maximum number of logical channel groups
maxLogMeasReport-r10
                            INTEGER ::= 520 -- Maximum number of logged measurement entries
                                             -- that can be reported by the UE in one message
                           INTEGER ::= 8 -- Maximum number of MBSFN frame allocations with
maxMBSFN-Allocations
                                             -- different offset
maxMBSFN-Area
                           INTEGER ::= 8
                            INTEGER ::= 7
maxMBSFN-Area-1
maxMBMS-ServiceListPerUE-r13 INTEGER ::= 15 -- Maximum number of services which the UE can
                                         -- include in the MBMS interest indication
                            INTEGER ::= 32
maxMeasId-Plus1
                            INTEGER ::= 33
maxMeasId-r12
                            INTEGER ::= 64
                                             -- Maximum number of additional frequency bands
                            INTEGER ::= 8
maxMultiBands
                                             -- that a cell belongs to
                           INTEGER ::= 8 -- Maximum number of NS and P-Max values per band
maxNS-Pmax-r10
maxNS-Pmax-r10
maxNAICS-Entries-r12
                           INTEGER ::= 8 -- Maximum number of supported NAICS combination(s)

INTEGER ::= 8 -- Maximum number of neighbouring cells in NAICS

-- configuration (per carrier frequency)
maxNeighCell-r12
                          INTEGER ::= 8 -- Maximum number of SCPTM neighbour cells
maxNeighCell-SCPTM-r13
                            INTEGER ::= 32
maxObjectId
maxObjectId-Plus1-r13
                         INTEGER ::= 33
maxObjectId-r13
                            INTEGER ::= 64
maxP-a-PerNeighCell-r12
                            INTEGER ::= 3
                                            -- Maximum number of power offsets for a neighbour cell
                                             -- in NAICS configuration
                          INTEGER ::= 16 --
INTEGER ::= 4 -- Maximum number of physical cell identity ranges
maxPageRec
maxPhysCellIdRange-r9
maxPLMN-r11
                           INTEGER ::= 6 -- Maximum number of PLMNs
maxPLMN-1-r14
                             INTEGER ::= 5
                                             -- Maximum number of PLMNs minus one
                            INTEGER ::= 511 -- Maximum number of CDMA2000 PNOffsets
maxPNOffset
maxPMCH-PerMBSFN
maxPSSCH-TxConfig-r14 INTEGER ::= 15
maxOCT-r1?
                            INTEGER ::= 16 -- Maximum number of PSSCH TX configurations
                            INTEGER ::= 6 -- Maximum number of QCIs
maxRAT-Capabilities
                            INTEGER ::= 8
                                            -- Maximum number of interworking RATs (incl EUTRA)
                          INTEGER ::= 8 -- Maximum number of PDSCH RE Mapping configurations
maxRE-MapQCL-r11
                                             -- (per carrier frequency)
maxReportConfigId
                            INTEGER ::= 32
maxReservationPeriod-r14 INTEGER := 16 -- Maximum number of resource reservation periodicities
                                             -- for sidelink V2X communication
                            INTEGER ::= 3 -- Maximum number of frequency layers for RSTD
maxRSTD-Freg-r10
                                             -- measurement
                            INTEGER ::= 64 -- Maximum number of MBMS service area identities
maxSAI-MBMS-r11
                                             -- broadcast per carrier frequency
                             INTEGER ::= 4 -- Maximum number of SCells

INTEGER ::= 31 -- Highest value of extended number range of SCells
                            INTEGER ::= 4
maxSCell-r10
maxSCell-r13
                            INTEGER ::= 1023
maxSC-MTCH-r13
                                                -- Maximum number of SC-MTCHs in one cell
maxSC-MTCH-BR-r14
                            INTEGER ::= 128 -- Maximum number of SC-MTCHs in one cell for feMTC
maxSL-CommRxPoolNFreq-r13 INTEGER ::= 32 -- Maximum number of individual sidelink communication
                                             -- Rx resource pools on neighbouring freq
maxSL-CommRxPoolPreconf-v1310 INTEGER := 12 -- Maximum number of additional preconfigured -- sidelink communication Rx resource pool entries
-- Tx resource pool
maxSL-TxPool-v1310
                           INTEGER ::= 4 -- Maximum number of additional sidelink
                                                   - Tx resource pool entries
                            INTEGER ::= 8 -- Maximum number of individual sidelink
maxSL-TxPool-r13
                                                 -- Tx resource pools
maxSL-CommTxPoolPreconf-v1310 INTEGER ::= 7 -- Maximum number of additional preconfigured
                                                 -- sidelink Tx resource pool entries
maxSL-Dest-r12
                        INTEGER ::= 16
                                                 -- Maximum number of sidelink destinations
maxSL-DiscCells-r13 INTEGER ::= 16 -- Maximum number of cells with similar sidelink
```

```
-- configurations
maxSL-DiscPowerClass-r12 INTEGER ::= 3
                                               -- Maximum number of sidelink power classes
maxSL-DiscRxPoolPreconf-r13 INTEGER ::= 16 -- Maximum number of preconfigured sidelink
                                               -- discovery Rx resource pool entries
maxSL-DiscSysInfoReportFreq-r13 INTEGER ::= 8
                                              -- Maximum number of frequencies to include in a
                                               -- SidelinkUEInformation for SI reporting
maxSL-DiscTxPoolPreconf-r13 INTEGER ::= 4
                                              -- Maximum number of preconfigured sidelink
                                               -- discovery Tx resource pool entries
                     INTEGER ::= 8 -- Maximum number of gap patterns that can be requested
maxSL-GP-r13
                                       -- for a frequency or assigned
-- measurement and report
                     INTEGER ::= 8 -- Maximum number of entries in sidelink priority list
maxSL-Prio-r13
maxSL-RxPool-r12
                           INTEGER ::= 16 -- Maximum number of individual sidelink Rx resource
maxSL-SyncConfig-r12
                           INTEGER ::= 16 -- Maximum number of sidelink Sync configurations
maxSL-TF-IndexPair-r12 INTEGER ::= 64 -- Maximum number of sidelink Time Freq resource index
                                           -- pairs
                           INTEGER ::= 4
                                          -- Maximum number of individual sidelink Tx resource
maxSL-TxPool-r12
pools
                          INTEGER ::= 16 -- Maximum number of RX resource pools for
maxSL-V2X-RxPool-r14
                                               -- V2X sidelink communication
maxSL-V2X-RxPoolPreconf-r14 INTEGER ::= 16
                                               -- Maximum number of RX resource pools for
                                               -- V2X sidelink communication
                           INTEGER ::= 8 -- Maximum number of TX resource pools for
maxSL-V2X-TxPool-r14
                                               -- V2X sidelink communication
maxSL-V2X-TxPoolPreconf-r14 INTEGER ::= 8
                                               -- Maximum number of TX resource pools for
                                               -- V2X sidelink communication
maxSL-V2X-SyncConfig-r14 INTEGER ::= 16 -- Maximum number of sidelink Sync configurations
                                               -- for V2X sidelink communication
                          INTEGER ::= 4 -- Maximum number of CBR range configurations
maxSL-V2X-CBRConfig-r14
                                              -- for V2X sidelink communication congestion
                                               -- control
maxSL-V2X-CBRConfig-1-r14 INTEGER ::= 3
maxSL-V2X-TxConfig-r14
                         INTEGER ::= 64 -- Maximum number of TX parameter configurations
                                              -- for V2X sidelink communication congestion -- control
maxSL-V2X-TxConfig-1-r14 INTEGER ::= 63
maxSL-V2X-CBRConfig2-r14 INTEGER ::= 8 -- Maximum number of CBR range configurations in
                                               -- pre-configuration for V2X sidelink
                                               -- communication congestion control
maxSL-V2X-CBRConfig2-1-r14 INTEGER ::= 7
-- configurations in pre-configuration for V2X
                                              -- sidelink communication congestion control
maxSL-V2X-TxConfig2-1-r14 INTEGER ::= 127
                           INTEGER ::= 3 -- Maximum number of STAGs

INTEGER ::= 5 -- Maximum number of Serving cells

INTEGER ::= 32 -- Highest value of extended number range of Serving
maxSTAG-r11
maxServCell-r10
maxServCell-r13
cells
                          INTEGER ::= 16 -- Maximum number of MBMS services that can be included
maxServiceCount
                                           -- in an MBMS counting request and response
maxServiceCount-1
                          INTEGER ::= 15
                           INTEGER ::= 29
maxSessionPerPMCH
maxSessionPerPMCH-1
                           INTEGER ::= 28
maxSIB
                           INTEGER ::= 32 -- Maximum number of SIBs
                           INTEGER ::= 31
maxSIB-1
maxSI-Message
                          INTEGER ::= 32 -- Maximum number of SI messages
                           INTEGER ::= 64 -- Maximum number of simultaneously aggregated bands
maxSimultaneousBands-r10
maxSubframePatternIDC-r11 INTEGER ::= 8
                                           -- Maximum number of subframe reservation patterns
                                           \mbox{--} that the UE can simultaneously recommend to the
                                           -- E-UTRAN for use.
                          INTEGER ::= 8 -- Maximum number of periodical traffic patterns
maxTrafficPattern-r14
                                           -- that the UE can simultaneously report to the
                                           -- E-UTRAN.
maxUTRA-FDD-Carrier
                         INTEGER ::= 16 -- Maximum number of UTRA FDD carrier frequencies
maxUTRA-TDD-Carrier
                           INTEGER ::= 16 -- Maximum number of UTRA TDD carrier frequencies
maxWLAN-Id-r12
                           INTEGER ::= 16 -- Maximum number of WLAN identifiers
maxWLAN-Bands-r13
                           INTEGER ::= 8 -- Maximum number of WLAN bands
                           INTEGER ::= 32 -- Maximum number of WLAN identifiers
maxWLAN-Id-r13
maxWLAN-Channels-r13
                          INTEGER ::= 16 -- maximum number of WLAN channels used in
                                          -- WLAN-CarrierInfo
maxWLAN-CarrierInfo-r13 INTEGER ::= 8 -- Maximum number of WLAN Carrier InformaxWLAN-Id-Report-r14 INTEGER ::= 32 -- Maximum number of WLAN IDs to report
                          INTEGER ::= 8 -- Maximum number of WLAN Carrier Information
-- ASN1STOP
```

NOTE: The value of maxDRB aligns with SA2.

End of EUTRA-RRC-Definitions

```
-- ASN1START
END
-- ASN1STOP
```

6.5 PC5 RRC messages

NOTE: The messages included in this section reflect the current status of the discussions. Additional messages may be included at a later stage.

6.5.1 General message structure

PC5-RRC-Definitions

This ASN.1 segment is the start of the PC5 RRC PDU definitions.

```
-- ASN1START

PC5-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

TDD-ConfigSL-r12

FROM EUTRA-RRC-Definitions;

-- ASN1STOP
```

SBCCH-SL-BCH-Message

The SBCCH-SL-BCH-Message class is the set of RRC messages that may be sent from the UE to the UE via SL-BCH on the SBCCH logical channel.

SBCCH-SL-BCH-Message-V2X

The SBCCH-SL-BCH-Message-V2X class is the set of RRC messages that may be sent from the UE to the UE via SL-BCH on the SBCCH logical channel for V2X sidelink communication.

6.5.2 Message definitions

MasterInformationBlock-SL

The *MasterInformationBlock-SL* includes the information transmitted by a UE transmitting SLSS, i.e. acting as synchronisation reference, via SL-BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: SBCCH

Direction: UE to UE

MasterInformationBlock-SL

```
-- ASN1START
MasterInformationBlock-SL ::=
                                      SEQUENCE {
                                         ENUMERATED {
    sl-Bandwidth-r12
                                              n6, n15, n25, n50, n75, n100},
                                          TDD-ConfigSL-r12,
    tdd-ConfigSL-r12
    directFrameNumber-r12
directSubframeNumber-r12
                                          BIT STRING (SIZE (10)),
                                          INTEGER (0..9),
    inCoverage-r12
                                          BOOLEAN,
    reserved-r12
                                          BIT STRING (SIZE (19))
-- ASN1STOP
```

MasterInformationBlock-SL field descriptions

directFrameNumber

Indicates the frame number in which SLSS and SL-BCH are transmitted. The subframe in the frame corresponding to directFrameNumber is indicated by directSubframeNumber.

inCoverage

Value TRUE indicates that the UE transmitting the MasterInformationBlock-SL is in E-UTRAN coverage.

sl-Bandwidth

Parameter: transmission bandwidth configuration. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.

– MasterInformationBlock-SL-V2X

The *MasterInformationBlock-SL-V2X* includes the information transmitted by a UE transmitting SLSS, i.e. acting as synchronisation reference, via SL-BCH for V2X sidelink communication.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: SBCCH

Direction: UE to UE

MasterInformationBlock-SL-V2X

```
-- ASN1START
MasterInformationBlock-SL-V2X-r14 ::=
                                            SEQUENCE {
    sl-Bandwidth-r14
                                        ENUMERATED {
                                           n6, n15, n25, n50, n75, n100},
    tdd-ConfigSL-r14
                                        TDD-ConfigSL-r12,
    directFrameNumber-r14
                                        BIT STRING (SIZE (10)),
    directSubframeNumber-r14
                                        INTEGER (0..9),
    inCoverage-r14
                                        BOOLEAN
   reserved-r14
                                        BIT STRING (SIZE (27))
```

}
-- ASN1STOP

MasterInformationBlock-SL-V2X field descriptions

directFrameNumber

Indicates the frame number in which SLSS and SL-BCH for V2X sidelink communication are transmitted. The subframe in the frame corresponding to *directFrameNumber* is indicated by *directSubframeNumber*.

inCoverage

Value TRUE indicates that the UE transmitting the MasterInformationBlock-SL-V2X for V2X sidelink communication is in E-UTRAN coverage.

sl-Bandwidth

Parameter: transmission bandwidth configuration. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.

End of PC5-RRC-Definitions

```
-- ASN1START
END
-- ASN1STOP
```

6.6 Direct Indication Information

Direct Indication information is transmitted on MPDCCH using P-RNTI but without associated *Paging* message. Table 6.6-1 defines the Direct Indication information, see TS 36.212 [22, 5.3.3.1.14].

When bit n is set to 1, UE shall behave as if the corresponding field is set in the *Paging* message, see 5.3.2.3. Bit 1 is the least significant bit.

Bit	Direct Indication information
1	systemInfoModification
2	etws-Indication
3	cmas-Indication
4	eab-ParamModification
5	systemInfoModification-eDRX
6, 7, 8	Not used, and shall be ignored by UE if received.

Table 6.6-1: Direct Indication information

6.6a Direct Indication FeMBMS

On MBMS-dedicated cell and on FeMBMS/Unicast-mixed cell, a Direct Indication FeMBMS is transmitted on PDCCH together with 8-bit MCCH change notification using M-RNTI, see TS 36.212 [22, 5.3.3.1.4]. Table 6.6a-1 defines the Direct Indication FeMBMS.

When the first bit is set to 1, UE shall behave as if *systemInfoModification* field is set in the *Paging* message and when the second bit is set to 1, UE shall behave as if both *etws-Indication* and *cmas-Indication* are set in the *Paging* message, see 5.3.2.3. Bit 1 is the least significant bit.

Table 6.6a-1: Direct Indication FeMBMS

Bit	Direct Indication FeMBMS
1	systemInfoModification
2	etws-Indication and cmas-Indication

6.7 NB-IoT RRC messages

6.7.1 General NB-IoT message structure

```
-- ASN1START
NBIOT-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
   RRCConnectionReestablishmentReject,
    SecurityModeCommand,
    SecurityModeComplete,
    SecurityModeFailure,
    Additional Spectrum Emission,
   ARFCN-ValueEUTRA-r9,
    CellIdentity,
    DedicatedInfoNAS,
   DRB-Identity,
    InitialUE-Identity,
    IntraFreqBlackCellList,
    IntraFreqNeighCellList,
    maxBands,
   maxCellBlack,
   maxCellInter,
   maxFBT2.
   maxFreq,
    maxMultiBands,
   maxPageRec,
   maxPLMN-r11,
    maxSAI-MBMS-r11,
   maxSIB,
    maxSIB-1,
   MBMS-SAI-r11,
   MBMS-SAI-List-r11,
    MBMSSessionInfo-r13,
   NextHopChainingCount,
    PagingUE-Identity,
    PLMN-Identity,
    P-Max,
    PowerRampingParameters,
    PreambleTransMax,
    PhysCellId,
    Q-OffsetRange,
    Q-QualMin-r9,
    Q-RxLevMin,
    ReestabUE-Identity,
    RegisteredMME,
    ReselectionThreshold,
    ResumeIdentity-r13,
    RRC-TransactionIdentifier,
    RSRP-Range,
    ShortMAC-I,
    S-TMSI,
    SystemInformationBlockType16-r11,
    SystemInfoValueTagSI-r13,
    T-Reordering,
    TimeAlignmentTimer,
    TrackingAreaCode,
    DataInactivityTimer-r14
FROM EUTRA-RRC-Definitions;
```

-- ASN1STOP

BCCH-BCH-Message-NB

The *BCCH-BCH-Message-NB* class is the set of RRC messages that may be sent from the E-UTRAN to the UE via BCH on the BCCH logical channel.

BCCH-DL-SCH-Message-NB

The *BCCH-DL-SCH-Message-NB* class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel.

PCCH-Message-NB

The *PCCH-Message-NB* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

- DL-CCCH-Message-NB

The *DL-CCCH-Message-NB* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.

DL-DCCH-Message-NB

The *DL-DCCH-Message-NB* class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink DCCH logical channel.

```
-- ASN1START
DL-DCCH-Message-NB ::= SEQUENCE {
                                    DL-DCCH-MessageType-NB
     message
DL-DCCH-MessageType-NB ::= CHOICE {
                                     CHOICE {
          dlInformationTransfer-r13 DLInformationTransfer-NB,
rrcConnectionReconfiguration-r13 RRCConnectionReconfiguration-NB,
rrcConnectionRelease-r13 RRCConnectionRelease-NB,
securityModeCommand-r13 SecurityModeCommand.
                                                             RRCConnectionRelease-NB, SecurityModeCommand,
          securityModeCommand-r13
          ueCapabilityEnquiry-r13
                                                               UECapabilityEnquiry-NB,
          rrcConnectionResume-r13
                                                                RRCConnectionResume-NB,
          spare2 NULL, spare1 NULL
     messageClassExtension SEQUENCE {}
-- ASN1STOP
```

UL-CCCH-Message-NB

The *UL-CCCH-Message-NB* class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink CCCH logical channel.

SC-MCCH-Message-NB

The SC-MCCH-Message-NB class is the set of RRC messages that may be sent from the E-UTRAN to the NB-IoT UE on the SC-MCCH logical channel.

UL-DCCH-Message-NB

The *UL-DCCH-Message-NB* class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink DCCH logical channel.

```
-- ASN1START
UL-DCCH-Message-NB ::= SEQUENCE {
                                UL-DCCH-MessageType-NB
    message
UL-DCCH-MessageType-NB ::= CHOICE {
                                CHOICE {
         {\tt rrcConnectionReconfigurationComplete-r13} \qquad {\tt RRCConnectionReconfigurationComplete-NB}, \\
        rrcConnectionReconfigurationComplete-ris RRCConnectionReestablishmentComplete-NB, rrcConnectionSetupComplete-ris RRCConnectionSetupComplete-NB, securityModeComplete-ris SecurityModeComplete,
         securityModeFailure-r13
                                                            SecurityModeFailure,
         ueCapabilityInformation-r13
                                                             UECapabilityInformation-NB,
         ulInformationTransfer-r13
                                                            ULInformationTransfer-NB,
         rrcConnectionResumeComplete-r13
                                                             RRCConnectionResumeComplete-NB,
         spare8 NULL, spare7 NULL,
         spare6 NULL, spare5 NULL, spare4 NULL,
         spare3 NULL, spare2 NULL, spare1 NULL
    messageClassExtension SEQUENCE {}
-- ASN1STOP
```

6.7.2 NB-IoT Message definitions

DLInformationTransfer-NB

The DLInformationTransfer-NB message is used for the downlink transfer of NAS dedicated information.

Signalling radio bearer: SRB1or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

DLInformationTransfer-NB message

```
-- ASN1START
DLInformationTransfer-NB ::=
                              SEQUENCE {
                             RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
   criticalExtensions
                                     CHOICE {
                                         CHOICE {
           CHOICE {
dlInformationTransfer-r13
DLInformationTransfer-NB-r13-IEs,
           sparel NULL
       criticalExtensionsFuture
                                       SEQUENCE {}
   }
}
DLInformationTransfer-NB-r13-IEs ::= SEQUENCE {
                                      DedicatedInfoNAS,
   dedicatedInfoNAS-r13
   lateNonCriticalExtension
                                         OCTET STRING
                                                                        OPTIONAL,
   nonCriticalExtension
                                         SEQUENCE {}
                                                                        OPTIONAL
-- ASN1STOP
```

MasterInformationBlock-NB

The MasterInformationBlock-NB includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

MasterInformationBlock-NB

```
-- ASN1START
{\tt MasterInformationBlock-NB} \ ::= \ \ {\tt SEQUENCE} \ \{
     systemFrameNumber-MSB-r13 BIT STRING (SIZE (4)), hvberSFN-LSB-r13 BIT STRING (SIZE (2)),
     hyperSFN-LSB-r13
     hyperSFN-LSB-r13 BIT STRING (SIZE schedulingInfoSIB1-r13 INTEGER (0..15), systemInfoValueTag-r13 INTEGER (0..31),
    ab-Enabled-r13 BOOLEAN,
operationModeInfo-r13 CHOICE {
   inband-SamePCI-r13 Inband-SamePCI-NB-r13,
   inband-DifferentPCI-r13 Guardband-NB-r13,
   standalone-r13 Standalone-NB-r13
          standalone-r13
                                                    Standalone-NB-r13
                                              BIT STRING (SIZE (11))
     spare
\label{eq:channelRasterOffset-NB-r13} ::= \texttt{ENUMERATED} \; \{ \texttt{khz-7dot5}, \; \texttt{khz-2dot5}, \; \texttt{khz2dot5}, \; \texttt{khz7dot5} \}
Guardband-NB-r13 ::=
                                          SEQUENCE {
    rasterOffset-r13
                                              ChannelRasterOffset-NB-r13,
     spare
                                               BIT STRING (SIZE (3))
Inband-SamePCI-NB-r13 ::=
                                         SEQUENCE {
     eutra-CRS-SequenceInfo-r13
                                             INTEGER (0..31)
Inband-DifferentPCI-NB-r13 ::= SEQUENCE {
    eutra-NumCRS-Ports-r13 ENUMERATED {same, four},
     rasterOffset-r13
                                               ChannelRasterOffset-NB-r13,
                                               BIT STRING (SIZE (2))
     spare
Standalone-NB-r13 ::=
                                          SEQUENCE {
                                               BIT STRING (SIZE (5))
    spare
```

} -- ASN1STOP

MasterInformationBlock-NB field descriptions

ab-Enabled

Value TRUE indicates that access barring is enabled and that the UE shall acquire *SystemInformationBlockType14-NB* before initiating RRC connection establishment or resume.

eutra-CRS-SequenceInfo

Information of the carrier containing NPSS/NSSS/NPBCH.

Each value is associated with an E-UTRA PRB index as an offset from the middle of the LTE system sorted out by channel raster offset. See TS 36.211[21] and TS 36.213 [23].

eutra-NumCRS-Ports

Number of E-UTRA CRS antenna ports, either the same number of ports as NRS or 4 antenna ports. See TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23].

hyperSFN-LSB

Indicates the 2 least significant bits of hyper SFN. The remaining bits are present in SystemInformationBlockType1-NB.

operationModeInfo

Deployment scenario (in-band/guard-band/standalone) and related information. See TS 36.211 [21] and TS 36.213 [23].

Inband-SamePCI indicates an in-band deployment and that the NB-IoT and LTE cell share the same physical cell id and have the same number of NRS and CRS ports.

Inband-DifferentPCI indicates an in-band deployment and that the NB-IoT and LTE cell have different physical cell id. guardband indicates a guard-band deployment.

standalone indicates a standalone deployment.

rasterOffset

NB-IoT offset from LTE channel raster. Unit in kHz in set { -7.5, -2.5, 2.5, 7.5} See TS 36.211[21] and TS 36.213 [23].

schedulingInfoSIB1

This field contains an index to a table specified in TS 36.213 [23, Table 16.4.1.3-3] that defines SystemInformationBlockType1-NB scheduling information.

systemFrameNumber-MSB

Defines the 4 most significant bits of the SFN. As indicated in TS 36.211 [21], the 6 least significant bits of the SFN are acquired implicitly by decoding the NPBCH.

systemInfoValueTag

Common for all SIBs other than MIB-NB, SIB14-NB and SIB16-NB.

- Paging-NB

The Paging-NB message is used for the notification of one or more UEs.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: PCCH

Direction: E-UTRAN to UE

Paging-NB message

```
-- ASN1START
Paging-NB ::=
                                    SEQUENCE {
   pagingRecordList-r13
                                       PagingRecordList-NB-r13
                                                                         OPTIONAL,
                                                                                     -- Need ON
                                        ENUMERATED {true}
    systemInfoModification-r13
                                                                         OPTIONAL,
                                                                                     -- Need ON
                                                                                     -- Need ON
    systemInfoModification-eDRX-r13
                                        ENUMERATED {true}
                                                                         OPTIONAL,
    nonCriticalExtension
                                        SEQUENCE { }
                                                                         OPTIONAL
PagingRecordList-NB-r13 ::=
                                    SEQUENCE (SIZE (1..maxPageRec)) OF PagingRecord-NB-r13
PagingRecord-NB-r13 ::=
                                    SEQUENCE {
    ue-Identity-r13
                                        PagingUE-Identity,
```

-- ASN1STOP

Paging-NB field descriptions

systemInfoModification

If present: indication of a BCCH modification other than for *SystemInformationBlockType14-NB* (SIB14-NB) and *SystemInformationBlockType16-NB* (SIB16-NB). This indication does not apply to UEs using eDRX cycle longer than the BCCH modification period.

systemInfoModification-eDRX

If present: indication of a BCCH modification other than for *SystemInformationBlockType14-NB* (SIB14-NB) and *SystemInformationBlockType16-NB* (SIB16-NB). This indication applies only to UEs using eDRX cycle longer than the BCCH modification period.

ue-Identity

Provides the NAS identity of the UE that is being paged.

RRCConnectionReconfiguration-NB

The *RRCConnectionReconfiguration-NB* message is the command to modify an RRC connection. It may convey information for resource configuration (including RBs, MAC main configuration and physical channel configuration) including any associated dedicated NAS information.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

RRCConnectionReconfiguration-NB message

```
-- ASN1START
RRCConnectionReconfiguration-NB ::= SEQUENCE {
   {\tt rrc-TransactionIdentifier} \qquad \qquad {\tt RRC-TransactionIdentifier} \,,
   criticalExtensions
                                          CHOICE {
       c1
                                              CHOICE {
           rrcConnectionReconfiguration-r13
                                                 RRCConnectionReconfiguration-NB-r13-IEs,
           sparel NULL
       },
       criticalExtensionsFuture SEQUENCE {}
}
RRCConnectionReconfiguration-NB-r13-IEs ::= SEQUENCE {
   dedicatedInfoNASList-r13 SEQUENCE (SIZE(1..maxDRB-NB-r13)) OF
                                                                         OPTIONAL,
                                                  DedicatedInfoNAS
   radioResourceConfigDedicated-r13 RadioResourceConfigDedicated-NB-r13 OPTIONAL,
                                                                                     -- Need ON
                                      ENUMERATED {true}
   fullConfig-r13
                                                                         OPTIONAL,
                                                                                      -- Cond
Reestab
   lateNonCriticalExtension
                                    OCTET STRING
                                                                          OPTIONAL,
                                      SEQUENCE {} OPTIONAL
   nonCriticalExtension
-- ASN1STOP
```

RRCConnectionReconfiguration-NB field descriptions

dedicatedInfoNASList

This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list.

fullConfig

Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message.

Conditional presence	Explanation
Reestab	This field is optionally present, need ON upon the first reconfiguration after RRC
	connection re-establishment; otherwise the field is not present.

RRCConnectionReconfigurationComplete-NB

The RRCConnectionReconfigurationComplete-NB message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionReconfigurationComplete-NB message

```
-- ASN1START
{\tt RRCConnectionReconfigurationComplete-NB} \ ::= \ {\tt SEQUENCE} \ \{
    rrc-TransactionIdentifier
                                            RRC-TransactionIdentifier,
    criticalExtensions
                                            CHOICE {
       rrcConnectionReconfigurationComplete-r13
                                                     RRCConnectionReconfigurationComplete-NB-r13-IEs,
       criticalExtensionsFuture
                                                     SEQUENCE {}
RRCConnectionReconfigurationComplete-NB-r13-IEs ::= SEQUENCE {
   lateNonCriticalExtension OCTET STRING
                                                                         OPTIONAL,
    nonCriticalExtension
                                       SEQUENCE {}
                                                                         OPTIONAL
-- ASN1STOP
```

RRCConnectionReestablishment-NB

The RRCConnectionReestablishment-NB message is used to re-establish SRB1.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

RRCConnectionReestablishment-NB message

```
-- ASN1START
RRCConnectionReestablishment-NB ::= SEQUENCE {
   rrc-TransactionIdentifier RRC-TransactionIdentifier,
                                     CHOICE {
   criticalExtensions
                                         CHOICE {
       c1
           {\tt rrcConnectionReestablishment-r13} \qquad {\tt RRCConnectionReestablishment-NB-r13-IEs},
           sparel NULL
       },
       criticalExtensionsFuture
                                         SEQUENCE {}
RRCConnectionReestablishment-NB-r13-IEs ::= SEQUENCE {
   radioResourceConfigDedicated-r13
                                             RadioResourceConfigDedicated-NB-r13,
                                              NextHopChainingCount,
   nextHopChainingCount-r13
   lateNonCriticalExtension
                                              OCTET STRING
                                              RRCConnectionReestablishment-NB-v1430-IEs
   nonCriticalExtension
RRCConnectionReestablishment-NB-v1430-IEs ::= SEQUENCE {
                            BIT STRING (SIZE (16)), -- Cond Reestablish-CP
   dl-NAS-MAC
                                      SEQUENCE {}
   nonCriticalExtension
                                                             OPTIONAL
```

-- ASN1STOP

RRCConnectionReestablishment-NB field descriptions

dI-NAS-MAC

Downlink authentication token, see TS 33.401 [32]. If this field is present, the UE shall ignore the field nextHopChainingCount.

Conditional presence	Explanation
Reestablish-CP	This field is mandatory present for NB-IoT UE using the Control Plane CloT EPS
	optimisation; otherwise the field is not present.

RRCConnectionReestablishmentComplete-NB

The RRCConnectionReestablishmentComplete-NB message is used to confirm the successful completion of an RRC connection re-establishment.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionReestablishmentComplete-NB message

```
-- ASN1START
RRCConnectionReestablishmentComplete-NB ::= SEQUENCE {
   rrc-TransactionIdentifier RRC-TransactionIdentifier,
                                            CHOICE {
    criticalExtensions
        {\tt rrcConnectionReestablishmentComplete-r13} \qquad {\tt RRCConnectionReestablishmentComplete-NB-r13-IEs}, \\
        criticalExtensionsFuture
                                                    SEQUENCE {}
}
{\tt RRCConnectionReestablishmentComplete-NB-r13-IEs} \ ::= \ {\tt SEQUENCE} \ \big\{
    lateNonCriticalExtension OCTET STRING
                                                                          OPTIONAL,
    nonCriticalExtension
                                         SEQUENCE {}
                                                                           OPTIONAL
-- ASN1STOP
```

RRCConnectionReestablishmentRequest-NB

The RRCConnectionReestablishmentRequest-NB message is used to request the reestablishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

RRCConnectionReestablishmentRequest-NB message

```
RRCConnectionReestablishmentRequest-NB-r14-IEs,
            criticalExtensionsFuture
                                              SEQUENCE {}
        }
    }
RRCConnectionReestablishmentRequest-NB-r13-IEs ::= SEQUENCE {
   ue-Identity-r13 ReestabUE-Identity, reestablishmentCause-r13 ReestablishmentCaus
                                         ReestablishmentCause-NB-r13,
                                         BIT STRING (SIZE (25))
}
    reestablishmentCause-r14 ReestablishmentCause-r14, spare
{\tt RRCConnectionReestablishmentRequest-NB-r14-IEs} \ ::= \ {\tt SEQUENCE} \ \{
                                         BIT STRING (SIZE (4))
    spare
ReestablishmentCause-NB-r13 ::=
                                          ENUMERATED {
                                              reconfigurationFailure, otherFailure,
                                              spare2, spare1}
ReestabUE-Identity-CP-NB-r14 ::=
                                          SEQUENCE {
    s-TMSI-r14
                                              S-TMSI,
                                              BIT STRING (SIZE (16)),
    ul-NAS-MAC-r14
    ul-NAS-Count-r14
                                              BIT STRING (SIZE (5))
-- ASN1STOP
```

RRCConnectionReestablishmentRequest-NB field descriptions

reestablishmentCause

Indicates the failure cause that triggered the re-establishment procedure.

eNB is not expected to reject a RRCConnectionReestablishmentRequest due to unknown cause value being used by the UE.

ue-Identity

UE identity included to retrieve UE context and to facilitate contention resolution by lower layers.

ul-NAS-Count

For description of this field see TS 33.401 [32].

ul-NAS-MAC

For description of this field see TS 33.401 [32].

RRCConnectionReject-NB

The RRCConnectionReject-NB message is used to reject the RRC connection establishment or RRC connection resume.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

RRCConnectionReject-NB message

```
-- ASN1START
                                      SEQUENCE {
RRCConnectionReject-NB ::=
   criticalExtensions
                                      CHOICE {
                                       CHOICE {
       c1
           rrcConnectionReject-r13
                                          RRCConnectionReject-NB-r13-IEs,
           sparel NULL
                                        SEQUENCE {}
       criticalExtensionsFuture
}
RRCConnectionReject-NB-r13-IEs ::=
                                      SEQUENCE {
   extendedWaitTime-r13
                                          INTEGER (1..1800),
   rrc-SuspendIndication-r13
                                          ENUMERATED {true}
                                                                      OPTIONAL, -- Need ON
```

RRCConnectionReject-NB field descriptions

extendedWaitTime

Value in seconds.

rrc-SuspendIndication

If present, this field indicates that the UE should remain suspended and not release its stored context.

RRCConnectionRelease-NB

The RRCConnectionRelease-NB message is used to command the release of an RRC connection.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

RRCConnectionRelease-NB message

```
-- ASN1START
RRCConnectionRelease-NB ::=
                              SEOUENCE {
                                     RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
   criticalExtensions
                                      CHOICE {
                                       CHOICE {
           rrcConnectionRelease-r13
                                             RRCConnectionRelease-NB-r13-IEs,
           spare1 NULL
       criticalExtensionsFuture
                                        SEQUENCE {}
   }
}
RRCConnectionRelease-NB-r13-IEs ::= SEQUENCE {
                      ReleaseCause-NB-r13,
   releaseCause-r13
   resumeIdentity-r13
                                     ResumeIdentity-r13
                                                                     OPTIONAL,
                                                                                 -- Need OR
   extendedWaitTime-r13
                                                                     OPTIONAL,
                                      INTEGER (1..1800)
                                                                                 -- Need ON
                                RedirectedCarrierInfo-NB-r13
   redirectedCarrierInfo-r13
                                                                     OPTIONAL,
                                                                                 -- Need ON
   lateNonCriticalExtension
                                      OCTET STRING
                                                                     OPTIONAL,
   nonCriticalExtension
                                     RRCConnectionRelease-NB-v1430-IEs
                                                                            OPTIONAL
}
RRCConnectionRelease-NB-v1430-IEs ::= SEQUENCE {
   redirectedCarrierInfo-v1430
                                      RedirectedCarrierInfo-NB-v1430 OPTIONAL,
Redirection
   extendedWaitTime-CPdata-r14
                                      INTEGER (1..1800) OPTIONAL, -- Cond NoExtendedWaitTime
   {\tt nonCriticalExtension}
                                      SEQUENCE {}
                                                                     OPTIONAL
ReleaseCause-NB-r13 ::=
                                      ENUMERATED {loadBalancingTAUrequired, other,
                                                 rrc-Suspend, spare1}
RedirectedCarrierInfo-NB-r13::=
                                      CarrierFreq-NB-r13
RedirectedCarrierInfo-NB-v1430 ::= SEQUENCE {
                                          ENUMERATED {
   redirectedCarrierOffsetDedicated-r14
                                              dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                              dB12, dB14, dB16, dB18, dB20, dB22, dB24, dB26},
   t322-r14
                                          ENUMERATED{
                                              min5, min10, min20, min30, min60, min120, min180,
                                              spare1}
-- ASN1STOP
```

RRCConnectionRelease-NB field descriptions

extendedWaitTime

Value in seconds.

extendedWaitTime-CPdata

Wait time for data transfer using the Control Plane CloT EPS optimisation. Value in seconds. See TS 24.301 [35].

redirectedCarrierInfo

The redirectedCarrierInfo indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to a NB-IoT carrier frequency, by means of the cell selection upon leaving RRC_CONNECTED as specified in TS 36.304 [4].

redirectedCarrierOffsetDedicated

Parameter "Qoffsetdedicated_{frequency}" in TS 36.304 [4]. For NB-IoT carrier frequencies, a UE that supports multi-band cells considers the *redirectedCarrierOffsetDedicated* to be common for all overlapping bands (i.e. regardless of the EARFCN that is used).

releaseCause

The releaseCause is used to indicate the reason for releasing the RRC Connection.

E-UTRAN should not set the releaseCause to loadBalancingTAURequired if the extendedWaitTime is present.

t322

Timer T322 as described in section 7.3. Value minN corresponds to N minutes.

Conditional presence	Explanation
NoExtendedWaitTime	The field is optionally present, need ON, if the extendedWaitTime is not included;
	otherwise the field is not present.
Redirection	The field is optionally present, need ON, if redirectedCarrierInfo is included; otherwise the
	field is not present.

RRCConnectionRequest-NB

The RRCConnectionRequest-NB message is used to request the establishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

RRCConnectionRequest-NB message

```
-- ASN1START
                                SEQUENCE {
RRCConnectionRequest-NB ::=
                                         CHOICE {
    criticalExtensions
        rrcConnectionRequest-r13
                                             RRCConnectionRequest-NB-r13-IEs,
                                             SEQUENCE {}
        criticalExtensionsFuture
}
                                         SEQUENCE {
RRCConnectionRequest-NB-r13-IEs ::=
    ue-Identity-r13
                                             InitialUE-Identity,
                                             EstablishmentCause-NB-r13,
    establishmentCause-r13
    multiToneSupport-r13
                                             ENUMERATED {true}
                                                                              OPTIONAL,
    multiCarrierSupport-r13
                                             ENUMERATED {true}
                                                                              OPTIONAL,
                                             BIT STRING (SIZE (22))
    spare
-- ASN1STOP
```

RRCConnectionRequest-NB field descriptions

establishmentCause

Provides the establishment cause for the RRC connection request as provided by the upper layers. eNB is not expected to reject a *RRCConnectionRequest* due to unknown cause value being used by the UE.

multiCarrierSupport

If present, this field indicates that the UE supports multi-carrier operation.

multiToneSupport

If present, this field indicates that the UE supports UL multi-tone transmissions on NPUSCH.

ue-Identity

UE identity included to facilitate contention resolution by lower layers.

RRCConnectionResume-NB

The RRCConnectionResume-NB message is used to resume the suspended RRC connection.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

RRCConnectionResume-NB message

```
-- ASN1START
RRCConnectionResume-NB ::=
                               SEOUENCE {
                               RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
   criticalExtensions
                                      CHOICE {
                                          CHOICE {
       c1
           rrcConnectionResume-r13
                                              RRCConnectionResume-NB-r13-IEs,
           spare1
                                               NULL
       criticalExtensionsFuture
                                          SEQUENCE { }
}
RRCConnectionResume-NB-r13-IEs ::=
                                      SEQUENCE {
   radioResourceConfigDedicated-r13
                                          RadioResourceConfigDedicated-NB-r13 OPTIONAL,
Need ON
   nextHopChainingCount-r13
                                          NextHopChainingCount,
                                           ENUMERATED {true}
   drb-ContinueROHC-r13
                                                                          OPTIONAL,
                                                                                      -- Need OP
                                          OCTET STRING
   lateNonCriticalExtension
                                                                          OPTIONAL,
                                           SEQUENCE {}
                                                                          OPTIONAL
   nonCriticalExtension
-- ASN1STOP
```

RRCConnectionResume-NB field descriptions

drb-ContinueROHC

This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset.

RRCConnectionResumeComplete-NB

The RRCConnectionResumeComplete-NB message is used to confirm the successful completion of an RRC connection resumption

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionResumeComplete-NB message

```
-- ASN1START
RRCConnectionResumeComplete-NB ::= SEQUENCE {
   rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions
                                              CHOICE
       rrcConnectionResumeComplete-r13
criticalExtensionsFuture
                                                   RRCConnectionResumeComplete-NB-r13-IEs,
                                                   SEQUENCE {}
}
RRCConnectionResumeComplete-NB-r13-IEs ::= SEQUENCE {
    selectedPLMN-Identity-r13
                                               INTEGER (1..maxPLMN-r11)
                                                                          OPTIONAL,
   dedicatedInfoNAS-r13
                                               DedicatedInfoNAS OPTIONAL,
   lateNonCriticalExtension
                                               OCTET STRING
                                                                                OPTIONAL.
    nonCriticalExtension
                                               SEQUENCE {}
                                                                                OPTIONAL
-- ASN1STOP
```

RRCConnectionResumeComplete-NB field descriptions

selectedPLMN-Identity

Index of the PLMN selected by the UE from the *plmn-IdentityList* included in *SystemInformationBlockType1-NB*. 1 if the 1st PLMN is selected from the *plmn-IdentityList* included in SIB1-NB, 2 if the 2nd PLMN is selected from the *plmn-IdentityList* included in SIB1-NB and so on.

RRCConnectionResumeRequest-NB

The RRCConnectionResumeRequest-NB message is used to request the resumption of a suspended RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to E-UTRAN

RRCConnectionResumeRequest-NB message

```
-- ASN1START
RRCConnectionResumeRequest-NB ::= SEQUENCE {
    criticalExtensions
                                           CHOICE {
       rrcConnectionResumeRequest-r13
                                               RRCConnectionResumeRequest-NB-r13-IEs,
       criticalExtensionsFuture
                                                SEQUENCE {}
RRCConnectionResumeRequest-NB-r13-IEs ::=
                                           SEQUENCE {
                                               ResumeIdentity-r13,
    resumeID-r13
    shortResumeMAC-I-r13
                                                   ShortMAC-I,
                                                EstablishmentCause-NB-r13,
    resumeCause-r13
                                                BIT STRING (SIZE (9))
    spare
-- ASN1STOP
```

RRCConnectionResumeRequest-NB field descriptions

resumeCause

Provides the resume cause for the RRC connection resume request as provided by the upper layers.

eNB is not expected to reject a RRCConnectionResumeRequest due to unknown cause value being used by the UE.

resumeID

UE identity to facilitate UE context retrieval at eNB.

shortResumeMAC-I

Authentication token to facilitate UE authentication at eNB.

– RRCConnectionSetup-NB

The RRCConnectionSetup-NB message is used to establish SRB1 and SRB1bis.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: E-UTRAN to UE

RRCConnectionSetup-NB message

```
-- ASN1START
RRCConnectionSetup-NB ::=
                              SEQUENCE {
                              RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
                                    CHOICE {
   criticalExtensions
                                         CHOICE {
           rrcConnectionSetup-r13
                                             RRCConnectionSetup-NB-r13-IEs,
           sparel NULL
                                         SEQUENCE {}
       criticalExtensionsFuture
}
RRCConnectionSetup-NB-r13-IEs ::=
                                     SEQUENCE {
   radioResourceConfigDedicated-r13
                                      RadioResourceConfigDedicated-NB-r13,
   lateNonCriticalExtension
                                         OCTET STRING
                                                                           OPTIONAL,
   nonCriticalExtension
                                         SEQUENCE {}
                                                                           OPTIONAL
-- ASN1STOP
```

RRCConnectionSetupComplete-NB

The *RRCConnectionSetupComplete-NB* message is used to confirm the successful completion of an RRC connection establishment.

Signalling radio bearer: SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionSetupComplete-NB message

```
-- ASN1START

RRCConnectionSetupComplete-NB ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions CHOICE {
        rrcConnectionSetupComplete-r13 CriticalExtensionsFuture SEQUENCE {}
    }
}
```

```
RRCConnectionSetupComplete-NB-r13-IEs ::= SEQUENCE {
    selectedPLMN-Identity-r13
                                                 INTEGER (1..maxPLMN-r11),
                                                  S-TMSI
    s-TMSI-r13
                                                                                        OPTIONAL,
    registeredMME-r13
                                                  RegisteredMME
                                                                                        OPTIONAL,
    dedicatedInfoNAS-r13 DedicatedInfoNAS, attachWithoutPDN-Connectivity-r13 ENUMERATED {true} up-CIoT-EPS-Optimisation-r13 ENUMERATED {true} lateNonCriticalExtension OCTET STRING
                                                                                       OPTIONAL,
                                                                                        OPTIONAL,
                                                                                       OPTIONAL
    nonCriticalExtension
                                                  RRCConnectionSetupComplete-NB-v1430-IEs OPTIONAL
}
RRCConnectionSetupComplete-NB-v1430-IEs ::= SEQUENCE {
    gummei-Type-r14
                                                        ENUMERATED { mapped} OPTIONAL,
    dcn-ID-r14
                                                        INTEGER (0..65535) OPTIONAL,
    nonCriticalExtension
                                                       SEQUENCE {}
                                                                                        OPTIONAL
-- ASN1STOP
```

RRCConnectionSetupComplete-NB field descriptions

attachWithoutPDN-Connectivity

This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers, TS 24.301 [35].

dcn-ID

The Dedicated Core Network Identity, see TS 23.401 [41].

gummei-Type

This field is used to indicate that the GUMMEI included is mapped (from 2G/3G identifiers) as indicated by the upper layers, TS 24.301 [35].

registeredMME

This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers.

selectedPLMN-Identity

Index of the PLMN selected by the UE from the *plmn-IdentityList* included in *SystemInformationBlockType1-NB*. 1 if the 1st PLMN is selected from the *plmn-IdentityList* included in SIB1, 2 if the 2nd PLMN is selected from the *plmn-IdentityList* included in SIB1 and so on.

up-CloT-EPS-Optimisation

This field is included when the UE supports S1-U data transfer or the User plane CloT EPS Optimisation, as indicated by the upper layers, see TS 24.301 [35].

SCPTMConfiguration-NB

The SCPTMConfiguration-NB message contains the control information applicable for MBMS services transmitted via SC-MRB.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: SC-MCCH
Direction: E-UTRAN to UE

SCPTMConfiguration-NB message

SCPTMConfiguration-NB field descriptions

sc-mtch-InfoList

Provides the configuration of each SC-MTCH in the current cell.

scptm-NeighbourCellList

List of neighbour cells providing MBMS services via SC-MRB. When absent, the UE shall assume that MBMS services listed in the SCPTMConfiguration-NB message are not provided via SC-MRB in any neighbour cell.

SystemInformation-NB

The *SystemInformation-NB* message is used to convey one or more System Information Blocks. All the SIBs included are transmitted with the same periodicity.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

SystemInformation-NB message

```
-- ASN1START
SystemInformation-NB ::=
                                SEQUENCE {
   criticalExtensions
                                        CHOICE {
       systemInformation-r13
                                            SystemInformation-NB-r13-IEs,
                                            SEQUENCE { }
       criticalExtensionsFuture
SystemInformation-NB-r13-IEs ::=
                                   SEQUENCE {
   sib-TypeAndInfo-r13
                                        SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
                                            SystemInformationBlockType2-NB-r13,
        sih2-r13
       sib3-r13
                                            SystemInformationBlockType3-NB-r13,
       sib4-r13
                                            SystemInformationBlockType4-NB-r13,
        sib5-r13
                                            SystemInformationBlockType5-NB-r13,
       sib14-r13
                                            SystemInformationBlockType14-NB-r13,
        sib16-r13
                                            SystemInformationBlockType16-NB-r13,
       sib15-v1430
                                            SystemInformationBlockType15-NB-r14,
       sib20-v1430
                                            SystemInformationBlockType20-NB-r14,
       sib22-v1430
                                            SystemInformationBlockType22-NB-r14
   lateNonCriticalExtension
                                        OCTET STRING
   nonCriticalExtension
                                        SEQUENCE {}
                                                                             OPTIONAL
-- ASN1STOP
```

SystemInformationBlockType1-NB

The *SystemInformationBlockType1-NB* message contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

SystemInformationBlockType1-NB message

```
-- ASN1START

SystemInformationBlockType1-NB ::= SEQUENCE {
  hyperSFN-MSB-r13 BIT STRING (SIZE (8)),
```

```
cellAccessRelatedInfo-r13
                                       SEQUENCE {
                                           PLMN-IdentityList-NB-r13,
       plmn-IdentityList-r13
        trackingAreaCode-r13
                                           TrackingAreaCode,
                                           CellIdentity,
        cellIdentity-r13
        cellBarred-r13
                                           ENUMERATED {barred, notBarred},
       intraFreqReselection-r13
                                           ENUMERATED {allowed, notAllowed}
    cellSelectionInfo-r13
                                     SEQUENCE {
                                           Q-RxLevMin,
       q-RxLevMin-r13
       q-QualMin-r13
                                           Q-QualMin-r9
    },
    p-Max-r13
                                       P-Max
                                                               OPTIONAL, -- Need OP
    freqBandIndicator-r13
                                       FreqBandIndicator-NB-r13,
    freqBandInfo-r13
                                       NS-PmaxList-NB-r13
                                                                      OPTIONAL,
                                                                                   -- Need OR
    multiBandInfoList-r13
    downlinkBitmap-r13 DL-Bitmap-NB-r13 OPTIONAL, eutraControlRegionSize-r13 ENUMERATED {n1, n2, n3} OPTIONAL, nrs-CRS-PowerOffset-r13 ENUMERATED {dR-6 dR dd-122 }
                                       MultiBandInfoList-NB-r13
                                                                       OPTIONAL,
                                                                                   -- Need OR
                                                                                   -- Need OP,
   downlinkBitmap-r13
                                                                                  -- Cond inband
                                                    dB-1dot77, dB0, dB1,
                                                    dB1dot23, dB2, dB3, dB4, dB4dot23, dB5,
                                                    dB4,
                                                         dB7,
                                                    dB6,
                                                                         dB8,
                                                    dB9}
                                                               OPTIONAL, -- Cond inband-SamePCI
    schedulingInfoList-r13
                                       SchedulingInfoList-NB-r13,
                                     ENUMERATED {ms160, ms320, ms480, ms640, ms960, ms1280, ms1600, spare1},
INTEGER (1..15) OPTIONAL, -- Need OP
SystemInfoValueTagList NB m12
    si-WindowLength-r13
    si-RadioFrameOffset-r13
    systemInfoValueTagList-r13
                                       SystemInfoValueTagList-NB-r13
                                                                                   -- Need OR
   lateNonCriticalExtension
                                       OCTET STRING
                                                                       OPTIONAL,
   nonCriticalExtension
                                       SystemInformationBlockType1-NB-v1350 OPTIONAL
}
SystemInformationBlockType1-NB-v1350 ::= SEQUENCE {
    cellSelectionInfo-v1350
                                      CellSelectionInfo-NB-v1350 OPTIONAL, -- Cond Qrxlevmin
   nonCriticalExtension
                                       SystemInformationBlockType1-NB-v1430 OPTIONAL
SystemInformationBlockType1-NB-v1430 ::= SEQUENCE {
    cellSelectionInfo-v1430
                                       CellSelectionInfo-NB-v1430 OPTIONAL,
                                                                                   -- Need OR
    nonCriticalExtension
                                       SEQUENCE {}
                                                                       OPTIONAL
PLMN-IdentityList-NB-r13 ::=
                                  SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo-NB-r13
PLMN-IdentityInfo-NB-r13 ::= SEQUENCE {
    cellReservedForOperatorUse-r13 PLMN-Identity,
   plmn-Identity-r13
                                           ENUMERATED {reserved, notReserved},
    attachWithoutPDN-Connectivity-r13
                                          ENUMERATED {true} OPTIONAL -- Need OP
SchedulingInfoList-NB-r13 ::= SEQUENCE (SIZE (1..maxSI-Message-NB-r13)) OF SchedulingInfo-NB-r13
SchedulingInfo-NB-r13::=
                              SEOUENCE {
                               ENUMERATED {rf64, rf128, rf256, rf512,
    si-Periodicity-r13
                                               rf1024, rf2048, rf4096, spare},
    si-RepetitionPattern-r13
                                   ENUMERATED {every2ndRF, every4thRF, every8thRF, every16thRF},
    sib-MappingInfo-r13
                                   SIB-MappingInfo-NB-r13,
    si-TB-r13
                                   ENUMERATED {b56, b120, b208, b256, b328, b440, b552, b680}
SystemInfoValueTagList-NB-r13 ::= SEQUENCE (SIZE (1.. maxSI-Message-NB-r13)) OF
                                       SystemInfoValueTagSI-r13
                                   SEQUENCE (SIZE (0..maxSIB-1)) OF SIB-Type-NB-r13
SIB-MappingInfo-NB-r13 ::=
SIB-Type-NB-r13 ::=
                                   ENUMERATED {
                                        sibType3-NB-r13, sibType4-NB-r13, sibType5-NB-r13,
                                        sibType14-NB-r13, sibType16-NB-r13, sibType15-NB-r14,
                                       sibType20-NB-r14, sibType22-NB-r14}
CellSelectionInfo-NB-v1350 ::=
                                   SEQUENCE {
                                       INTEGER (-8..-1)
   delta-RxLevMin-v1350
CellSelectionInfo-NB-v1430 ::=
                                   SEQUENCE {
   powerClass14dBm-Offset-r14
                                     ENUMERATED {dB-6, dB-3, dB3, dB6, dB9, dB12} OPTIONAL, --
   Need OP
```

```
ce-authorisationOffset-r14 ENUMERATED {dB5, dB10, dB15, dB20, dB25, dB30, dB35}
OPTIONAL -- Need OP
}
-- ASN1STOP
```

SystemInformationBlockType1-NB field descriptions

attachWithoutPDN-Connectivity

If present, the field indicates that attach without PDN connectivity as specified in TS 24.301 [35] is supported for this PLMN.

ce-authorisationOffset

Parameter "Qoffset_{authorization}" in TS 36.304 [4]. Value in dB. Value dB5 corresponds to 5 dB, dB10 corresponds to 10 dB and so on.

If the field is absent, the value of 0 dB shall be used for "Qoffset_{authorization}".

cellBarred

Barred means the cell is barred, as defined in TS 36.304 [4].

cellIdentity

Indicates the cell identity.

cellReservedForOperatorUse

As defined in TS 36.304 [4].

cellSelectionInfo

Cell selection information as specified in TS 36.304 [4].

downlinkBitmap

NB-IoT downlink subframe configuration for downlink transmission. If the bitmap is not present, the UE shall assume that all subframes are valid (except for subframes carrying NPSS/NSSS/NPBCH/SIB1-NB) as specified in TS 36.213 [23, 16.4].

eutraControlRegionSize

Indicates the control region size of the E-UTRA cell for the in-band operation mode, see TS 36.213 [23]. Unit is in number of OFDM symbols.

freqBandInfo

A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, 6.2.4F] for the frequency band in freqBandIndicator.

hyperSFN-MSE

Indicates the 8 most significant bits of hyper-SFN. Together with hyperSFN-LSB in MIB-NB, the complete hyper-SFN is built up. hyper-SFN is incremented by one when the SFN wraps around.

intraFreqReselection

Used to control cell reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 36.304 [4].

multiBandInfoList

A list of additional frequency band indicators, *additionalPmax* and *additionalSpectrumEmission* values, as defined in TS 36.101 [42, table 5.5-1]. If the UE supports the frequency band in the *freqBandIndicator* IE it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the *multiBandInfoList* IE.

nrs-CRS-PowerOffset

NRS power offset between NRS and E-UTRA CRS, see TS 36.213 [23, 16.2.2]. Unit in dB. Default value of 0.

plmn-IdentityList

List of PLMN identities. The first listed PLMN-Identity is the primary PLMN.

powerClass14dBm-Offset

Parameter "Poffset" in TS 36.304 [4]. Only applicable for UE supporting *powerClassNB-14dBm*. Value in dB. Value dB-6 corresponds to -6 dB, dB-3 corresponds to -3 dB and so on. If the fied is absent, the UE applies the (default) value of 0 dB for "Poffset" in TS 36.304 [4].

р-Мах

Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability.

q-QualMin

Parameter "Q_{qualmin}" in TS 36.304 [4].

q-RxLevMin, delta-RxLevMin

Parameter $Q_{rxlevmin}$ in TS 36.304 [4]. If delta-RxLevMin is not included, actual value $Q_{rxlevmin} = q$ -RxLevMin * 2 [dBm]. If delta-RxLevMin is included, actual value $Q_{rxlevmin} = (q$ -RxLevMin) * 2 [dBm].

schedulingInfoList

Indicates additional scheduling information of SI messages.

si-Periodicity

Periodicity of the SI-message in radio frames, such that rf256 denotes 256 radio frames, rf512 denotes 512 radio frames, and so on.

si-RadioFrameOffset

Offset in number of radio frames to calculate the start of the SI window.

If the field is absent, no offset is applied.

si-RepetitionPattern

Indicates the starting radio frames within the SI window used for SI message transmission. Value every2ndRF corresponds to every 2 radio frames, value every4thRF corresponds to every 4 radio frames and so on. The first transmission of the SI message is transmitted from the first radio frame of the SI window.

SystemInformationBlockType1-NB field descriptions

si-TE

This field indicates the transport block size in number of bits and the corresponding number of consecutive NB-IoT downlink subframes that are used to broadcast the SI message. Value b56 corresponds to 56 bits, b120 corresponds to 120 bits and so on. TBS of 56 bits and 120 bits are transmitted over 2 sub-frames, other TBS are transmitted over 8 sub-frames, see TS 36.213 [23, Table 16.4.1.5.1-1].

si-WindowLength

Common SI scheduling window for all SIs. Unit in milliseconds, where ms160 denotes 160 milliseconds, ms320 denotes 320 milliseconds and so on.

sib-MappingInfo

List of the SIBs mapped to this *SystemInformation* message. There is no mapping information of SIB2-NB; it is always present in the first *SystemInformation* message listed in the *schedulingInfoList* list.

systemInfoValueTagList

Indicates SI message specific value tags. It includes the same number of entries, and listed in the same order, as in SchedulingInfoList.

systemInfoValueTagSI

SI message specific value tag as specified in Clause 5.2.1.3. Common for all SIBs within the SI message other than SIB14-NB.

trackingAreaCode

A trackingAreaCode that is common for all the PLMNs listed.

Conditional presence	Explanation
inband	The field is mandatory present if IE operationModeInfo in MIB-NB is set to inband-
	SamePCI or inband-DifferentPCI. Otherwise the field is not present.
inband-SamePCI	The field is mandatory present, if IE operationModeInfo in MIB-NB is set to inband-
	SamePCI. Otherwise the field is not present.
Qrxlevmin	This field is optionally present, Need OR, if <i>q-RxLevMin</i> is set to the minimum value.
	Otherwise the field is not present.

UECapabilityEnquiry-NB

The UECapabilityEnquiry-NB message is used to request the transfer of UE radio access capabilities for NB-IoT.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

UECapabilityEnquiry-NB message

```
-- ASN1START
UECapabilityEnquiry-NB ::= SEQUENCE {
    rrc-TransactionIdentifier
                                       RRC-TransactionIdentifier,
    criticalExtensions
                                       CHOICE {
        c1
                                           CHOICE {
           ueCapabilityEnquiry-r13
                                               UECapabilityEnquiry-NB-r13-IEs,
           spare1
        criticalExtensionsFuture
                                           SEQUENCE { }
UECapabilityEnquiry-NB-r13-IEs ::= SEQUENCE {
    lateNonCriticalExtension
                                                                          OPTIONAL.
                                      OCTET STRING
    nonCriticalExtension
                                       SEQUENCE {}
                                                                           OPTIONAL
-- ASN1STOP
```

UECapabilityInformation-NB

The *UECapabilityInformation-NB* message is used to transfer of UE radio access capabilities requested by the E-UTRAN.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

UECapabilityInformation-NB message

```
-- ASN1START
UECapabilityInformation-NB ::= SEQUENCE {
                                      RRC-TransactionIdentifier,
   rrc-TransactionIdentifier
   criticalExtensions
                                       CHOICE {
           ueCapabilityInformation-r13
                                          UECapabilityInformation-NB-r13-IEs,
                                          SEQUENCE {}
           criticalExtensionsFuture
UECapabilityInformation-NB-r13-IEs ::= SEQUENCE {
   ue-Capability-Container-r13 UE-Capability-NB-r13,
   ue-RadioPagingInfo-r13
                                          UE-RadioPagingInfo-NB-r13,
   lateNonCriticalExtension
                                          OCTET STRING
                                                                              OPTIONAL,
   nonCriticalExtension
                                          SEQUENCE {}
                                                                              OPTIONAL
-- ASN1STOP
```

UECapabilityInformation-NB field descriptions

ue-RadioPagingInfo

This field contains UE capability information used for paging.

ULInformationTransfer-NB

The ULInformationTransfer-NB message is used for the uplink transfer of NAS information.

Signalling radio bearer: SRB1 or SRB1bis

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

ULInformationTransfer-NB message

```
-- ASN1START
ULInformationTransfer-NB ::=
                                SEQUENCE {
   criticalExtensions
                                       CHOICE {
           ulInformationTransfer-r13
                                           ULInformationTransfer-NB-r13-IEs,
                                            SEQUENCE {}
           criticalExtensionsFuture
ULInformationTransfer-NB-r13-IEs ::=
                                       SEQUENCE {
   dedicatedInfoNAS-r13
                                           DedicatedInfoNAS,
    lateNonCriticalExtension
                                            OCTET STRING
                                                                            OPTIONAL,
   nonCriticalExtension
                                            SEQUENCE {}
                                                                            OPTIONAL
-- ASN1STOP
```

6.7.3 NB-IoT information elements

6.7.3.1 NB-IoT System information blocks

SystemInformationBlockType2-NB

The IE *SystemInformationBlockType2-NB* contains radio resource configuration information that is common for all UEs

NOTE: UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

SystemInformationBlockType2-NB information element

```
-- ASN1START
SystemInformationBlockType2-NB-r13 ::= SEQUENCE {
    radioResourceConfigCommon-r13
                                           RadioResourceConfigCommonSIB-NB-r13,
    ue-TimersAndConstants-r13
                                           UE-TimersAndConstants-NB-r13,
    freqInfo-r13
                                           SEQUENCE {
        ul-CarrierFreq-r13
                                               CarrierFreq-NB-r13
                                                                           OPTIONAL,
                                                                                       -- Need OP
        additionalSpectrumEmission-r13
                                               AdditionalSpectrumEmission
    timeAlignmentTimerCommon-r13
                                           TimeAlignmentTimer,
    multiBandInfoList-r13 SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission
    OPTIONAL,
                -- Need OR
    lateNonCriticalExtension
                                           OCTET STRING
                                                                           OPTIONAL,
      cp-Reestablishment-r14
                                           ENUMERATED {true}
                                                                           OPTIONAL
                                                                                           -- Need
OP
    ]]
-- ASN1STOP
```

SystemInformationBlockType2-NB field descriptions

additionalSpectrumEmission

The UE requirements related to IE Additional Spectrum Emission are defined in TS 36.101 [42, 6.2.4F].

cp-Reestablishment

This field indicates if the NB-IoT UE is allowed to trigger RRC connection re-establishment when AS security has not been activated.

multiBandInfoList

A list of *additionalSpectrumEmission* i.e. one for each additional frequency band included in *multiBandInfoList* in *SystemInformationBlockType1-NB*, listed in the same order.

ul-CarrierFreq

Uplink carrier frequency as defined in TS 36.101 [42, 5.7.3F]. If *operationModeInfo* in the MIB-NB is set to *standalone* and the field is absent, the value of the carrier frequency is determined by the TX-RX frequency separation defined in TS 36.101 [42, table 5.7.4-1] and the value of the carrier frequency offset is 0. If *operationModeInfo* in the MIB-NB is not set to *standalone*, the field is mandatory present.

SystemInformationBlockType3-NB

The IE *SystemInformationBlockType3-NB* contains cell re-selection information common for intra-frequency, and interfrequency cell re-selection as well as intra-frequency cell re-selection information other than neighbouring cell related.

SystemInformationBlockType3-NB information element

```
s-NonIntraSearch-r13
                                           ReselectionThreshold
   intraFreqCellReselectionInfo-r13
                                      SEQUENCE {
       q-RxLevMin-r13
                                           Q-RxLevMin,
                                            Q-QualMin-r9
       q-QualMin-r13
                                                                OPTIONAL, -- Need OP
       p-Max-r13
                                           P-Max
                                                                 OPTIONAL,
                                                                           -- Need OP
       s-IntraSearchP-r13
                                           ReselectionThreshold,
                                           T-Reselection-NB-r13
       t-Reselection-r13
   freqBandInfo-r13
                                        NS-PmaxList-NB-r13
                                                                     OPTIONAL, -- Need OR
   multiBandInfoList-r13
                                        SEQUENCE (SIZE (1..maxMultiBands)) OF
                                           NS-PmaxList-NB-r13
                                                                     OPTIONAL,
                                                                                -- Need OR
   lateNonCriticalExtension
                                            OCTET STRING
                                                                     OPTIONAL,
   [[ intraFreqCellReselectionInfo-v1350 IntraFreqCellReselectionInfo-NB-v1350 OPTIONAL -- Cond
Orxlevmin
    ]],
   [[ intraFreqCellReselectionInfo-v1360 IntraFreqCellReselectionInfo-NB-v1360 OPTIONAL -- Need
OR
   11,
   [[ intraFreqCellReselectionInfo-v1430 IntraFreqCellReselectionInfo-NB-v1430 OPTIONAL -- Need
OR
   ]]
}
IntraFreqCellReselectionInfo-NB-v1350 ::= SEQUENCE {
   delta-RxLevMin-v1350
                                           INTEGER (-8..-1)
IntraFreqCellReselectionInfo-NB-v1360 ::= SEQUENCE {
   s-IntraSearchP-v1360
                                              ReselectionThreshold-NB-v1360
IntraFreqCellReselectionInfo-NB-v1430 ::= SEQUENCE {
   powerClass14dBm-Offset-r14 ENUMERATED {dB-6, dB-3, dB3, dB6, dB9, dB12}
                                                                            OPTIONAL,
   ce-AuthorisationOffset-r14 ENUMERATED {dB5, dB10, dB15, dB20, dB25, dB30, dB35}
                                                                                   OPTIONAL
   -- Need OP
-- ASN1STOP
```

SystemInformationBlockType3-NB field descriptions

ce-AuthorisationOffset

Parameter "Qoffset_{authorization}" in TS 36.304 [4]. Value in dB. Value dB5 corresponds to 5 dB, dB10 corresponds to 10 dB and so on

If the field is absent, the UE applies the value of ce-authorisationOffset in SystemInformationBlockType1-NB.

multiBandInfoList

A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, 6.2.4F] applicable for the intra-frequency neighbouring NB-IoT cells if the UE selects the frequency band from freqBandIndicator in SystemInformationBlockType1-NB.

powerClass14dBm-Offset

Parameter "Poffset" in TS 36.304 [4], only applicable for UE supporting powerClassNB-14dBm. Value in dB. Value dB-6 corresponds to -6 dB, dB-3 corresponds to -3 dB and so on. If the field is absent, the UE applies the (default) value of 0 dB for "Poffset" in TS 36.304 [4].

p-Max

Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability.

q-Hyst

Parameter Qhyst in TS 36.304 [4], Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.

q-QualMin

Parameter "Qqualmin" in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin.

q-RxLevMin, delta-RxLevMin

Parameter "Q_{rxlevmin}" in TS 36.304 [4], applicable for intra-frequency neighbour cells. If delta-RxLevMin is not included, actual value $Q_{rxlevmin} = q - RxLevMin * 2 [dBm]$. If delta-RxLevMin is included, actual value $Q_{rxlevmin} = (q - RxLevMin + q)$ delta-RxLevMin) * 2 [dBm]

s-IntraSearchP

Parameter "SintraSearchP" in TS 36.304 [4].

In case s-IntraSearchP-v1360 is included, the UE shall ignore s-IntraSearchP (i.e. without suffix).

s-NonIntraSearch

intraFreqBlackCellList

intraFreqNeighCellList

Parameter "SnonIntraSearchP" in TS 36.304 [4].

t-Reselection

Parameter "Treselection_{NB-loT_Intra}" in TS 36.304 [4].

Conditional presence	Explanation
Qrxlevmin	This field is optionally present, Need OR, if <i>q-RxLevMin</i> is set to the minimum value.
	Otherwise the field is not present.

SystemInformationBlockType4-NB

The IE SystemInformationBlockType4-NB contains neighbouring cell related information relevant only for intrafrequency cell re-selection. The IE includes cells with specific re-selection parameters.

SystemInformationBlockType4-NB information element

```
-- ASN1START
SystemInformationBlockType4-NB-r13 ::=
                                         SEQUENCE {
   intraFreqNeighCellList-r13
                                     IntraFreqNeighCellList OPTIONAL,
                                                                         -- Need OR
   intraFreqBlackCellList-r13
                                      IntraFreqBlackCellList OPTIONAL,
   lateNonCriticalExtension
                                                             OPTIONAL,
                                      OCTET STRING
-- ASN1STOP
```

SystemInformationBlockType4-NB field descriptions List of blacklisted intra-frequency neighbouring cells

List of intra-frequency neighbouring cells with specific cell re-selection parameters.

SystemInformationBlockType5-NB

The IE *SystemInformationBlockType5-NB* contains information relevant only for inter-frequency cell re-selection i.e. information about other NB-IoT frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

SystemInformationBlockType5-NB information element

```
-- ASN1START
SystemInformationBlockType5-NB-r13 ::= SEQUENCE {
    interFreqCarrierFreqList-r13
t-Reselection-r13
                                             InterFreqCarrierFreqList-NB-r13,
                                               T-Reselection-NB-r13,
    lateNonCriticalExtension
                                              OCTET STRING
                                                                                 OPTIONAL,
    [[ scptm-FreqOffset-r14
                                              INTEGER (1..8)
                                                                                 OPTIONAL -- Need OP
    11
InterFreqCarrierFreqList-NB-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-NB-
InterFreqCarrierFreqInfo-NB-r13 ::= SEQUENCE {
    dl-CarrierFreq-r13
                                          CarrierFreq-NB-r13,
    q-RxLevMin-r13
                                          Q-RxLevMin,
    q-QualMin-r13
                                          Q-QualMin-r9
                                                                            OPTIONAL,
                                                                                              -- Need OP
                                                                   OPTIONAL,
    p-Max-r13
                                          P-Max
                                                                                              -- Need OP
    q-UIISetFreq-r13 Q-OffsetRange DEFAULT dB0, interFreqNeighCellList-r13 InterFreqNeighCellList-NB-r13 OPTIONAL, interFreqBlackCellList-r13 InterFreqBlackCellList-NB-r13 OPTIONAL, multiBandInfoList-r13 MultiBandInfoList NB-r13 OPTIONAL,
                                                                                              -- Need OR
                                                                                              -- Need OR
    multiBandInfoList-r13
                                          MultiBandInfoList-NB-r13 OPTIONAL,
                                                                                              -- Need OR
    [[ delta-RxLevMin-v1350
                                         INTEGER (-8..-1)
                                                                  OPTIONAL -- Cond Qrxlevmin
    [[ powerClass14dBm-Offset-r14 ENUMERATED {dB-6, dB-3, dB3, dB6, dB9, dB12}
OPTIONAL, -- Need OP
       ce-AuthorisationOffset-r14
                                          ENUMERATED {dB5, dB10, dB15, dB20, dB25, dB30, dB35}
    OPTIONAL -- Need OP
    ]]
InterFreqNeighCellList-NB-r13 ::=
                                          SEQUENCE (SIZE (1..maxCellInter)) OF PhysCellId
InterFreqBlackCellList-NB-r13 ::=
                                          SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellId
-- ASN1STOP
```

SystemInformationBlockType5-NB field descriptions

ce-AuthorisationOffset

Parameter "Qoffset_{authorization}" in TS 36.304 [4]. Value in dB. Value dB5 corresponds to 5 dB, dB10 corresponds to 10 dB and so on. If the field is absent, the UE applies the value of ce-*authorisationOffset* in *SystemInformationBlockType1-NB*.

p-Max

Value applicable for the neighbouring NB-IoT cells on this carrier frequency. If absent the UE applies the maximum power according to the UE capability.

interFreqBlackCellList

List of blacklisted inter-frequency neighbouring cells.

interFreqCarrierFreqList

List of neighbouring inter-frequencies. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this.

interFreqNeighCellList

List of inter-frequency neighbouring cells.

multiBandInfoList

Indicates the list of frequency bands, with the associated *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 36.101 [42, 6.2.4], in addition to the band represented by dl-CarrierFreq for which cell reselection parameters are common.

powerClass14dBm-Offset

Parameter "Poffset" in TS 36.304 [4], only applicable for UE supporting *powerClassNB-14dBm*. Value in dB. Value dB-6 corresponds to -6 dB, dB-3 corresponds to -3 dB and so on. If the field is absent, the UE applies the (default) value of 0 dB for "Poffset" in TS 36.304 [4]

q-OffsetFreq

Parameter "Qoffsetfrequency" in TS 36.304 [4].

g-QualMir

Parameter "Q_{qualmin}" in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for O_{qualmin}.

q-RxlevMin, delta-RxLevMin

Parameter " $Q_{RxLevmin}$ " in TS 36.304 [4]. If delta-RxLevMin is not included, actual value $Q_{rxlevmin} = q$ -RxLevMin * 2 [dBm]. If delta-RxLevMin is included, actual value $Q_{rxlevmin} = (q$ -RxLevMin) * 2 [dBm].

scptm-FregOffset

Parameter Qoffsetscptm in TS 36.304 [4]. Actual value Qoffsetscptm = field value * 2 [dB].

If the field is absent, the UE uses infinite dBs for the SC-PTM frequency offset with cell ranking as specified in TS 36.304 [4].

t-Reselection

Parameter "Treselection_{NB-loT_Inter}" in TS 36.304 [4].

Conditional presence	Explanation
Qrxlevmin	This field is optionally present, Need OR, if <i>q-RxLevMin</i> is set to the minimum value.
	Otherwise the field is not present.

SystemInformationBlockType14-NB

The IE SystemInformationBlockType14-NB contains the AB parameters.

SystemInformationBlockType14-NB information element

```
-- ASN1START
SystemInformationBlockType14-NB-r13 ::= SEQUENCE {
                    CHOICE {
   ab-Param-r13
       ab-Common-r13
                                    AB-Config-NB-r13,
                                    SEQUENCE (SIZE (1..maxPLMN-r11)) OF AB-ConfigPLMN-NB-r13
       ab-PerPLMN-List-r13
                                                           OPTIONAL, -- Need OR
   lateNonCriticalExtension
                                OCTET STRING
                                                           OPTIONAL,
AB-ConfigPLMN-NB-r13 ::= SEQUENCE {
   ab-Config-r13
                                AB-Config-NB-r13
                                                          OPTIONAL -- Need OR
AB-Config-NB-r13 ::=
                         SEQUENCE {
                                 ENUMERATED {a, b, c},
   ab-BarringBitmap-r13
   ab-Category-r13
                                 BIT STRING (SIZE(10)),
                                                           OPTIONAL, -- Need OP
   ab-BarringForExceptionData-r13 ENUMERATED {true}
```

```
ab-BarringForSpecialAC-r13 BIT STRING (SIZE(5))
}
-- ASN1STOP
```

SystemInformationBlockType14-NB field descriptions

ab-BarringBitmap

Access class barring for AC 0-9. The first/ leftmost bit is for AC 0, the second bit is for AC 1, and so on.

ab-BarringForExceptionData

Indicates whether ExceptionData is subject to access barring.

ab-BarringForSpecialAC

Access class barring for AC 11-15. The first/ leftmost bit is for AC 11, the second bit is for AC 12, and so on.

ab-Category

Indicates the category of UEs for which AB applies. Value *a* corresponds to all UEs, value *b* corresponds to the UEs that are neither in their HPLMN nor in a PLMN that is equivalent to it, and value *c* corresponds to the UEs that are neither in the PLMN listed as most preferred PLMN of the country where the UEs are roaming in the operator-defined PLMN selector list on the USIM, nor in their HPLMN nor in a PLMN that is equivalent to their HPLMN, see TS 22.011 [10].

ab-Common

The AB parameters applicable for all PLMN(s).

ab-PerPLMN-List

The AB parameters per PLMN, listed in the same order as the PLMN(s) occur in *plmn-IdentityList* in *SystemInformationBlockType1-NB*.

SystemInformationBlockType15-NB

The IE *SystemInformationBlockType15-NB* contains the MBMS Service Area Identities (SAI) of the current and/ or neighbouring carrier frequencies.

SystemInformationBlockType15-NB information element

```
-- ASN1START
{\tt SystemInformationBlockType15-NB-r14 ::= SEQUENCE } \{
                              MBMS-SAI-List-r11
                                                                           OPTIONAL,
                                                                                      -- Need OR
    mbms-SAI-IntraFreq-r14
                                           MBMS-SAI-InterFreqList-NB-r14
    mbms-SAI-InterFreqList-r14
                                                                           OPTIONAL,
    lateNonCriticalExtension
                                           OCTET STRING
                                                                           OPTIONAL.
MBMS-SAI-InterFreqList-NB-r14 ::=
                                      SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-NB-r14
MBMS-SAI-InterFreq-NB-r14 ::=
                                       SEQUENCE {
    dl-CarrierFreq-r14
                                           CarrierFreq-NB-r13,
    mbms-SAI-List-r14
                                           MBMS-SAI-List-r11,
   multiBandInfoList-r14
                                           AdditionalBandInfoList-NB-r14 OPTIONAL
                                                                                       -- Need OR
}
-- ASN1STOP
```

SystemInformationBlockType15-NB field descriptions

mbms-SAI-InterFreqList

Contains a list of neighboring frequencies including additional frequency bands, if any, that provide MBMS services and the corresponding MBMS SAIs.

mbms-SAI-IntraFreq

Contains the list of MBMS SAIs for the current frequency. A duplicate MBMS SAI indicates that this and all following SAIs are not offered by this cell but only by neighbour cells on the current frequency. For MBMS service continuity, the UE shall use all MBMS SAIs listed in *mbms-SAI-IntraFreq* to derive the MBMS frequencies of interest.

mbms-SAI-List

Contains a list of MBMS SAIs for a specific frequency.

multiBandInfoList

A list of additional frequency bands applicable for the cells participating in the SC-PTM transmission.

SystemInformationBlockType16-NB

The IE *SystemInformationBlockType16-NB* contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

```
-- ASN1START

SystemInformationBlockType16-NB-r13 ::= SystemInformationBlockType16-r11

-- ASN1STOP
```

SystemInformationBlockType20-NB

The IE *SystemInformationBlockType20-NB* contains the information required to acquire the control information associated with transmission of MBMS using SC-PTM.

SystemInformationBlockType20-NB information element

```
-- ASN1START
SystemInformationBlockType20-NB-r14 ::= SEQUENCE {
    npdcch-SC-MCCH-Config-r14
                                           NPDCCH-SC-MCCH-Config-NB-r14,
    sc-mcch-CarrierConfig-r14
                                            CHOICE {
        dl-CarrierConfig-r14
                                                DL-CarrierConfigCommon-NB-r14,
       dl-CarrierIndex-r14
                                                INTEGER (0.. maxNonAnchorCarriers-NB-r14)
    sc-mcch-RepetitionPeriod-r14
                                           ENUMERATED {rf32, rf128, rf512, rf1024,
                                                        rf2048, rf4096, rf8192, rf16384},
    sc-mcch-Offset-r14
                                            INTEGER (0..10),
    sc-mcch-ModificationPeriod-r14
                                            ENUMERATED { rf32, rf128, rf256, rf512, rf1024,
                                                    rf2048, rf4096, rf8192, rf16384, rf32768,
                                                    rf65536, rf131072, rf262144, rf524288,
                                                    rf1048576, spare1},
                                            SC-MCCH-SchedulingInfo-NB-r14
    sc-mcch-SchedulingInfo-r14
                                                                                OPTIONAL.
                                                                                           -- Need
OP
    lateNonCriticalExtension
                                            OCTET STRING
                                                                                OPTIONAL,
}
NPDCCH-SC-MCCH-Config-NB-r14 ::=
                                    SEQUENCE {
   npdcch-NumRepetitions-SC-MCCH-r14 ENUMERATED {r1, r2, r4, r8, r16,
                                                        r32, r64, r128, r256,
                                                        r512, r1024, r2048},
   npdcch-StartSF-SC-MCCH-r14
                                            ENUMERATED {v1dot5, v2, v4, v8,
                                                        v16, v32, v48, v64},
   npdcch-Offset-SC-MCCH-r14
                                            ENUMERATED {zero, oneEighth, oneQuarter,
                                                        threeEighth, oneHalf, fiveEighth,
                                                        threeQuarter, sevenEighth}
SC-MCCH-SchedulingInfo-NB-r14::=
                                    SEOUENCE
                                                ENUMERATED {
    onDurationTimerSCPTM-r14
                                                    pp1, pp2, pp3, pp4,
                                                    pp8, pp16, pp32, spare},
    drx-InactivityTimerSCPTM-r14
                                                ENUMERATED {
                                                    pp0, pp1, pp2, pp3,
                                                    pp4, pp8, pp16, pp32},
    schedulingPeriodStartOffsetSCPTM-r14
                                                CHOICE {
        sf10
                                                    INTEGER(0..9),
        sf20
                                                    INTEGER(0..19),
        sf32
                                                    INTEGER (0..31),
        sf40
                                                    INTEGER(0..39),
                                                    INTEGER(0..63),
        sf64
                                                    INTEGER(0..79),
        sf80
        sf128
                                                    INTEGER(0..127),
        sf160
                                                    INTEGER(0..159),
        sf256
                                                    INTEGER(0..255),
        sf320
                                                    INTEGER(0..319),
        sf512
                                                    INTEGER(0..511),
        sf640
                                                    INTEGER(0..639),
        sf1024
                                                    INTEGER(0..1023),
        sf2048
                                                    INTEGER(0..2047),
```

SystemInformationBlockType20-NB field descriptions

dl-CarrierConfig

Downlink carrier used for SC-MCCH.

dl-CarrierIndex

Index to a downlink carrier signalled in system information. Value '0' corresponds to the anchor carrier, value '1' corresponds to the first entry in *dl-ConfigList* in *SystemInformationBlockType22-NB*, value '2' corresponds to the second entry in *dl-ConfigList* and so on.

drx-InactivityTimerSCPTM

Timer for SC-MCCH reception in TS 36.321 [6]. Value in number of NPDCCH periods. Value pp1 corresponds to 1 NPDCCH period, pp2 corresponds to 2 NPDCCH periods and so on.

npdcch-NumRepetitions-SC-MCCH

The maximum number of NPDCCH repetitions the UE needs to monitor for SC-MCCH multicast search space, see TS 36.213 [23].

npdcch-Offset-SC-MCCH

Fractional period offset of starting subframe for NPDCCH multicast search space for SC-MCCH, see TS 36.213 [23].

npdcch-StartSF-SC-MCCH

Starting subframes configuration of the NPDCCH multicast search space for SC-MCCH, see TS 36.213 [23].

onDurationTimerSCPTM

Timer for SC-MCCH reception in TS 36.321 [6]. Value in number of NPDCCH periods. Value pp1 corresponds to 1 NPDCCH period, pp2 corresponds to 2 NPDCCH periods and so on.

schedulingPeriodStartOffsetSCPTM

SCPTM-SchedulingCycle and SCPTM-SchedulingOffset in TS 36.321 [6]. The value of SCPTM-SchedulingCycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. The value of SCPTM-SchedulingOffset is in number of sub-frames.

sc-mcch-CarrierConfig

Downlink carrier that is used for SC-MCCH.

sc-mcch-ModificationPeriod

Defines periodically appearing boundaries, i.e. radio frames for which (H-SFN * 1024 +SFN) mod *sc-mcch-ModificationPeriod* = 0. The contents of different transmissions of SC-MCCH information can only be different if there is at least one such boundary in-between them. Value rf32 corresponds to 32 radio frames, value rf128 corresponds to 128 radio frames and so on.

sc-mcch-Offset

Indicates, together with the sc-mcch-RepetitionPeriod, the boundary of the repetition period: (H-SFN * 1024 +SFN) mod *sc-mcch-RepetitionPeriod* = sc-mcch-Offset.

sc-mcch-RepetitionPeriod

Defines the interval between transmissions of SC-MCCH information, in radio frames. Value rf32 corresponds to 32 radio frames, rf128 corresponds to 128 radio frames and so on.

sc-mcch-SchedulingInfo

DRX information for the SC-MCCH. If the field is absent, DRX is not used for SC-MCCH reception.

SystemInformationBlockType22-NB

The IE *SystemInformationBlockType22-NB* contains radio resource configuration for paging and random access procedure on non-anchor carriers.

SystemInformationBlockType22-NB information element

```
-- ASN1START
SystemInformationBlockType22-NB-r14 ::= SEQUENCE {
   dl-ConfigList-r14
                                      DL-ConfigCommonList-NB-r14
                                                                 OPTIONAL,
                                                                            -- Need OR
                                     UL-ConfigCommonList-NB-r14 OPTIONAL, -- Need OR
   ul-ConfigList-r14
                                                                           -- Cond pcch-config
                                     PagingWeight-NB-r14 OPTIONAL,
   pagingWeightAnchor-r14
   nprach-ProbabilityAnchorList-r14
                                     NPRACH-ProbabilityAnchorList-NB-r14 OPTIONAL,
nprach-config
   lateNonCriticalExtension
                                      OCTET STRING
                                                                     OPTIONAL,
}
```

```
DL-ConfigCommonList-NB-r14 ::= SEQUENCE (SIZE (1.. maxNonAnchorCarriers-NB-r14)) OF
                                          DL-ConfigCommon-NB-r14
UL-ConfigCommonList-NB-r14 ::=
                                 SEQUENCE (SIZE (1.. maxNonAnchorCarriers-NB-r14)) OF
                                          UL-ConfigCommon-NB-r14
DL-ConfigCommon-NB-r14 ::=
                                  SEOUENCE {
                                      DL-CarrierConfigCommon-NB-r14,
   dl-CarrierConfig-r14
   pcch-Config-r14
                                      PCCH-Config-NB-r14 OPTIONAL, -- Need OR
PCCH-Config-NB-r14 ::=
                                   SEQUENCE {
   npdcch-NumRepetitionPaging-r14
                                      ENUMERATED {
                                         r1, r2, r4, r8, r16, r32, r64, r128,
                                          r256, r512, r1024, r2048,
                                          spare4, spare3, spare2, spare1} OPTIONAL, -- Need OP
   pagingWeight-r14
                                          PagingWeight-NB-r14 DEFAULT w1,
}
PagingWeight-NB-r14 ::= ENUMERATED {w1, w2, w3, w4, w5, w6, w7, w8,
                                              w9, w10, w11, w12, w13, w14, w15, w16}
UL-ConfigCommon-NB-r14 ::=
                                 SEQUENCE {
   ul-CarrierFreq-r14
                                    CarrierFreq-NB-r13,
   nprach-ParametersList-r14
                                      NPRACH-ParametersList-NB-r14 OPTIONAL, -- Need OR
NPRACH-ParametersList-NB-r14 ::=
                                      SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF
                                          NPRACH-Parameters-NB-r14
NPRACH-Parameters-NB-r14 ::=
                                      SEQUENCE {
   nprach-Parameters-r14
                                          SEQUENCE {
       nprach-Periodicity-r14
                                              ENUMERATED {ms40, ms80, ms160, ms240,
                                                          ms320, ms640, ms1280, ms2560}
                                                 OPTIONAL, -- NEED OP
       nprach-StartTime-r14
                                              ENUMERATED {ms8, ms16, ms32, ms64,
                                                         ms128, ms256, ms512, ms1024}
                                                             -- NEED OP
                                                  OPTIONAL,
                                              ENUMERATED {n0, n12, n24, n36, n2, n18, n34, spare1}
       nprach-SubcarrierOffset-r14
                                                 OPTIONAL,
                                                             -- NEED OP
       nprach-NumSubcarriers-r14
                                              ENUMERATED {n12, n24, n36, n48}
                                                  OPTIONAL, -- NEED OP
       nprach-SubcarrierMSG3-RangeStart-r14
                                              ENUMERATED {zero, oneThird, twoThird, one}
                                                  OPTIONAL, -- NEED OP
                                              ENUMERATED \{r1, r2, r4, r8, r16, r32, r64, r128,
       npdcch-NumRepetitions-RA-r14
                                                         r256, r512, r1024, r2048,
                                                         spare4, spare3, spare2, spare1}
                                                  OPTIONAL, -- NEED OP
       npdcch-StartSF-CSS-RA-r14
                                              ENUMERATED {v1dot5, v2, v4, v8, v16, v32, v48, v64}
                                                  OPTIONAL, -- NEED OP
                                              ENUMERATED {zero, oneEighth, oneFourth, threeEighth}
       npdcch-Offset-RA-r14
                                                 OPTIONAL, -- NEED OP
       nprach-NumCBRA-StartSubcarriers-r14
                                              ENUMERATED {n8, n10, n11, n12, n20, n22, n23, n24,
                                                 n32, n34, n35, n36, n40, n44, n46, n48}
OPTIONAL, -- NEED OP
       npdcch-CarrierIndex-r14
                                              INTEGER (1..maxNonAnchorCarriers-NB-r14)
                                                  OPTIONAL,
                                                             -- Need OP
       OPTIONAL -- Need OR
NPRACH-ProbabilityAnchorList-NB-r14 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF
                                             NPRACH-ProbabilityAnchor-NB-r14
NPRACH-ProbabilityAnchor-NB-r14 ::=
                                      SEOUENCE {
   nprach-ProbabilityAnchor-r14
                                          ENUMERATED {
                                              zero, oneSixteenth, oneFifteenth, oneFourteenth,
                                              oneThirteenth, oneTwelfth, oneEleventh, oneTenth,
                                              oneNinth, oneEighth, oneSeventh, oneSixth,
                                              oneFifth, oneFourth, oneThird, oneHalf}
                                                      OPTIONAL
                                                                -- Need OP
```

-- ASN1STOP

SystemInformationBlockType22-NB field descriptions

dl-CarrierConfig

Provides the configuration of the DL non-anchor carrier.

dl-ConfigList

List of DL non-anchor carriers and associated configuration that can be used for paging and/or random access.

npdcch-CarrierIndex

Index of the carrier in the list of DL non anchor carriers. The first entry in the list has index '1', the second entry has index '2' and so on.

If the field is absent, the DL anchor carrier is used.

npdcch-NumRepetitionPaging

Maximum number of repetitions for NPDCCH common search space (CSS) for paging, see TS 36.213 [23, 16.6]. If the field is absent, the value of npdcch-NumRepetitionPaging configured in SystemInformationBlockType2-NB in IE pcch-Config applies.

npdcch-NumRepetitions-RA

Maximum number of repetitions for NPDCCH common search space (CSS) for RAR, Msg3 retransmission and Msg4, see TS 36.213 [23, 16.6].

If the field is absent, the value of *npdcch-NumRepetitions-RA* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry of *nprach-ParametersList* applies.

npdcch-Offset-RA

Fractional period offset of starting subframe for NPDCCH common search space (CSS Type 2), see TS 36.213 [23, 16.6].

If the field is absent, the value of *npdcch-Offset-RA* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry of *nprach-ParametersList* applies.

npdcch-StartSF-CSS-RA

Starting subframe configuration for NPDCCH common search space (CSS), including RAR, Msg3 retransmission, and Msg4, see TS 36.213 [23, 16.6].

If the field is absent, the value of *npdcch-StartSF-CSS-RA* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry of *nprach-ParametersList* applies.

nprach-NumCBRA-StartSubcarriers

The number of start subcarriers from which a UE can randomly select a start subcarrier as specified in TS 36.321 [6]. The start subcarrier indices that the UE is allowed to randomly select from, are given by:

nprach-SubcarrierOffset + [0, nprach-NumCBRA-StartSubcarriers - 1].

If the field is absent, the value of *nprach-NumCBRA-StartSubcarriers* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry of *nprach-ParametersList* applies.

nprach-NumSubcarriers

Number of sub-carriers in a NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers.

If the field is absent, the value of *nprach-NumSubcarriers* configured in *SystemInformationBlockType2-NB* for the PRACH resource in the corresponding entry of *nprach-ParametersList* applies.

nprach-ParametersList

Configure NPRACH parameters for each NPRACH resource on one non-anchor UL carrier. Up to three NPRACH resources can be configured on one non-anchor UL carrier. Each NPRACH resource is associated with a different number of NPRACH repetitions.

E-UTRAN includes the same number of entries, and listed in the same order, as in *nprach-ParametersList* in *SystemInformationBlockType2-NB*.

nprach-Periodicity

Periodicity of a NPRACH resource, see TS 36.211 [21, 10.1.6]. Unit in millisecond.

If the field is absent, the value of *nprach-Periodicity* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry in *nprach-ParametersList* applies.

nprach-ProbabilityAnchor

Configure the selection probability for the anchor carrier NPRACH resource. Value zero corresponds to a probability of 0, oneSixteenth corresponds to the probability of 1/16, oneFifteenth corresponds to the probability of 1/15, and so on. If the field is absent, the selection probability of the anchor carrier NPRACH resource is 1.

All non-anchor carriers NPRACH resources have equal probability between them. The probability of selecting a non-anchor carrier NPRACH resource is (1- nprach-ProbabilityAnchor).

nprach-ProbabilityAnchorList

Configures the selection probability for each NPRACH resource on the anchor carrier.

E-UTRAN includes the same number of entries, and listed in the same order, as in *nprach-ParametersList* in *SystemInformationBlockType2-NB*.

nprach-StartTime

Start time of the NPRACH resource in one period, see TS 36.211 [21, 10.1.6]. Unit in millisecond.

If the field is absent, the value of *nprach-StartTime* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry of *nprach-ParametersList* applies.

nprach-SubcarrierOffset

Frequency location of the NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers, offset from subcarrier 0.

If the field is absent, the value of *nprach-SubcarrierOffset* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry of *nprach-ParametersList* applies.

nprach-SubcarrierMSG3-RangeStart

Fraction for calculating the starting subcarrier index of the range reserved for indication of UE support for multi-tone Msg3 transmission, within the NPRACH resource, see TS 36.211 [21, 10.1.6]. Multi-tone Msg3 transmission is not supported for {32, 64, 128} repetitions of NPRACH. For at least one of the NPRACH resources with the number of NPRACH repetitions other than {32, 64, 128}, the value of *nprach-SubcarrierMSG3-RangeStart* should not be 0. If *nprach-SubcarrierMSG3-RangeStart* is equal to *oneThird* or *twoThird* the start subcarrier indexes for the two partitions are given by:

nprach-SubcarrierOffset + [0, FLOOR (nprach-NumCBRA-StartSubcarriers * nprach-SubcarrierMSG3-RangeStart) -1] for the single-tone Msg3 NPRACH partition;

nprach-SubcarrierOffset + [FLOOR (nprach-NumCBRA-StartSubcarriers * nprach-SubcarrierMSG3-RangeStart), nprach-NumCBRA-StartSubcarriers - 1]

for the multi-tone Msg3 NPRACH partition;

If the field is absent, the value of *nprach-SubcarrierMSG3-RangeStart* configured in *SystemInformationBlockType2-NB* for the NPRACH resource in the corresponding entry of *nprach-ParametersList* applies.

pagingWeight

Weight of the non-anchor paging carrier for uneven paging load distribution across the carriers. Value w1 corresponds to a relative weight of 1, w2 corresponds to a relative weight of 2, and so on.

The paging load for a carrier 'i' is equal to w(i)/W where i is equal to 0 for the anchor carrier and equal to the index of the carrier in the *dl-ConfigList* for a non-anchor carrier, W is the sum of the weights of all paging carriers.

To avoid correlation between paging carrier and paging occasion, the weights should be assigned such that: nB * W <= 16384.

pagingWeightAnchor

Weight of the anchor carrier for uneven paging load distribution across the carriers. Value w1 corresponds to a relative weight of 1, w2 corresponds to a relative weight of 2, and so on.

If the field is absent, the (default) value of wo is applied, i.e. the anchor carrier is not used for paging.

pcch-Config

Configure the PCCH parameters for the non-anchor DL carrier.

ul-CarrierFreq

UL carrier frequency of the non-anchor carrier as defined in TS 36.101 [42, 5.7.3F].

ul-ConfigList

List of UL non-anchor carriers and associated configuration that can be used for random access.

Conditional presence	Explanation
pcch-Config	This field is optionally present, Need OP, if the field <i>dl-ConfigList</i> is present and at least one of the carriers in <i>dl-ConfigList</i> is configured for paging. Otherwise the field is not present and only the anchor carrier is used for paging.
nprach-config	This field is mandatory present, if the field <i>ul-ConfigList</i> is present and at least one of the carriers in <i>ul-ConfigList</i> is configured for random access. Otherwise the field is not present and only the anchor carrier is used for random access.

6.7.3.2 NB-IoT Radio resource control information elements

CarrierConfigDedicated-NB

The IE CarrierConfigDedicated-NB is used to specify a carrier in NB-IoT.

CarrierConfigDedicated-NB information elements

```
-- ASN1START
                                      SEQUENCE {
CarrierConfigDedicated-NB-r13 ::=
   dl-CarrierConfig-r13 DL-CarrierConfigDedicated-NB-r13,
   ul-CarrierConfig-r13
                              UL-CarrierConfigDedicated-NB-r13
DL-CarrierConfigDedicated-NB-r13 ::= SEQUENCE {
   dl-CarrierFreq-r13
                                         CarrierFreq-NB-r13,
   downlinkBitmapNonAnchor-r13
                                          CHOICE {
       useNoBitmap-r13
                                             NULL,
       useAnchorBitmap-r13
                                              NULL
       explicitBitmapConfiguration-r13
                                              DL-Bitmap-NB-r13,
          OPTIONAL,
                        -- Need ON
   dl-GapNonAnchor-r13
                                          CHOICE {
```

```
NULL,
       useNoGap-r13
       useAnchorGapConfig-r13
       explicitGapConfiguration-r13
                                              DL-GapConfig-NB-r13,
       spare
           OPTIONAL,
                        -- Need ON
   inbandCarrierInfo-r13
                                          SEOUENCE {
       samePCI-Indicator-r13
                                              CHOICE
           samePCI-r13
                                                 SEQUENCE {
               indexToMidPRB-r13
                                                      INTEGER (-55..54)
           differentPCI-r13
                                                 SEQUENCE {
                                                      ENUMERATED {same, four}
               eutra-NumCRS-Ports-r13
                                  OPTIONAL,
                                                 -- Cond anchor-guardband
       eutraControlRegionSize-r13
                                              ENUMERATED {n1, n2, n3}
   }
                                  OPTIONAL,
                                                 -- Cond non-anchor-inband
   [ nrs-PowerOffsetNonAnchor-v1330
                                        ENUMERATED {dB-12, dB-10, dB-8, dB-6,
                                                      dB-4, dB-2, dB0, dB3}
                                  OPTIONAL
                                              -- Need ON
   11
UL-CarrierConfigDedicated-NB-r13 ::= SEQUENCE {
   ul-CarrierFreq-r13
                             CarrierFreq-NB-r13
                                                     OPTIONAL, -- Need OP
-- ASN1STOP
```

CarrierConfigDedicated-NB field descriptions

dl-CarrierConfig

Downlink carrier used for all unicast transmissions.

dl-CarrierFreq

DL carrier frequency. The downlink carrier is not in a E-UTRA PRB which contains E-UTRA PSS/SSS/PBCH.

dl-GapNonAnchor

Downlink transmission gap configuration for the non-anchor carrier, see TS 36.211 [21, 10.2.3.4].

downlinkBitmapNonAnchor

NB-IoT downlink subframe configuration for downlink transmission on the non-anchor carrier. See TS 36.213 [23, 16.4].

eutraControlRegionSize

Indicates the control region size of the E-UTRA cell for the in-band operation mode, see TS 36.213 [23]. Unit is in number of OFDM symbols. If *operationModeInfo* in MIB-NB is set to *inband-SamePCI* or *inband-DifferentPCI*, it should be set to the value broadcast in SIB1-NB.

eutra-NumCRS-Ports

Number of E-UTRA CRS antenna ports, either the same number of ports as NRS or 4 antenna ports. See TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23].

inbandCarrierInfo

Provides the configuration of a non-anchor inband carrier.

indexToMidPRB

The PRB index is signaled by offset from the middle of the EUTRA system.

nrs-PowerOffsetNonAnchor

Provides the power offset of the downlink narrowband reference-signal EPRE of the non-anchor carrier relative to the anchor carrier, unit in dB. Value dB-12 corresponds to -12 dB, dB-10 corresponds to -10 dB and so on. See TS 36.213 [23, 16.2.2].

samePCI-Indicator

This parameter specifies whether the non-anchor carrier reuses the same PCI as the EUTRA carrier.

ul-CarrierConfig

Uplink non-anchor carrier used for all unicast transmissions.

ul-CarrierFred

UL carrier frequency as defined in TS 36.101 [42, 5.7.3F]. If absent, the same TX-RX frequency separation and carrier frequency offset as for the anchor carrier applies.

Conditional presence	Explanation
non-anchor-inband	The field is mandatory present if the non-anchor carrier is an inband carrier; otherwise it is
	not present.
anchor-guardband	The field is mandatory present if operationModeInfo is set to guardband in the MIB;
	otherwise it is not present.

CarrierFreq-NB

The IE CarrierFreq-NB is used to provide the NB-IoT carrier frequency, as defined in TS 36.101 [42].

CarrierFreq-NB information elements

CarrierFreq-NB field descriptions

carrierFreq

Provides the ARFCN applicable for the NB-IoT carrier frequency as defined in TS 36.101 [42, Table 5.7.3-1].

carrierFreqOffset

Offset of the NB-IoT channel number to EARFCN as defined in TS 36.101 [42, 5.7.3F]. Value v-10 means -10, v-9 means -9, and so on.

- DL-Bitmap-NB

The IE *DL-Bitmap-NB* is used to specify the set of NB-IoT downlink subframes for downlink transmission.

DL-Bitmap-NB information element

```
-- ASN1START

DL-Bitmap-NB-r13 ::= CHOICE {
    subframePattern10-r13 BIT STRING (SIZE (10)),
    subframePattern40-r13 BIT STRING (SIZE (40))
}

-- ASN1STOP
```

DL-Bitmap-NB field descriptions

subframePattern10, subframePattern40

NB-loT downlink subframe configuration over 10ms or 40ms for inband and 10ms for standalone/guardband. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. Value 0 in the bitmap indicates that the corresponding subframe is invalid for downlink transmission. Value 1 in the bitmap indicates that the corresponding subframe is valid for downlink transmission.

DL-CarrierConfigCommon-NB

The IE *DL-CarrierConfigCommon-NB* is used to specify the common configuration of a DL non-anchor carrier in NB-IoT.

DL-CarrierConfigCommon-NB information elements

```
useNoGap-r14
                                              NULL,
        useAnchorGapConfig-r14
                                                NULL,
        explicitGapConfiguration-r14
                                              DL-GapConfig-NB-r13
    inbandCarrierInfo-r14
                                            SEQUENCE {
        samePCI-Indicator-r14
                                             CHOICE
            samePCI-r14
                                                  SEQUENCE {
                 indexToMidPRB-r14
                                                        INTEGER (-55..54)
            differentPCI-r14
                                                    SEQUENCE {
                eutra-NumCRS-Ports-r14
                                                        ENUMERATED {same, four}
                          -- Cond anchor-guardband
           OPTIONAL.
        eutraControlRegionSize-r14
                                                ENUMERATED {n1, n2, n3}
        OPTIONAL,
                        -- Cond non-anchor-inband
   {\tt nrs-PowerOffsetNonAnchor-r14} \qquad \qquad {\tt ENUMERATED} \ \left\{ {\tt dB-12} \,, \,\, {\tt dB-10} \,, \,\, {\tt dB-8} \,, \,\, {\tt dB-6} \,, \right.
                                                         dB-4, dB-2, dB0, dB3} DEFAULT dB0,
-- ASN1STOP
```

DL-CarrierConfigCommon-NB field descriptions

dl-CarrierFreq

DL carrier frequency. The downlink carrier is not in a E-UTRA PRB which contains E-UTRA PSS/SSS/PBCH.

dl-GapNonAnchor

Downlink transmission gap configuration for the non-anchor carrier, see TS 36.211 [21, 10.2.3.4].

downlinkBitmapNonAnchor

NB-IoT downlink subframe configuration for downlink transmission on the non-anchor carrier. See TS 36.213 [23, 16.4].

eutraControlRegionSize

Indicates the control region size of the E-UTRA cell for the in-band operation mode, see TS 36.213 [23]. Unit is in number of OFDM symbols. If *operationModeInfo* in MIB-NB is set to *inband-SamePCI* or *inband-DifferentPCI*, it should be set to the value broadcast in SIB1-NB.

eutra-NumCRS-Ports

Number of E-UTRA CRS antenna ports, either the same number of ports as NRS or 4 antenna ports. See TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23].

inbandCarrierInfo

Provides the configuration of a non-anchor inband carrier.

indexToMidPRB

The PRB index is signaled by offset from the middle of the EUTRA system.

nrs-PowerOffsetNonAnchor

Provides the downlink narrowband reference-signal EPRE offset of the non-anchor carrier relative to the downlink narrowband reference-signal EPRE of the anchor carrier, unit in dB. Value dB-12 corresponds to -12 dB, dB-10 corresponds to -10 dB and so on. See TS 36.213 [23, 16.2.2].

samePCI-Indicator

This parameter specifies whether the non-anchor carrier reuses the same PCI as the EUTRA carrier.

Conditional presence	Explanation
non-anchor-inband	The field is mandatory present if the non-anchor carrier is an inband carrier; otherwise it is
	not present.
anchor-guardband	The field is mandatory present, if operationModeInfo is set to guardband in the MIB;
	otherwise it is not present.

DL-GapConfig-NB

The IE *DL-GapConfig-NB* is used to specify the downlink gap configuration for NPDCCH and NPDSCH. Downlink gaps apply to all NPDCCH/NPDSCH transmissions except for BCCH.

DL-GapConfig-NB information element

```
-- ASN1START

DL-GapConfig-NB-r13 ::= SEQUENCE {
   dl-GapThreshold-r13 ENUMERATED {n32, n64, n128, n256},
   dl-GapPeriodicity-r13 ENUMERATED {sf64, sf128, sf256, sf512},
```

DL-GapConfig-NB field descriptions

dl-GapDurationCoeff

Coefficient to calculate the gap duration of a DL transmission: dl-GapDurationCoeff * dl-GapPeriodicity, Duration in number of subframes. See TS 36.211 [21, 10.2.3.4].

dl-GapPeriodicity

Periodicity of a DL transmission gap in number of subframes. See TS 36.211 [21, 10.2.3.4].

dl-GapThreshold

Threshold on the maximum number of repetitions configured for NPDCCH before application of DL transmission gap configuration. See TS 36.211 [21, 10.2.3.4].

LogicalChannelConfig-NB

The IE LogicalChannelConfig-NB is used to configure the logical channel parameters.

LogicalChannelConfig-NB information element

LogicalChannelConfig-NB field descriptions

logicalChannelSR-Prohibit

Value *TRUE* indicates that the *logicalChannelSR-ProhibitTimer* is enabled for the logical channel. If *logicalChannelSR-Prohibit* is configured (i.e. indicates value *TRUE*), E-UTRAN also configures *logicalChannelSR-ProhibitTimer*. See TS 36.321 [6].

priority

Logical channel priority in TS 36.321 [6]. Value is an integer.

Conditional presence	Explanation
UL	The field is mandatory present for UL logical channels; otherwise it is not present.

- MAC-MainConfig-NB

The IE MAC-MainConfig-NB is used to specify the MAC main configuration for signalling and data radio bearers.

MAC-MainConfig-NB information element

```
-- ASN1START
                                    SEQUENCE {
MAC-MainConfig-NB-r13 ::=
                                    SEQUENCE {
    ul-SCH-Config-r13
       periodicBSR-Timer-r13
                                            PeriodicBSR-Timer-NB-r13
                                                                            OPTIONAL,
                                                                                        -- Need ON
       retxBSR-Timer-r13
                                           RetxBSR-Timer-NB-r13
                                                                        OPTIONAL,
                                                                                    -- Need ON
                                                                                    -- Need ON
    drx-Config-r13
                                       DRX-Config-NB-r13
                                                                        OPTIONAL,
    {\tt timeAlignmentTimerDedicated-r13} \qquad {\tt TimeAlignmentTimer},
    logicalChannelSR-Config-r13
                                        CHOICE {
       release
                                           NULL,
                                           SEOUENCE {
        setup
            logicalChannelSR-ProhibitTimer-r13 ENUMERATED {
                                                   pp2, pp8, pp32, pp128, pp512,
```

```
pp1024, pp2048, spare}
    }
                                                                         OPTIONAL, -- Need ON
    [[ rai-Activation-r14
                                                 ENUMERATED {true}
                                                                            OPTIONAL, -- Need OR
       dataInactivityTimerConfig-r14 CHOICE {
                                                 NULL,
                                                 SEQUENCE {
            setup
                dataInactivityTimer-r14
                                                    DataInactivityTimer-r14
                                                                         OPTIONAL
                                                                                     -- Need ON
    ]],
                                        ENUMERATED {
       drx-Cycle-v1430
                                    sf1280, sf2560, sf5120, sf10240} OPTIONAL
                                                                                     -- Need ON
    [[ ra-CFRA-Config-r14
                               ENUMERATED {true}
                                                            OPTIONAL
                                                                            -- Need ON
PeriodicBSR-Timer-NB-r13 ::=
                                    ENUMERATED {
                                       pp2, pp4, pp8, pp16, pp64, pp128, infinity, spare}
RetxBSR-Timer-NB-r13 ::=
                                    ENUMERATED {
                                        pp4, pp16, pp64, pp128, pp256, pp512, infinity, spare}
DRX-Config-NB-r13 ::=
                                    CHOICE {
   release
                                        NULL,
    setup
                                        SEQUENCE {
                                            ENUMERATED {
       onDurationTimer-r13
                                                pp1, pp2, pp3, pp4, pp8, pp16, pp32, spare},
       drx-InactivityTimer-r13
                                             ENUMERATED
                                                pp0, pp1, pp2, pp3, pp4, pp8, pp16, pp32},
       drx-RetransmissionTimer-r13
                                             ENUMERATED {
                                                pp0, pp1, pp2, pp4, pp6, pp8, pp16, pp24,
                                                 pp33, spare7, spare6, spare5,
                                                 spare4, spare3, spare2, spare1},
       drx-Cycle-r13
                                             ENUMERATED {
                                                sf256, sf512, sf1024, sf1536, sf2048, sf3072, sf4096, sf4608, sf6144, sf7680, sf8192, sf9216,
                                                spare4, spare3, spare2, spare1},
        drx-StartOffset-r13
                                             INTEGER (0..255),
       drx-ULRetransmissionTimer-r13
                                             ENUMERATED {
                                                pp0, pp1, pp2, pp4, pp6, pp8, pp16, pp24,
                                                 pp33, pp40, pp64, pp80, pp96,
                                                pp112, pp128, pp160, pp320}
-- ASN1STOP
```

MAC-MainConfig-NB field descriptions

drx-Confia

Used to configure DRX as specified in TS 36.321 [6].

drx-Cycle

longDRX-Cycle in TS 36.321 [6]. The value of longDRX-Cycle is in number of sub-frames. Value sf256 corresponds to 256 sub-frames, sf512 corresponds to 512 sub-frames and so on. In case drx-Cycle-v1430 is signalled, the UE shall ignore drx-Cycle-r13.

drx-StartOffset

drxStartOffset in TS 36.321 [6]. Value is in number of sub-frames by step of (drx-cycle / 256).

drx-InactivityTimer

Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

drx-RetransmissionTimer

Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

drx-ULRetransmissionTimer

Timer for DRX in TS 36.321 [6].

Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

logicalChannelSR-ProhibitTimer

Timer used to delay the transmission of an SR. See TS 36.321 [6]. Value in number of PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp8 corresponds to 8 PDCCH periods and so on.

periodicBSR-Timer

Timer for BSR reporting in TS 36.321 [6].

Value in number of PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp4 corresponds to 4 PDCCH periods and so on.

ra-CFRA-Config

Activation of contention free random access (CFRA), see TS 36.321 [6].

rai-Activation

Activation of release assistance indication (RAI) in TS 36.321 [6].

retxBSR-Timer

Timer for BSR reporting in TS 36.321 [6]. Value in number of PDCCH periods. Value pp4 corresponds to 4 PDCCH periods, pp16 corresponds to 16 PDCCH periods and so on.

onDurationTimer

Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.

timeAlignmentTimer

Indicates the value of the time alignment timer, see TS 36.321 [6].

NPDCCH-ConfigDedicated-NB

The IE NPDCCH-ConfigDedicated-NB specifies the subframes and resource blocks for NPDCCH monitoring.

NPDCCH-ConfigDedicated-NB information element

NPDCCH-ConfigDedicated-NB field descriptions

npdcch-NumRepetitions

Maximum number of repetitions for NPDCCH UE specific search space (USS), see TS 36.213 [23, 16.6]. UE monitors one set of values (consisting of aggregation level, number of repetitions and number of blind decodes) according to the configured maximum number of repetitions.

npdcch-Offset-USS

Fractional period offset of starting subframe for NPDCCH UE specific search space (USS), see TS 36.213 [23, 16.6].

npdcch-StartSF-USS

Starting subframe configuration for an NPDCCH UE-specific search space, see TS 36.213 [23, 16.6]. Value v1dot5 corresponds to 1.5, value 2 corresponds to 2 and so on.

NPDSCH-ConfigCommon-NB

The IE NPDSCH-ConfigCommon-NB is used to specify the common NPDSCH configuration.

NPDSCH-ConfigCommon-NB information element

NPDSCH-ConfigCommon-NB field descriptions

nrs-Power

Provides the downlink narrowband reference-signal EPRE, see TS 36.213 [23, 16.2]. The actual value in dBm.

NPRACH-ConfigSIB-NB

The IE NPRACH-ConfigSIB-NB is used to specify the NPRACH configuration for the anchor carrier.

NPRACH-ConfigSIB-NB information elements

```
-- ASN1START
NPRACH-ConfigSIB-NB-r13 ::=
                                     SEQUENCE {
    nprach-CP-Length-r13
                                        ENUMERATED {us66dot7, us266dot7},
    rsrp-ThresholdsPrachInfoList-r13
                                      RSRP-ThresholdsNPRACH-InfoList-NB-r13 OPTIONAL,
OR
                                   NPRACH-ParametersList-NB-r13
    nprach-ParametersList-r13
NPRACH-ConfigSIB-NB-v1330 ::=
                                   SEQUENCE {
    nprach-ParametersList-v1330
                                     NPRACH-ParametersList-NB-v1330
NPRACH-ParametersList-NB-r13 ::=
                                   SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF NPRACH-
Parameters-NB-r13
NPRACH-ParametersList-NB-v1330 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF NPRACH-
Parameters-NB-v1330
NPRACH-Parameters-NB-r13::=
                                     SEQUENCE {
                                             ENUMERATED {ms40, ms80, ms160, ms240,
   nprach-Periodicity-r13
                                                          ms320, ms640, ms1280, ms2560},
    nprach-StartTime-r13
                                             ENUMERATED {ms8, ms16, ms32, ms64,
                                                          ms128, ms256, ms512, ms1024},
                                             ENUMERATED {n0, n12, n24, n36, n2, n18, n34, spare1},
   nprach-SubcarrierOffset-r13
    nprach-NumSubcarriers-r13
                                             ENUMERATED {n12, n24, n36, n48},
    nprach-SubcarrierMSG3-RangeStart-r13
                                             ENUMERATED {zero, oneThird, twoThird, one},
    maxNumPreambleAttemptCE-r13
                                             ENUMERATED {n3, n4, n5, n6, n7, n8, n10, spare1},
                                             ENUMERATED {n1, n2, n4, n8, n16, n32, n64, n128}, ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,
    numRepetitionsPerPreambleAttempt-r13
    npdcch-NumRepetitions-RA-r13
                                                         r256, r512, r1024, r2048,
                                                          spare4, spare3, spare2, spare1},
```

NPRACH-ConfigSIB-NB field descriptions

maxNumPreambleAttemptCE

Maximum number of preamble transmission attempts per NPRACH resource. See TS 36.321 [6].

npdcch-NumRepetitions-RA

Maximum number of repetitions for NPDCCH common search space (CSS) for RAR, Msg3 retransmission and Msg4, see TS 36.213 [23, 16.6].

npdcch-Offset -RA

Fractional period offset of starting subframe for NPDCCH common search space (CSS Type 2), see TS 36.213 [23, 16.6].

npdcch-StartSF-CSS-RA

Starting subframe configuration for NPDCCH common search space (CSS), including RAR, Msg3 retransmission, and Msg4, see TS 36.213 [23, 16.6].

nprach-CP-Length

Cyclic prefix length for NPRACH transmission (T_{CP}), see TS 36.211 [21, 10.1.6]. Value us66dot7 corresponds to 66.7 microseconds and value us266dot7 corresponds to 266.7 microseconds.

nprach-NumCBRA-StartSubcarriers

The number of start subcarriers from which a UE can randomly select a start subcarrier as specified in TS 36.321 [6]. The start subcarrier indices that the UE is allowed to randomly select from, are given by:

nprach-SubcarrierOffset + [0, nprach-NumCBRA-StartSubcarriers - 1]

nprach-NumSubcarriers

Number of sub-carriers in a NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers.

nprach-ParametersList

Configures NPRACH parameters for each NPRACH resource. Up to three PRACH resources can be configured in a cell. Each NPRACH resource is associated with a different number of NPRACH repetitions.

nprach-Periodicity

Periodicity of a NPRACH resource, see TS 36.211 [21, 10.1.6]. Unit in millisecond.

nprach-StartTime

Start time of the NPRACH resource in one period, see TS 36.211 [21, 10.1.6]. Unit in millisecond.

nprach-SubcarrierOffset

Frequency location of the NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers, offset from subcarrier 0.

nprach-SubcarrierMSG3-RangeStart

Fraction for calculating the starting subcarrier index of the range reserved for indication of UE support for multi-tone Msg3 transmission, within the NPRACH resource, see TS 36.211 [21, 10.1.6]. Multi-tone Msg3 transmission is not supported for {32, 64, 128} repetitions of NPRACH. For at least one of the NPRACH resources with the number of NPRACH repetitions other than {32, 64, 128}, the value of *nprach-SubcarrierMSG3-RangeStart* should not be 0. If *nprach-SubcarrierMSG3-RangeStart* is equal to oneThird}or twoThird the start subcarrier indexes for the two partitions are given by:

nprach-SubcarrierOffset + [0, floor(nprach-NumCBRA-StartSubcarriers * nprach-SubcarrierMSG3-RangeStart) -1] for the single-tone Msg3 NPRACH partition;

nprach-SubcarrierOffset + [floor(nprach-NumCBRA-StartSubcarriers * nprach-SubcarrierMSG3-RangeStart), nprach-NumCBRA-StartSubcarriers - 1]

for the multi-tone Msg3 NPRACH partition;

numRepetitionsPerPreambleAttempt

Number of NPRACH repetitions per attempt for each NPRACH resource, See TS 36.211 [21, 10.1.6].

rsrp-ThresholdsPrachInfoList

The criterion for UEs to select a NPRACH resource. Up to 2 RSRP threshold values can be signalled. The first element corresponds to RSRP threshold 1, the second element corresponds to RSRP threshold 2. See TS 36.321 [6]. If absent, there is only one NPRACH resource.

A UE that supports *powerClassNB-14dBm-r14* shall correct the RSRP threshold values before applying them as follows:

RSRP threshold = Signalled RSRP threshold - min{0, (14-min(23, P-Max)) where P-Max is the value of *p-Max* field in *SystemInformationBlockType1-NB*.

NPUSCH-Config-NB

The IE *NPUSCH-ConfigCommon-NB* is used to specify the common NPUSCH configuration. The IE *NPUSCH-ConfigDedicated-NB* is used to specify the UE specific NPUSCH configuration.

NPUSCH-Config-NB information element

```
-- ASN1START
NPUSCH-ConfigCommon-NB-r13 ::= SEQUENCE {
     ack-NACK-NumRepetitions-Msg4-r13
                                                SEQUENCE (SIZE(1.. maxNPRACH-Resources-NB-r13)) OF
                                                                       ACK-NACK-NumRepetitions-NB-r13,
     srs-SubframeConfig-r13
                                                   ENUMERATED {
                                                         sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,
                                                         sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15
                                                                                             OPTIONAL,
                                                                                                            -- Need OR
     dmrs-Config-r13
                                                   SEQUENCE {
                                                  INTEGER (0..12)
          threeTone-BaseSequence-r13
threeTone-CyclicShift-r13
sixTone-BaseSequence-r13
sixTone-CyclicShift-r13
                                                                                           OPTIONAL,
                                                                                                             -- Need OP
                                                       INTEGER (0..2),
INTEGER (0..14)
                                                                                           OPTIONAL,
                                                                                                            -- Need OP
                                                        INTEGER (0..3),
    sixTone-CyclicShift-r13 INTEGER (0..3),
twelveTone-BaseSequence-r13 INTEGER (0..30)

OPTIONAL, -- Need OR
ul-ReferenceSignalsNPUSCH-r13 UL-ReferenceSignalsNPUSCH-NB-r13
                                                                                             OPTIONAL
                                                                                                            -- Need OP
UL-ReferenceSignalsNPUSCH-NB-r13 ::= SEQUENCE {
     groupHoppingEnabled-r13
                                                      BOOLEAN,
     groupAssignmentNPUSCH-r13
                                                        INTEGER (0..29)
{\tt NPUSCH-ConfigDedicated-NB-r13} ::= {\tt SEQUENCE} \ \{
    ack-NACK-NumRepetitions-r13 ACK-NACK-NumRepetitions-NB-r13 OPTIONAL, -- Need ON npusch-AllSymbols-r13 BOOLEAN OPTIONAL, -- Cond SRS groupHoppingDisabled-r13 ENUMERATED {true} OPTIONAL -- Need OR
                                                                            OPTIONAL, -- Cond SRS
OPTIONAL -- Need OR
ACK-NACK-NumRepetitions-NB-r13 ::= ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128}
-- ASN1STOP
```

NPUSCH-Config-NB field descriptions

ack-NACK-NumRepetitions

Number of repetitions for the ACK NACK resource unit carrying HARQ response to NPDSCH, see TS 36.213 [23, 16.4.2]. If absent, the value of *ack-NACK-NumRepetitions-Msg4* signalled in SIB2 is used.

ack-NACK-NumRepetitions-Msg4

Number of repetitions for ACK/NACK HARQ response to NPDSCH containing Msg4 per NPRACH resource, see TS 36.213 [23, 16.4.2].

groupAssignmentNPUSCH

See TS 36.211 [21, 10.1.4.1.3].

groupHoppingDisabled

See TS 36.211 [21, 10.1.4.1.3]

groupHoppingEnabled

See TS 36.211 [21, 10.1.4.1.3].

npusch-AllSymbols

If set to TRUE, the UE shall use all NB-IoT symbols for NPUSCH transmission. If set to FALSE, the UE punctures the NPUSCH transmissions in the symbols that collides with SRS. If the field is not present, the UE uses all NB-IoT symbols for NPUSCH transmission. See TS 36.211 [21, 10.1.3.6].

sixTone-BaseSequence

The base sequence of DMRS sequence in a cell for 6 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 14. Value 14 is not used.

sixTone-CyclicShift

Define 4 cyclic shifts for the 6-tone case, see TS 36.211 [21, 10.1.4.1.2].

srs-SubframeConfig

SRS SubframeConfiguration. See TS 36.211 [21, table 5.5.3.3-1]. Value sc0 corresponds to value 0, sc1 to value 1 and so on.

threeTone-BaseSequence

The base sequence of DMRS sequence in a cell for 3 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 12. Value 12 is not used.

threeTone-CyclicShift

Define 3 cyclic shifts for the 3-tone case, see TS 36.211 [21, 10.1.4.1.2].

twelveTone-BaseSequence

The base sequence of DMRS sequence in a cell for 12 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 30. Value 30 is not used.

ul-ReferenceSignalsNPUSCH

Used to specify parameters needed for the transmission on NPUSCH.

Conditional presence	Explanation
SRS	This field is optionally present, need OP, if srs-SubframeConfig is broadcasted.
	Otherwise, the IE is not present.

PDCP-Config-NB

The IE *PDCP-Config-NB* is used to set the configurable PDCP parameters for data radio bearers.

PDCP-Config-NB information element

```
-- ASN1START
PDCP-Config-NB-r13 ::=
                            SEQUENCE {
    discardTimer-r13
                                ENUMERATED {
                                    ms5120, ms10240, ms20480, ms40960,
                                    ms81920, infinity, spare2, spare1
                                        OPTIONAL,
                                                            -- Cond Setup
    headerCompression-r13
                                CHOICE {
                                    NULL,
        notUsed
        rohc
                                    SEQUENCE {
            maxCID-r13
                                        INTEGER (1..16383)
                                                                         DEFAULT 15,
            profiles-r13
                                        SEQUENCE {
                profile0x0002
                                            BOOLEAN.
                profile0x0003
                                            BOOLEAN.
                profile0x0004
                                             BOOLEAN,
                profile0x0006
                                            BOOLEAN.
                profile0x0102
                                            BOOLEAN.
                profile0x0103
                                            BOOLEAN.
                profile0x0104
                                             BOOLEAN
            },
```

```
}
},
...
}
-- ASN1STOP
```

PDCP-Config-NB field descriptions

discardTimer

Indicates the discard timer value specified in TS 36.323 [8]. Value in milliseconds. Value ms5120 means 5120 ms, ms10240 means 10240 ms and so on.

headerCompression

E-UTRAN does not reconfigure header compression except optionally upon RRC Connection Resumption.

maxCID

Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8]. The total value of MAX_CIDs across all bearers for the UE should be less than or equal to the value of *maxNumberROHC-ContextSessions* parameter as indicated by the UE.

profiles

The profiles used by both compressor and decompressor in both UE and E-UTRAN. The field indicates which of the ROHC profiles specified in TS 36.323 [8] are supported, i.e. value *true* indicates that the profile is supported. Profile 0x0000 shall always be supported when the use of ROHC is configured. If support of two ROHC profile identifiers with the same 8 LSB's is signalled, only the profile corresponding to the highest value shall be applied.

Conditional presence	Explanation
Setup	The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON.

PhysicalConfigDedicated-NB

The IE *PhysicalConfigDedicated-NB* is used to specify the UE specific physical channel configuration.

PhysicalConfigDedicated-NB information element

```
PhysicalConfigDedicated Non-anchor carrier used for all unicast transmissions.

interferenceRandomisationConfig
Interference randomisation enabled in connected mode, see TS 36.211 [21].

npdcch-ConfigDedicated
NPDCCH configuration.

npusch-ConfigDedicated
UL unicast configuration.

twoHARQ-ProcessesConfig
Activation of two HARQ processes, see TS 36.212 [22] and TS 36.213 [23].

uplink-PowerControlDedicated
UL power control parameter.
```

– RACH-ConfigCommon-NB

The IE RACH-ConfigCommon-NB is used to specify the generic random access parameters.

RACH-ConfigCommon-NB information element

```
-- ASN1START
RACH-ConfigCommon-NB-r13 ::=
                                SEQUENCE {
   preambleTransMax-CE-r13
                                  PreambleTransMax,
   powerRampingParameters-r13
                                   PowerRampingParameters,
   rach-InfoList-r13
                                   RACH-InfoList-NB-r13,
   connEstFailOffset-r13
                                   INTEGER (0..15)
                                                                OPTIONAL,
                                                                           -- Need OP
}
RACH-InfoList-NB-r13 ::=
                      SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF RACH-Info-NB-r13
                 ::=
                       SEQUENCE {
RACH-Info-NB-r13
                                   ENUMERATED {
   ra-ResponseWindowSize-r13
                                       pp2, pp3, pp4, pp5, pp6, pp7, pp8, pp10},
   pp1, pp2, pp3, pp4, pp8, pp16, pp32, pp64}
-- ASN1STOP
```

RACH-ConfigCommon-NB field descriptions

connEstFailOffset

Parameter "Qoffset_{temp}" in TS 36.304 [4]. If the field is not present the value of infinity shall be used for "Qoffset_{temp}".

mac-ContentionResolutionTimer

Timer for contention resolution in TS 36.321 [6]. Value in PDCCH periods. Value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on. The value considered by the UE is: *mac-ContentionResolutionTimer* = Min (signaled value x PDCCH period, 10.24s).

powerRampingParameters

Power ramping step and preamble initial received target power – same as TS 36.213 [23] and TS 36.321 [6]. If more than one repetition level is configured in the cell, then the UE transmits NPRACH with max power except for the lowest repetition level. Otherwise, the UE uses NPRACH power ramping.

preambleTransMax-CE

Maximum number of preamble transmission in TS 36.321 [6]. Value is an integer.

ra-ResponseWindowSize

Duration of the RA response window in TS 36.321 [6]. Value in PDCCH periods. Value pp2 corresponds to 2 PDDCH periods, pp3 corresponds to 3 PDCCH periods and so on. The value considered by the UE is: *ra-ResponseWindowSize* = Min (signaled value x PDCCH period, 10.24s).

RadioResourceConfigCommonSIB-NB

The IE *RadioResourceConfigCommonSIB-NB* is used to specify common radio resource configurations in the system information, e.g., the random access parameters and the static physical layer parameters.

RadioResourceConfigCommonSIB-NB information element

```
-- ASN1START
RadioResourceConfigCommonSIB-NB-r13 ::= SEQUENCE {
                                           RACH-ConfigCommon-NB-r13,
    rach-ConfigCommon-r13
   bcch-Config-r13
                                           BCCH-Config-NB-r13,
   pcch-Config-r13
                                           PCCH-Config-NB-r13
   nprach-Config-r13
                                           NPRACH-ConfigSIB-NB-r13,
   npdsch-ConfigCommon-r13
                                           NPDSCH-ConfigCommon-NB-r13,
    npusch-ConfigCommon-r13
                                           NPUSCH-ConfigCommon-NB-r13,
    dl-Gap-r13
                                           DL-GapConfig-NB-r13
                                                                       OPTIONAL,
                                                                                        -- Need OP
    uplinkPowerControlCommon-r13
                                           UplinkPowerControlCommon-NB-r13,
    11
       nprach-Config-v1330
                                           NPRACH-ConfigSIB-NB-v1330 OPTIONAL
                                                                                        -- Need OR
    ]]
BCCH-Config-NB-r13 ::=
                                        SEQUENCE {
```

```
modificationPeriodCoeff-r13
                                           ENUMERATED {n16, n32, n64, n128}
PCCH-Config-NB-r13 ::=
                                       SEQUENCE {
   defaultPagingCycle-r13
                                          ENUMERATED {rf128, rf256, rf512, rf1024},
                                           ENUMERATED
                                               fourT, twoT, oneT, halfT, quarterT, one8thT,
                                               one16thT, one32ndT, one64thT,
                                               one128thT, one256thT, one512thT, one1024thT,
                                               spare3, spare2, spare1},
                                           ENUMERATED {
   npdcch-NumRepetitionPaging-r13
                                               r1, r2, r4, r8, r16, r32, r64, r128,
                                               r256, r512, r1024, r2048,
                                               spare4, spare3, spare2, spare1}
}
-- ASN1STOP
```

RadioResourceConfigCommonSIB-NB field descriptions

defaultPagingCycle

Default paging cycle, used to derive 'T' in TS 36.304 [4]. Value rf128 corresponds to 128 radio frames, rf256 corresponds to 256 radio frames and so on.

dl-Gap

Downlink transmission gap configuration for the anchor carrier. See TS 36.211 [21, 10.2.3.4]. If the field is absent, there is no gap.

modificationPeriodCoeff

Actual modification period, expressed in number of radio frames= modificationPeriodCoeff* defaultPagingCycle. n16 corresponds to value 16, n32 corresponds to value 32, and so on. The BCCH modification period should be larger or equal to 40.96s.

nΒ

Parameter: nB is used as one of parameters to derive the Paging Frame and Paging Occasion according to TS 36.304 [4]. Value in multiples of 'T' as defined in TS 36.304 [4]. A value of fourT corresponds to 4 * T, a value of twoT corresponds to 2 * T and so on.

npdcch-NumRepetitionPaging

Maximum number of repetitions for NPDCCH common search space (CSS) for paging, see TS 36.213 [23, 16.6].

RadioResourceConfigDedicated-NB

The IE *RadioResourceConfigDedicated-NB* is used to setup/modify/release RBs, to modify the MAC main configuration, and to modify dedicated physical configuration.

RadioResourceConfigDedicated-NB information element

```
-- ASN1START
RadioResourceConfigDedicated-NB-r13 ::= SEQUENCE {
   srb-ToAddModList-r13
                                                                       OPTIONAL,
                                       SRB-ToAddModList-NB-r13
                                                                                   -- Need ON
                                                                       OPTIONAL,
                                                                                   -- Need ON
   drb-ToAddModList-r13
                                         DRB-ToAddModList-NB-r13
                                         DRB-ToReleaseList-NB-r13
                                                                                   -- Need ON
   drb-ToReleaseList-r13
   mac-MainConfig-r13
                                         CHOICE {
       explicitValue-r13
                                             MAC-MainConfig-NB-r13,
       defaultValue-r13
                                             NULL
                                                                        OPTIONAL,
                                                                                   -- Need ON
   physicalConfigDedicated-r13
                                         PhysicalConfigDedicated-NB-r13 OPTIONAL,
                                                                                   -- Need ON
                                         RLF-TimersAndConstants-NB-r13 OPTIONAL,
                                                                                   -- Need ON
   rlf-TimersAndConstants-r13
}
SRB-ToAddModList-NB-r13 ::=
                                 SEQUENCE (SIZE (1)) OF SRB-ToAddMod-NB-r13
SRB-ToAddMod-NB-r13 ::=
                                  SEOUENCE {
                                     CHOICE {
   rlc-Config-r13
       explicitValue
                                         RLC-Config-NB-r13,
       defaultValue
                                         NULL
          OPTIONAL.
                                                                            -- Cond Setup
   logicalChannelConfig-r13
                                     CHOICE {
       explicitValue
                                         LogicalChannelConfig-NB-r13,
       defaultValue
           OPTIONAL,
                                                                            -- Cond Setup
```

```
[[ rlc-Config-v1430
                                     RLC-Config-NB-v1430
                                                                 OPTIONAL
                                                                             -- Need ON
    ]]
}
DRB-ToAddModList-NB-r13 ::=
                                  SEQUENCE (SIZE (1..maxDRB-NB-r13)) OF DRB-ToAddMod-NB-r13
DRB-ToAddMod-NB-r13 ::=
                                  SEQUENCE {
   eps-BearerIdentity-r13
                                      INTEGER (0..15)
                                                                             -- Cond DRB-Setup
                                                               OPTIONAL,
   drb-Identity-r13
                                      DRB-Identity,
   pdcp-Config-r13
                                      PDCP-Config-NB-r13
                                                                 OPTIONAL,
                                                                             -- Cond Setup
                                     RLC-Config-NB-r13 OPTIONAL,
   rlc-Config-r13
                                                                             -- Cond Setup
                                                                 OPTIONAL,
   logicalChannelIdentity-r13
                                                                             -- Cond DRB-Setup
                                      INTEGER (3..10)
                                      LogicalChannelConfig-NB-r13 OPTIONAL,
                                                                            -- Cond Setup
   logicalChannelConfig-r13
       rlc-Config-v1430
                                     RLC-Config-NB-v1430
                                                                 OPTIONAL
                                                                             -- Need ON
   11
}
DRB-ToReleaseList-NB-r13 ::=
                                 SEQUENCE (SIZE (1..maxDRB-NB-r13)) OF DRB-Identity
-- ASN1STOP
```

RadioResourceConfigDedicated-NB field descriptions

logicalChannelConfig

For SRB a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1.

logicalChannelIdentity

The logical channel identity for both UL and DL for a DRB. Value 3 is not used.

mac-MainConfig

The default MAC MAIN configuration is specified in 9.2.2.

physicalConfigDedicated

The default dedicated physical configuration is specified in 9.2.4.

rlc-Config

For SRBs a choice is used to indicate whether the RLC configuration is signalled explicitly or set to the values defined in the default RLC configuration for SRB1 in 9.2.1.1. RLC AM is the only applicable RLC mode.

Conditional presence	Explanation
DRB-Setup	The field is mandatory present if the corresponding DRB is being set up; otherwise it is
	not present.
Setup	The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise
	the field is optionally present, need ON.

– RLC-Config-NB

The IE *RLC-Config-NB* is used to specify the RLC configuration of SRBs and DRBs.

RLC-Config-NB information element

```
-- ASN1START
RLC-Config-NB-r13 ::= CHOICE {
                     SEQUENCE {
                         UL-AM-RLC-NB-r13,
       ul-AM-RLC-r13
       dl-AM-RLC-r13
                               DL-AM-RLC-NB-r13
   },
RLC-Config-NB-v1430 ::= SEQUENCE {
   t-Reordering-r14
                           T-Reordering
                                             OPTIONAL
                                                           -- Cond twoHARO
UL-AM-RLC-NB-r13 ::=
                       SEQUENCE {
                            T-PollRetransmit-NB-r13,
   t-PollRetransmit-r13
   maxRetxThreshold-r13
                            ENUMERATED {t1, t2, t3, t4, t6, t8, t16, t32}
DL-AM-RLC-NB-r13 ::= SEQUENCE {
```

```
enableStatusReportSN-Gap-r13 ENUMERATED {true} OPTIONAL
T-PollRetransmit-NB-r13 ::= ENUMERATED {
                               ms250, ms500, ms1000, ms2000, ms3000, ms4000,
                               ms6000, ms10000, ms15000, ms25000, ms40000, ms60000,
                               ms90000, ms120000, ms180000, spare1}
-- ASN1STOP
```

RLC-Config-NB field descriptions Indicates that status reporting due to detection of reception failure is enabled, as specified in TS 36.322 [7]. Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on.

t-PollRetransmit Timer for RLC AM in TS 36.322 [7], in milliseconds. Value msX means X ms, msY means Y ms and so on.

t-Reordering

enableStatusReportSN-Gap

maxRetxThreshold

Timer for reordering in TS 36.322 [7], in milliseconds.

Conditional presence	Explanation
twoHARQ	The field is mandatory present if twoHARQ-ProcessesConfig is set to TRUE. Otherwise,
	the field is not present and, if previously configured, the timer is released.

RLF-TimersAndConstants-NB

The IE RLF-TimersAndConstants-NB contains UE specific timers and constants applicable for UEs in RRC_CONNECTED.

RLF-TimersAndConstants-NB information element

```
-- ASN1START
RLF-TimersAndConstants-NB-r13 ::= CHOICE {
    release
                                        NULL,
    setup
                                        SEQUENCE {
                                            ENUMERATED {
        t301-r13
                                                ms2500, ms4000, ms6000, ms10000,
                                                ms15000, ms25000, ms40000, ms60000},
                                            ENUMERATED
        t310-r13
                                               ms0, ms200, ms500, ms1000, ms2000, ms4000, ms8000},
                                            ENUMERATED {
       n310-r13
                                                n1, n2, n3, n4, n6, n8, n10, n20},
                                            ENUMERATED {
        t311-r13
                                                ms1000, ms3000, ms5000, ms10000, ms15000,
                                                ms20000, ms30000},
                                            ENUMERATED {
       n311-r13
                                                n1, n2, n3, n4, n5, n6, n8, n10},
                                            ENUMERATED {
        [[ t311-v1350
                                                ms40000, ms60000, ms90000, ms120000}
                                                        OPTIONAL
                                                                   -- Need OR
        ]]
-- ASN1STOP
```

RLF-TimersAndConstants-NB field descriptions

Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

t3xy

Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms200 corresponds with 200 ms and so on. The UE shall use the extended value t311-v1350, if present, and ignore the value signaled by t311-r13.

UplinkPowerControl-NB

The IE *UplinkPowerControlCommon-NB* and IE *UplinkPowerControlDedicated-NB* are used to specify parameters for uplink power control in the system information and in the dedicated signalling, respectively.

UplinkPowerControl-NB information elements

6.7.3.3 NB-IoT Security control information elements

Void

6.7.3.4 NB-IoT Mobility control information elements

AdditionalBandInfoList-NB

AdditionalBandInfoList-NB information element

```
-- ASN1START

AdditionalBandInfoList-NB-r14 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-NB-r13

-- ASN1STOP
```

FreqBandIndicator-NB

The IE FreqBandIndicator-NB indicates the E-UTRA operating band as defined in TS 36.101 [42, table 5.5-1].

FreqBandIndicator-NB information element

```
-- ASN1START

FreqBandIndicator-NB-r13 ::= INTEGER (1.. maxFBI2)
```

-- ASN1STOP

MultiBandInfoList-NB

MultiBandInfoList-NB information element

– NS-PmaxList-NB

The IE NS-PmaxList-NB concerns a list of additionalPmax and additionalSpectrumEmission as defined in TS 36.101 [42, 6.2.4F] for a given frequency band. E-UTRAN does not include the same value of additionalSpectrumEmission in SystemInformationBlockType2-NB within this list.

NS-PmaxList-NB information element

ReselectionThreshold-NB

The IE *ReselectionThreshold-NB* is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = field value * 2 [dB].

ReselectionThreshold-NB information element

```
-- ASN1START

ReselectionThreshold-NB-v1360 ::= INTEGER (32..63)

-- ASN1STOP
```

T-Reselection-NB

The IE *T-Reselection-NB* concerns the cell reselection timer Treselection_{RAT} for NB-IoT.

Value in seconds. s0 means 0 second and behaviour as specified in 7.3.2 applies, s3 means 3 seconds and so on.

T-Reselection-NB information element

```
-- ASN1START

T-Reselection-NB-r13 ::= ENUMERATED {s0, s3, s6, s9, s12, s15, s18, s21}

-- ASN1STOP
```

6.7.3.5 NB-IoT Measurement information elements

Void

6.7.3.6 NB-IoT Other information elements

EstablishmentCause-NB

The IE *EstablishmentCause-NB* provides the establishment cause for the RRC connection request or the RRC connection resume request as provided by the upper layers.

EstablishmentCause-NB information element

```
-- ASN1START

EstablishmentCause-NB-r13 ::= ENUMERATED {
    mt-Access, mo-Signalling, mo-Data, mo-ExceptionData, delayTolerantAccess-v1330, spare3, spare2, spare1}

-- ASN1STOP
```

UE-Capability-NB

The IE *UE-Capability-NB* is used to convey the NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5]. The IE *UE-Capability-NB* is transferred in NB-IoT only.

UE-Capability-NB information element

```
-- ASN1START
                                SEQUENCE {
UE-Capability-NB-r13 ::=
   accessStratumRelease-r13 AccessStratumRelease-NB-r13, ue-Category-NB-r13 ENUMERATED {nb1}
   ue-Category-NB-r13
                                                                        OPTIONAL.
                                ENUMERATED {ID1}
ENUMERATED {supported}
PDCP-Parameters-NB-r13
PhyLayerParameters-NB-r13,
PF-Parameters-NB-r13
   multipleDRB-r13
                                                                        OPTIONAL,
   pdcp-Parameters-r13
                                                                         OPTIONAL,
   phyLayerParameters-r13
    rf-Parameters-r13
                                    RF-Parameters-NB-r13,
   nonCriticalExtension
                                    UE-Capability-NB-v1430-IEs
                                                                        OPTIONAL
UE-Capability-NB-v1430-IEs ::= SEQUENCE {
                                        MAC-Parameters-NB-r14
   mac-Parameters-r14
phyLayerParameters-v1430
rf-Parameters-v1430
   ue-Category-NB-r14
                                    ENUMERATED {nb2}
                                                                        OPTIONAL.
                                                                         OPTIONAL,
                                       PhyLayerParameters-NB-v1430 OPTIONAL,
    rf-Parameters-v1430
                                        RF-Parameters-NB-v1430,
                                        UE-Capability-NB-v1440-IES OPTIONAL
   nonCriticalExtension
}
UE-Capability-NB-v1440-IEs ::=
                                   SEQUENCE {
   phyLayerParameters-v1440
                                       PhyLayerParameters-NB-v1440
                                                                         OPTIONAL,
    nonCriticalExtension
                                        SEOUENCE { }
                                                                         OPTIONAL
AccessStratumRelease-NB-r13 ::=
                                   ENUMERATED {rel13, rel14, spare6, spare5, spare4, spare3,
spare2, spare1, ...}
PDCP-Parameters-NB-r13 ::= SEQUENCE {
    profile0x0002
                                            BOOLEAN.
       profile0x0003
                                            BOOLEAN.
        profile0x0004
                                            BOOLEAN.
       profile0x0006
                                            BOOLEAN,
       profile0x0102
                                            BOOLEAN.
        profile0x0103
                                            BOOLEAN.
       profile0x0104
                                            BOOLEAN
    maxNumberROHC-ContextSessions-r13 ENUMERATED {cs2, cs4, cs8, cs12}
                                                                          DEFAULT cs2,
MAC-Parameters-NB-r14
                       ::= SEQUENCE {
```

```
ENUMERATED {supported} OPTIONAL
  dataInactMon-r14
rai-Support-r14
                                                                                      OPTIONAL,
}
PhyLayerParameters-NB-r13 ::= SEQUENCE {
                                     ENUMERATED {supported} OPTIONAL,
FINIMERATED {supported} OPTIONAL
   multiTone-r13
    multiCarrier-r13
PhyLayerParameters-NB-v1430 ::= SEQUENCE {
multiCarrier-NPRACH-r14 ENUMERATED {supported}
twoHARO-Processes-r14 ENUMERATED {supported}
                                                                      OPTIONAL,
OPTIONAL
                                          ENUMERATED {supported}
    twoHARQ-Processes-r14
}
PhyLayerParameters-NB-v1440 ::=
                                      SEQUENCE {
                                       ENUMERATED {supported}
   interferenceRandomisation-r14
                                                                            OPTIONAL
RF-Parameters-NB-r13 ::= SEQUENCE {
    supportedBandList-r13 Support
    multiNS-Dmax-r13 FNIMER
                                          UENCE {
SupportedBandList-NB-r13,
    multiNS-Pmax-r13
                                           ENUMERATED {supported}
                                                                         OPTIONAL
RF-Parameters-NB-v1430 ::=
                                     SEQUENCE {
                                        ENUMERATED {supported} OPTIONAL
SupportedBandList-NB-r13 ::=
                                     SEQUENCE (SIZE (1..maxBands)) OF SupportedBand-NB-r13
                                    SEQUENCE {
SupportedBand-NB-r13 ::=
                                      FreqBandIndicator-NB-r13,
   band-r13
   powerClassNB-20dBm-r13
                                          ENUMERATED {supported}
                                                                         OPTIONAL
-- ASN1STOP
```

UE-Capability-NB field descriptions

accessStratumRelease

Set to rel14 in this version of the specification.

datalnactMon

Indicates whether the UE supports the data inactivity monitoring as specified in TS 36.321 [6].

interferenceRandomisation

Indicates whether the UE supports interference randomisation in connected mode as defined in TS.36.211 [21].

maxNumberROHC-ContextSessions

Set to the maximum number of concurrently active ROHC contexts supported by the UE, excluding context sessions that leave all headers uncompressed. cs2 corresponds with 2 (context sessions), cs4 corresponds with 4 and so on. The network ignores this field if the UE supports none of the ROHC profiles in *supportedROHC-Profiles*.

multiCarrier

Defines whether the UE supports multi -carrier operation.

multicarrier-NPRACH

Defines whether the UE supports NPRACH on non-anchor carrier as specified in TS 36.321 [6].

multipleDRB

Defines whether the UE supports multiple DRBs.

multiNS-Pmax

Defines whether the UE supports the mechanisms defined for NB-IoT cells broadcasting NS-PmaxList-NB.

multiTone

Defines whether the UE supports UL multi-tone transmissions on NPUSCH.

powerClassNB-14dBm

Defines whether the UE supports power class 14dBm in all the bands supported by the UE as specified in TS 36.101 [42].

If powerClassNB-20dBm is included, the UE shall not include the field powerClassNB-14dBm.

powerClassNB-20dBm

Defines whether the UE supports power class 20dBm in NB-IoT for the band, as specified in TS 36.101 [42]. If neither *powerClassNB-14dBm* nor *powerClassNB-20dBm* is included, UE supports power class 23 dBm in the NB-IoT band.

rai-Support

Defines whether the UE supports release assistance indication (RAI) as specified in TS 36.321 [6].

supportedBandList

Includes the supported NB-IoT bands as defined in TS 36.101 [42].

supportedROHC-Profiles

List of supported ROHC profiles as defined in TS 36.323 [8].

twoHARQ-Processes

Defines whether the UE supports two HARQ processes operation in DL and UL as specified in TS 36.212 [22] and TS 36.213 [23].

ue-Category-NB

UE category as defined in TS 36.306 [5]. Value nb1 corresponds to UE category NB1, value nb2 corresponds to UE category NB2.

A UE shall always include the field *ue-Category-NB-r13* in this version of the specification.

NOTE 1: The IE *UE-Capability-NB* does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently AS need not provide "man-in-the-middle" protection for the security capabilities.

UE-RadioPagingInfo-NB

The IE *UE-RadioPagingInfo-NB* contains UE NB-IoT capability information needed for paging.

UE-RadioPagingInfo-NB information element

```
-- ASN1START

UE-RadioPagingInfo-NB-r13 ::= SEQUENCE {
   ue-Category-NB-r13 ENUMERATED {nb1} OPTIONAL,
   ...,
   [[ multiCarrierPaging-r14 ENUMERATED {true} OPTIONAL
   ]]
}
```

-- ASN1STOP

UE-RadioPagingInfo-NB field descriptions

multiCarrierPaging

Indicates whether the UE supports paging on non-anchor carriers as defined in TS 36.304 [4].

ue-Category-NB

UE NB-IoT category as defined in TS 36.306 [5]. A UE shall always include the field *ue-Category-NB-r13* in this version of the specification.

UE-TimersAndConstants-NB

The IE *UE-TimersAndConstants-NB* contains timers and constants used by the UE in either RRC_CONNECTED or RRC_IDLE.

UE-TimersAndConstants-NB information element

```
-- ASN1START
UE-TimersAndConstants-NB-r13 ::=
                                    SEQUENCE {
   t300-r13
                                        ENUMERATED {
                                            ms2500, ms4000, ms6000, ms10000,
                                            ms15000, ms25000, ms40000, ms60000},
                                        ENUMERATED {
   t301-r13
                                           ms2500, ms4000, ms6000, ms10000,
                                            ms15000, ms25000, ms40000, ms60000},
   t310-r13
                                        ENUMERATED
                                            ms0, ms200, ms500, ms1000, ms2000, ms4000, ms8000},
                                        ENUMERATED {
   n310-r13
                                            n1, n2, n3, n4, n6, n8, n10, n20},
   t311-r13
                                        ENUMERATED {
                                            ms1000, ms3000, ms5000, ms10000, ms15000,
                                            ms20000, ms30000},
   n311-r13
                                        ENUMERATED {
                                            n1, n2, n3, n4, n5, n6, n8, n10},
   [[ t311-v1350
                                        ENUMERATED {
                                            ms40000, ms60000, ms90000, ms120000}
                                                        OPTIONAL -- Need OR
   11
-- ASN1STOP
```

UE-TimersAndConstants-NB field descriptions

n3xy

Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

t3xv

Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms200 corresponds with 200 ms and so on. The UE shall use the extended value *t311-v1350*, if present, and ignore the value signaled by *t311-r13*.

6.7.3.7 NB-IoT MBMS information elements

Void

6.7.3.7a NB-IoT SC-PTM information elements

SC-MTCH-InfoList-NB

The IE *SC-MTCH-InfoList-NB* provides the list of ongoing MBMS sessions transmitted via SC-MRB and for each MBMS session, the associated G-RNTI and scheduling information.

SC-MTCH-InfoList-NB information element

-- ASN1START

```
SC-MTCH-InfoList-NB-r14 ::= SEQUENCE (SIZE (0.. maxSC-MTCH-NB-r14)) OF SC-MTCH-Info-NB-r14
SC-MTCH-Info-NB-r14 ::=
   sc-mtch-CarrierConfig-r14
dl-CarrierConfig-r14
dl-CarrierIndex-r14
                                        SEOUENCE
                                        CHOICE {
                                                 DL-CarrierConfigCommon-NB-r14,
                                            INTEGER (0.. maxNonAnchorCarriers-NB-r14)
   mbmsSessionInfo-r14
                                        MBMSSessionInfo-r13,
    g-RNTI-r14
                                        BIT STRING(SIZE(16)),
    g-RNT1-r14 BIT STRING(SIZE(16)),
sc-mtch-SchedulingInfo-r14 SC-MTCH-SchedulingInfo-NB-r14 OPTIONAL, -- Need OP
sc-mtch-NeighbourCell-r14 BIT STRING (SIZE(maxNeighCell-SCPTM-NB-r14)) OPTIONAL, -
                                                                                         OPTIONAL, --
Need OP
    r32, r64, r128, r256,
                                                     r512, r1024, r2048, spare4,
                                                     spare3, spare2, spare1},
   npdcch-StartSF-SC-MTCH-r14
                                       ENUMERATED {vldot5, v2, v4, v8,
                                                     v16, v32, v48, v64},
                                        ENUMERATED {zero, oneEighth, oneQuarter,
   npdcch-Offset-SC-MTCH-r14
                                                    threeEighth, oneHalf, fiveEighth,
                                                     threeQuarter, sevenEighth},
}
SC-MTCH-SchedulingInfo-NB-r14 ::=
                                      SEOUENCE
    onDurationTimerSCPTM-r14
                                        ENUMERATED {
                                             pp1, pp2, pp3, pp4,
                                                pp8, pp16, pp32, spare},
   drx-InactivityTimerSCPTM-r14
                                            ENUMERATED {
                                                pp0, pp1, pp2, pp3,
                                                 pp4, pp8, pp16, pp32},
    schedulingPeriodStartOffsetSCPTM-r14 CHOICE {
                                                 INTEGER(0..9),
        sf10
        sf20
                                                 INTEGER(0..19),
        sf32
                                                 INTEGER(0..31),
        sf40
                                                 INTEGER(0..39),
        sf64
                                                 INTEGER(0..63),
        sf80
                                                 INTEGER(0..79),
        sf128
                                                 INTEGER(0..127),
        sf160
                                                INTEGER(0..159),
                                                 INTEGER(0..255),
        sf256
        sf320
                                                 INTEGER(0..319),
        sf512
                                                INTEGER(0..511),
        sf640
                                                 INTEGER(0..639),
        sf1024
                                                INTEGER(0..1023),
        sf2048
                                                INTEGER(0..2047),
        sf4096
                                                 INTEGER(0..4095),
        sf8192
                                                INTEGER(0..8191)
    },
}
-- ASN1STOP
```

SC-MTCH-InfoList-NB field descriptions

dl-CarrierConfia

Downlink carrier used for SC-MTCH.

dl-CarrierIndex

Index to a downlink carrier signalled in system information. Value '0' corresponds to the anchor carrier, value '1' corresponds to the first entry in *dl-ConfigList* in *SystemInformationBlockType22-NB*, value '2' corresponds to the second entry in *dl-ConfigList* and so on.

drx-InactivityTimerSCPTM

Timer for SC-MTCH reception in TS 36.321 [6]. Value in number of NPDCCH periods. Value pp1 corresponds to 1 NPDCCH period, pp2 corresponds to 2 NPDCCH periods and so on.

g-RNTI

G-RNTI used to scramble the scheduling and transmission of a SC-MTCH.

mbmsSessionInfo

Indicates the ongoing MBMS session in a SC-MTCH.

npdcch-NPDSCH-MaxTBS-SC-MTCH

Maximum NPDSCH TBS for the SC-MTCH, see TS 36.213 [23]. Value *n680* corresponds to 680 bits and value *n2536* corresponds to 2536 bits.

npdcch-NumRepetition-SC-MTCH

The maximum number of NPDCCH repetitions the UE needs to monitor for SC-MTCH multicast search space, see TS 36.213 [23].

npdcch-Offset-SC-MTCH

Fractional period offset of starting subframe for NPDCCH multicast search space for SC-MTCH, see TS 36.213 [23].

npdcch-startSF-SC-MTCH

Starting subframes configuration of the NPDCCH multicast search space for SC-MTCH, see TS 36.213 [23].

onDurationTimerSCPTM

Timer for SC-MTCH reception in TS 36.321 [6]. Value in number of NPDCCH periods. Value pp1 corresponds to 1 NPDCCH period, pp2 corresponds to 2 NPDCCH periods and so on.

schedulingPeriodStartOffsetSCPTM

SCPTM-SchedulingCycle and SCPTM-SchedulingOffset in TS 36.321 [6]. The value of SCPTM-SchedulingCycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. The value of SCPTM-SchedulingOffset is in number of sub-frames.

sc-mtch-CarrierConfig

Downlink carrier that is used for SC-MTCH.

sc-mtch-NeighbourCell

Indicates neighbour cells which also provide this service on SC-MTCH. The first bit is set to 1 if the service is provided on SC-MTCH in the first cell in *scptmNeighbourCellList*, otherwise it is set to 0. The second bit is set to 1 if the service is provided on SC-MTCH in the second cell in *scptmNeighbourCellList*, and so on. If this field is absent, the UE shall assume that this service is not available on SC-MTCH in any neighbour cell.

sc-mtch-SchedulingInfo

DRX information for the SC-MTCH.

If this field is absent, DRX is not used for the SC-MTCH.

SCPTM-NeighbourCellList-NB

The IE SCPTM-NeighbourCellList-NB indicates a list of neighbour cells where ongoing MBMS sessions provided via SC-MRB in the current cells are also provided.

```
-- ASN1START

SCPTM-NeighbourCellList-NB-r14 ::= SEQUENCE (SIZE (1..maxNeighCell-SCPTM-NB-r14)) OF PCI-ARFCN-NB-r14

PCI-ARFCN-NB-r14 ::= SEQUENCE {
   physCellId-r14 PhysCellId,
   carrierFreq-r14 CarrierFreq-NB-r13 OPTIONAL -- Need OP
}

-- ASN1STOP
```

SCPTM-NeighbourCellList-NB field descriptions		
physCellId		
Physical Cell Identity of the neighbour cell.		
carrierFreq		
Carrier frequency of the neighbour cell.		
Absence of the IE means that the neighbour cell is on the same frequency as the current cell.		

6.7.4 NB-IoT RRC multiplicity and type constraint values

Multiplicity and type constraint definitions

```
maxNPRACH-Resources-NB-r13 INTEGER ::= 3 -- Maximum number of NPRACH resources for NB-IoT maxNonAnchorCarriers-NB-r14 INTEGER ::= 15 -- Maximum number of non-anchor carriers for NB-IoT maxDRB-NB-r13 INTEGER ::= 2 -- Maximum number of Data Radio Bearers for NB-IoT maxNeighCell-SCPTM-NB-r14 INTEGER ::= 8 -- Maximum number of SCPTM neighbour cells maxNS-Pmax-NB-r13 INTEGER ::= 4 -- Maximum number of NS and P-Max values per band maxSC-MTCH-NB-r14 INTEGER ::= 64 -- Maximum number of SC-MTCHs in one cell for NB-IoT maxSI-Message-NB-r13 INTEGER ::= 8 -- Maximum number of SI messages for NB-IoT
```

End of NBIOT-RRC-Definitions

```
-- ASN1START
END
-- ASN1STOP
```

6.7.5 Direct Indication Information

Direct Indication information is transmitted on NPDCCH using P-RNTI but without associated *Paging-NB* message. Table 6.7.5-1 defines the Direct Indication information, see TS 36.212 [22, 6.4.3.3].

When bit n is set to 1, the UE shall behave as if the corresponding field is set in the *Paging-NB* message, see 5.3.2.3. Bit 1 is the least significant bit.

Table 6.7.5-1: Direct Indication information

Bit	Field in Direct Indication information
1	systemInfoModification
2	systemInfoModification-eDRX
3, 4, 5,	Not used, and shall be ignored by UE if received
6, 7, 8	

7 Variables and constants

7.1 UE variables

NOTE: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Unless explicitly specified otherwise, it is however up to UE implementation how to store the variables. The optionality of the IEs in ASN.1 is used only to indicate that the values may not always be available.

EUTRA-UE-Variables

This ASN.1 segment is the start of the E-UTRA UE variable definitions.

```
-- ASN1START
EUTRA-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    AbsoluteTimeInfo-r10,
    AreaConfiguration-r10
    AreaConfiguration-v1130,
    CarrierFreqGERAN,
    CellIdentity,
    ConnEstFailReport-r11,
    SpeedStateScaleFactors,
    C-RNTI,
    LoggingDuration-r10,
    LoggingInterval-r10,
    LogMeasInfo-r10,
    MeasCSI-RS-Id-r12,
    MeasId,
    MeasId-v1250,
    MeasIdToAddModList,
    MeasIdToAddModListExt-r12,
    MeasIdToAddModList-v1310,
    MeasIdToAddModListExt-v1310,
    MeasObjectToAddModList,
    MeasObjectToAddModList-v9e0,
    MeasObjectToAddModListExt-r13,
    MeasScaleFactor-r12,
    MobilityStateParameters,
    NeighCellConfig,
    PhysCellId,
    PhysCellIdCDMA2000,
    PhysCellIdGERAN,
    PhysCellIdUTRA-FDD,
    PhysCellIdUTRA-TDD,
    PLMN-Identity,
    PLMN-IdentityList3-r11,
    QuantityConfig,
    ReportConfigToAddModList,
    RLF-Report-r9,
    TargetMBSFN-AreaList-r12,
    TraceReference-r10,
    Tx-ResourcePoolMeasList-r14,
    VisitedCellInfoList-r12,
    maxCellMeas.
    maxCSI-RS-Meas-r12,
    maxMeasId,
    maxMeasId-r12,
    UL-DelayConfig-r13,
    WLAN-CarrierInfo-r13,
    WLAN-Identifiers-r12,
    WLAN-Id-List-r13,
    WLAN-Status-r13
    WLAN-Status-v1430,
    WLAN-SuspendConfig-r14
FROM EUTRA-RRC-Definitions;
-- ASN1STOP
```

VarConnEstFailReport

The UE variable VarConnEstFailReport includes the connection establishment failure information.

VarConnEstFailReport UE variable

```
-- ASN1START
```

```
VarConnEstFailReport-r11 ::= SEQUENCE {
   connEstFailReport-r11 ConnEstFailReport-r11,
   plmn-Identity-r11 PLMN-Identity
}
-- ASN1STOP
```

VarLogMeasConfig

The UE variable *VarLogMeasConfig* includes the configuration of the logging of measurements to be performed by the UE while in RRC_IDLE, covering intra-frequency, inter-frequency, inter-RAT mobility and MBSFN related measurements. If MBSFN logging is configured, the UE performs logging of measurements while in both RRC_IDLE and RRC_CONNECTED. Otherwise, the UE performs logging of measurements only while in RRC_IDLE.

VarLogMeasConfig UE variable

```
-- ASN1START
VarLogMeasConfig-r10 ::=
                                            SEQUENCE {
    areaConfiguration-r10
                                      AreaConfiguration-r10
                                                                       OPTIONAL.
    loggingDuration-r10
                                       LoggingDuration-r10,
    loggingInterval-r10
                                       LoggingInterval-r10
VarLogMeasConfig-r11 ::= SEQUENCE {
    areaConfiguration-r10 AreaConfiguration-v1130 AreaConfiguration-v1130
                                                                       OPTIONAL,
                                        AreaConfiguration-v1130
                                                                       OPTIONAL,
    loggingDuration-r10
                                      LoggingDuration-r10,
    loggingInterval-r10
                                       LoggingInterval-r10
    areaConfiguration-r10 SEQUENCE {
VarLogMeasConfig-r12 ::=
                                  AreaConfiguration-r10
AreaConfiguration-v1130
LoggingDuration-r10,
                                                                      OPTIONAL.
    areaConfiguration-v1130
                                                                      OPTIONAL,
    loggingDuration-r10 loggingInterval-r10
                                      LoggingInterval-r10,
    targetMBSFN-AreaList-r12
                                       TargetMBSFN-AreaList-r12
                                                                       OPTIONAL
-- ASN1STOP
```

- VarLogMeasReport

The UE variable VarLogMeasReport includes the logged measurements information.

VarLogMeasReport UE variable

```
-- ASN1START
                                        SEQUENCE {
VarLogMeasReport-r10 ::=
   traceReference-r10
                                        TraceReference-r10,
                                           OCTET STRING (SIZE (2)),
    traceRecordingSessionRef-r10
    tce-Id-r10
                                       OCTET STRING (SIZE (1)),
    plmn-Identity-r10
                                        PLMN-Identity,
    absoluteTimeInfo-r10
                                        AbsoluteTimeInfo-r10,
    logMeasInfoList-r10
                                        LogMeasInfoList2-r10
VarLogMeasReport-r11 ::= SEQUENCE {
   traceRecordingSessionRef-r10 TraceReference-r10,

tce-Id-r10 OCTET STRING (SIZE
                                       OCTET STRING (SIZE (2)),
                                        OCTET STRING (SIZE (1)),
   plmn-IdentityList-r11
                                       PLMN-IdentityList3-r11,
    absoluteTimeInfo-r10
                                       AbsoluteTimeInfo-r10,
    logMeasInfoList-r10
                                       LogMeasInfoList2-r10
LogMeasInfoList2-r10 ::=
                                        SEQUENCE (SIZE (1..maxLogMeas-r10)) OF LogMeasInfo-r10
-- ASN1STOP
```

VarMeasConfig

The UE variable *VarMeasConfig* includes the accumulated configuration of the measurements to be performed by the UE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements.

NOTE: The amount of measurement configuration information, which a UE is required to store, is specified in subclause 11.1. If the number of frequencies configured for a particular RAT exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies of that RAT are measured. If the total number of frequencies for all RATs provided to the UE in the measurement configuration exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies/RATs are measured.

VarMeasConfig UE variable

```
-- ASN1START
VarMeasConfig ::=
                                   SEQUENCE {
     - Measurement identities
                                       MeasIdToAddModList
                                                                           OPTIONAL,
   measIdList
   measIdListExt-r12
                                       MeasIdToAddModListExt-r12
                                                                           OPTIONAL,
   measIdList-v1310
                                           MeasIdToAddModList-v1310
                                                                                   OPTIONAL,
   measIdListExt-v1310
                                       MeasIdToAddModListExt-v1310
                                                                           OPTIONAL,
    -- Measurement objects
                                       MeasObjectToAddModList
   measObjectList
                                                                           OPTIONAL,
   measObjectListExt-r13
                                       MeasObjectToAddModListExt-r13
                                                                           OPTIONAL,
                                       MeasObjectToAddModList-v9e0
   measObjectList-v9i0
                                                                           OPTIONAL,
    -- Reporting configurations
   reportConfigList
                                       ReportConfigToAddModList
                                                                           OPTIONAL.
    -- Other parameters
   quantityConfig
                                       QuantityConfig
                                                                           OPTIONAL,
   measScaleFactor-r12
                                       MeasScaleFactor-r12
                                                                           OPTIONAL,
                                       INTEGER (-140..-44)
   s-Measure
                                                                           OPTIONAL.
   speedStatePars
                                       CHOICE {
       release
                                           NULL,
                                           SEQUENCE {
       setup
           mobilityStateParameters
                                               MobilityStateParameters,
           timeToTrigger-SF
                                               SpeedStateScaleFactors
                                                                            OPTIONAL,
   allowInterruptions-r11
                                  BOOLEAN
                                                                       OPTIONAL
-- ASN1STOP
```

· VarMeasReportList

The UE variable VarMeasReportList includes information about the measurements for which the triggering conditions have been met.

VarMeasReportList UE variable

```
-- ASN1START
                                   SEQUENCE (SIZE (1..maxMeasId)) OF VarMeasReport
VarMeasReportList ::=
VarMeasReportList-r12 ::=
                                   SEQUENCE (SIZE (1..maxMeasId-r12)) OF VarMeasReport
VarMeasReport ::=
                                  SEOUENCE {
    -- List of measurement that have been triggered
    measId
                                       MeasId,
   measId-v1250
                                       MeasId-v1250
                                                                       OPTIONAL,
    cellsTriggeredList
                                       CellsTriggeredList
                                                                       OPTIONAL,
                                       CSI-RS-TriggeredList-r12
    csi-RS-TriggeredList-r12
                                                                       OPTIONAL,
                                       Tx-ResourcePoolMeasList-r14 OPTIONAL,
   poolsTriggeredList-r14
    numberOfReportsSent
CellsTriggeredList ::=
                                   SEQUENCE (SIZE (1..maxCellMeas)) OF CHOICE {
   physCellIdEUTRA
                                           PhysCellId,
    physCellIdUTRA
                                           CHOICE {
                                               PhysCellIdUTRA-FDD,
        fdd
        tdd
                                               PhysCellIdUTRA-TDD
```

VarMobilityHistoryReport

The UE variable VarMobilityHistoryReport includes the mobility history information.

```
-- ASN1START
VarMobilityHistoryReport-r12 ::= VisitedCellInfoList-r12
-- ASN1STOP
```

- VarRLF-Report

The UE variable VarRLF-Report includes the radio link failure information or handover failure information.

VarRLF-Report UE variable

```
-- ASN1START

VarRLF-Report-r10 ::= SEQUENCE {
    rlf-Report-r10 RLF-Report-r9,
    plmn-Identity-r10 PLMN-Identity
}

VarRLF-Report-r11 ::= SEQUENCE {
    rlf-Report-r10 RLF-Report-r9,
    plmn-IdentityList-r11 PLMN-IdentityList3-r11
}
```

VarShortMAC-Input

The UE variable VarShortMAC-Input specifies the input used to generate the shortMAC-I.

VarShortMAC-Input UE variable

```
-- ASN1START

VarShortMAC-Input ::= SEQUENCE {
    cellIdentity CellIdentity,
    physCellId PhysCellId,
    c-RNTI C-RNTI
}

-- ASN1STOP
```

```
VarShortMAC-Input field descriptions

cellIdentity
Set to CellIdentity of the current cell.

c-RNTI
Set to C-RNTI that the UE had in the PCell it was connected to prior to the failure.

physCellId
Set to the physical cell identity of the PCell the UE was connected to prior to the failure.
```

VarShortResumeMAC-Input

The UE variable *VarShortResumeMAC-Input* specifies the input used to generate the *shortResumeMAC-I* during RRC Connection Resume procedure.

VarShortResumeMAC-Input UE variable

```
-- ASN1START

VarShortResumeMAC-Input-r13 ::= SEQUENCE {
    cellIdentity-r13 CellIdentity,
    physCellId-r13 PhysCellId,
    c-RNTI-r13 C-RNTI,
    resumeDiscriminator-r13 BIT STRING(SIZE(1))
}

-- ASN1STOP
```

VarShortResumeMAC-Input field descriptions

cellidentity

Set to CellIdentity of the current cell.

c-RNTI

Set to C-RNTI that the UE had in the PCell it was connected to prior to suspension of the RRC connection.

physCellla

Set to the physical cell identity of the PCell the UE was connected to prior to suspension of the RRC connection..

resumeDiscriminator

A constant that allows differentiation in the calculation of the MAC-I for shortResumeMAC-I

The resumeDiscriminator is set to '1'

VarWLAN-MobilityConfig

The UE variable VarWLAN-MobilityConfig includes information about WLAN for access selection and mobility.

VarWLAN-MobilityConfig UE variable

```
-- ASN1START

VarWLAN-MobilityConfig ::= SEQUENCE {
    wlan-MobilitySet-r13 WLAN-Id-List-r13 OPTIONAL,
    successReportRequested ENUMERATED {true} OPTIONAL,
    wlan-SuspendConfig-r14 WLAN-SuspendConfig-r14 OPTIONAL
}

-- ASN1STOP
```

VarWLAN-MobilityConfig field descriptions

wlan-MobilitySet

Indicates the WLAN mobility set configured.

successReportRequested

Indicates whether the UE shall report successful connection to WLAN. Applicable to LWA and LWIP.

- VarWLAN-Status

The UE variable *VarWLAN-Status* includes information about the status of WLAN connection for LWA, RCLWI or LWIP.

VarWLAN-Status UE variable

```
-- ASN1START

VarWLAN-Status-r13 ::= SEQUENCE {
    status-r13 WLAN-Status-r13,
    status-r14 WLAN-Status-v1430 OPTIONAL
}
```

-- ASN1STOP

VarWLAN-Status field descriptions

status

Indicates the connection status to WLAN and causes for connection failures.

Multiplicity and type constraint definitions

This section includes multiplicity and type constraints applicable (only) for UE variables.

End of EUTRA-UE-Variables

```
-- ASN1START
END
-- ASN1STOP
```

7.1a NB-IoT UE variables

NOTE: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Unless explicitly specified otherwise, it is however up to UE implementation how to store the variables. The optionality of the IEs in ASN.1 is used only to indicate that the values may not always be available.

NBIOT-UE-Variables

This ASN.1 segment is the start of the NB-IoT UE variable definitions.

```
-- ASN1START

NBIOT-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    VarShortMAC-Input,
    VarShortResumeMAC-Input-r13

FROM EUTRA-UE-Variables;

VarShortMAC-Input-NB-r13 ::= VarShortMAC-Input

VarShortResumeMAC-Input-NB-r13 ::= VarShortResumeMAC-Input-r13

-- ASN1STOP
```

End of NBIOT-UE-Variables

```
-- ASN1START
END
-- ASN1STOP
```

7.2 Counters

Counter	Reset	Incremented	When reaching max value

7.3 Timers

7.3.1 Timers (Informative)

Timer	Start	Stop	At expiry
T300 NOTE1	Transmission of RRCConnectionRequest or RRCConnectionResumeR equest	Reception of RRCConnectionSetup, RRCConnectionReject or RRCConnectionResume message, cell re-selection and upon abortion of connection establishment by upper layers	Perform the actions as specified in 5.3.3.6
T301 NOTE1	Transmission of RRCConnectionReestabil shmentRequest	Reception of RRCConnectionReestablishment or RRCConnectionReestablishment Reject message as well as when the selected cell becomes unsuitable	Go to RRC_IDLE
T302	Reception of RRCConnectionReject while performing RRC connection establishment	Upon entering RRC_CONNECTED and upon cell re-selection	Inform upper layers about barring alleviation as specified in 5.3.3.7
T303	Access barred while performing RRC connection establishment for mobile originating calls	Upon entering RRC_CONNECTED and upon cell re-selection	Inform upper layers about barring alleviation as specified in 5.3.3.7
T304	Reception of RRCConnectionReconfig uration message including the MobilityControl Info or reception of MobilityFromEUTRACo mmand message including CellChangeOrder	Criterion for successful completion of handover within E-UTRA, handover to E-UTRA or cell change order is met (the criterion is specified in the target RAT in case of inter-RAT)	In case of cell change order from E-UTRA or intra E-UTRA handover, initiate the RRC connection re-establishment procedure; In case of handover to E-UTRA, perform the actions defined in the specifications applicable for the source RAT.
T305	Access barred while performing RRC connection establishment for mobile originating signalling	Upon entering RRC_CONNECTED and upon cell re-selection	Inform upper layers about barring alleviation as specified in 5.3.3.7

Timer	Start	Stop	At expiry
T306	Access barred while performing RRC connection establishment for mobile originating CS fallback.	Upon entering RRC_CONNECTED and upon cell re-selection	Inform upper layers about barring alleviation as specified in 5.3.3.7
T307	Reception of RRCConnectionReconfig uration message including MobilityControlInfoSCG	Successful completion of random access on the PSCell, upon initiating re-establishment and upon SCG release	Inform E-UTRAN about the SCG change failure by initiating the SCG failure information procedure as specified in 5.6.13.
T308	Access barred due to ACDC while performing RRC connection establishment subject to ACDC	Upon entering RRC_CONNECTED and upon cell re-selection	Inform upper layers about barring alleviation for ACDC as specified in 5.3.3.7
T310 NOTE1 NOTE2	Upon detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive out-of-sync indications from lower layers	Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure and upon initiating the connection re-establishment procedure	If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure
T311 NOTE1	Upon initiating the RRC connection re- establishment procedure	Selection of a suitable E-UTRA cell or a cell using another RAT.	Enter RRC_IDLE
T312 NOTE2	Upon triggering a measurement report for a measurement identity for which T312 has been configured, while T310 is running	Upon receiving N311 consecutive in-sync indications from lower layers, upon triggering the handover procedure, upon initiating the connection re-establishment procedure, and upon the expiry of T310	If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure
T313 NOTE2	Upon detecting physical layer problems for the PSCell i.e. upon receiving N313 consecutive out-of-sync indications from lower layers	Upon receiving N314 consecutive in-sync indications from lower layers for the PSCell, upon initiating the connection re-establishment procedure, upon SCG release and upon receiving RRCConnectionReconfiguration including MobilityControlInfoSCG	Inform E-UTRAN about the SCG radio link failure by initiating the SCG failure information procedure as specified in 5.6.13.
T320	Upon receiving <i>t320</i> or upon cell (re)selection to E-UTRA from another RAT with validity time configured for dedicated priorities (in which case the remaining validity time is applied).	Upon entering RRC_CONNECTED, when PLMN selection is performed on request by NAS, or upon cell (re)selection to another RAT (in which case the timer is carried on to the other RAT).	Discard the cell reselection priority information provided by dedicated signalling.

Timer	Start	Stop	At expiry
T321	Upon receiving measConfig including a reportConfig with the purpose set to reportCGI	Upon acquiring the information needed to set all fields of cellGlobalId for the requested cell, upon receiving measConfig that includes removal of the reportConfig with the purpose set to reportCGI	Initiate the measurement reporting procedure, stop performing the related measurements and remove the corresponding <i>measId</i>
T322	Upon receiving redirectedCarrierOffset Dedicated included in RedirectedCarrierInfo	Upon entering RRC_CONNECTED, when PLMN selection is performed on request by NAS, or upon cell (re)selection to another RAT.	Release redirectedCarrierOffsetDedicat ed.
T325	Timer (re)started upon receiving RRCConnectionReject message with deprioritisationTimer.		Stop deprioritisation of all frequencies or E-UTRA signalled by <i>RRCConnectionReject</i> .
T330	Upon receiving LoggedMeasurementCon figuration message	Upon log volume exceeding the suitable UE memory, upon initiating the release of LoggedMeasurementConfigurat ion procedure	Perform the actions specified in 5.6.6.4
T340 NOTE2	Upon transmitting UEAssistanceInformatio n message with powerPrefIndication set to normal	Upon initiating the connection re-establishment procedure	No action.
T341 NOTE2	Upon transmitting UEAssistanceInformatio n message with bw- Preference.	Upon resuming an RRC connection or upon initiating the connection re-establishment procedure	No action.
T342 NOTE2	Upon transmitting DelayBudgetReport message.	Upon initiating the connection re-establishment and connection resume procedures	No action.
T350	Upon entering RRC_IDLE if <i>t350</i> has been received in wlan-OffloadInfo.	Upon entering RRC_CONNECTED, or upon cell reselection.	Perform the actions specified in 5.6.12.4.
T351	Reception of RRCConnectionReconfig uration message including the associationTimer in WLAN-MobilityConfig.	Upon successful connection to WLAN, upon WLAN connection failure, upon leaving RRC_CONNECTED, upon triggering the handover procedure, or upon initiating the connection re-establishment procedure.	Perform WLAN Connection Status Reporting specified in 5.6.15.2.
T360	Upon performing the redistribution target selection as specified in TS 36.304 [4].	Upon entering RRC_CONNECTED, upon receiving a Paging message including redistributionIndication; upon reselecting a cell not belonging to the redistribution target.	Stop considering a frequency or cell to be redistribution target, and perform the redistribution target selection if the condition specified in TS 36.304 [4] is met.

Timer	Start	Stop	At expiry
T370	Upon receiving SL- DiscConfig including a discSysInfoToReportCon fig set to setup.	Upon initiating the transmission of SidelinkUEInformation including discSysInfoReportFreqList, upon receiving SL-DiscConfig including discSysInfoToReportConfig set to release, upon handover and re-establishment.	Release discSysInfoToReportConfig.
T314 NOTE2	Upon early detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive "early-out-of-sync" indications from lower layers.	Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure and upon initiating the connection re-establishment procedure	Initiate the UE Assistance Information procedure to report early detection of physical layer problems in accordance with 5.6.10.
T315 NOTE2	Upon detecting physical layer improvements of the PCell i.e. upon receiving N311 consecutive "early-insync" indications from lower layers.	Upon receiving N310 consecutive "early-out-of-sync" indications from lower layers for the PCell.	Initiate the UE Assistance Information procedure to report detection of physical layer improvements in accordance with 5.6.10.
T343 NOTE2	Upon transmitting UEAssistanceInformation message with RLM- Report including earlyOutOfSync.	Upon initiating the connection re-establishment procedure	No action.
T344 NOTE2	Upon transmitting UEAssistanceInformation message with RLM- Report including earlyInSync.	Upon initiating the connection re-establishment procedure	No action.
	nly the timers marked with "Ne behaviour as specified in 7	IOTE1" are applicable to NB-loT. 7.3.2 applies.	

7.3.2 Timer handling

When the UE applies zero value for a timer, the timer shall be started and immediately expire unless explicitly stated otherwise.

7.4 Constants

Constant	Usage
N310	Maximum number of consecutive "out-of-sync" or "early-out-of-sync" indications for the PCell received from lower layers
N311	Maximum number of consecutive "in-sync" or "early-in-sync" indications for the PCell received from lower layers
N313	Maximum number of consecutive "out-of-sync" indications for the PSCell received from lower layers
N314	Maximum number of consecutive "in-sync" indications for the PSCell received from lower layers

8 Protocol data unit abstract syntax

8.1 General

The RRC PDU contents in clause 6, clause 9.3.2 and clause 10 are described using abstract syntax notation one (ASN.1) as specified in ITU-T Rec. X.680 [13] and X.681 [14]. Transfer syntax for RRC PDUs is derived from their ASN.1 definitions by use of Packed Encoding Rules, unaligned as specified in ITU-T Rec. X.691 [15].

The following encoding rules apply in addition to what has been specified in X.691:

- When a bit string value is placed in a bit-field as specified in 15.6 to 15.11 in X.691, the leading bit of the bit string value shall be placed in the leading bit of the bit-field, and the trailing bit of the bit string value shall be placed in the trailing bit of the bit-field.

NOTE: The terms 'leading bit' and 'trailing bit' are defined in ITU-T Rec. X.680. When using the 'bstring' notation, the leading bit of the bit string value is on the left, and the trailing bit of the bit string value is on the right.

- When decoding types constrained with the ASN.1 Contents Constraint ("CONTAINING"), automatic decoding of the contained type should not be performed because errors in the decoding of the contained type should not cause the decoding of the entire RRC message PDU to fail. It is recommended that the decoder first decodes the outer PDU type that contains the OCTET STRING or BIT STRING with the Contents Constraint, and then decodes the contained type that is nested within the OCTET STRING or BIT STRING as a separate step.
- When decoding a) RRC message PDUs, b) BIT STRING constrained with a Contents Constraint, or c) OCTET STRING constrained with a Contents Constraint, PER decoders are required to never report an error if there are extraneous zero or non-zero bits at the end of the encoded RRC message PDU, BIT STRING or OCTET STRING.

8.2 Structure of encoded RRC messages

An RRC PDU, which is the bit string that is exchanged between peer entities/ across the radio interface contains the basic production as defined in X.691.

RRC PDUs shall be mapped to and from PDCP SDUs (in case of DCCH) or RLC SDUs (in case of PCCH, BCCH, BR-BCCH, CCCH or MCCH) upon transmission and reception as follows:

- when delivering an RRC PDU as an PDCP SDU to the PDCP layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the PDCP SDU and onwards; and
- when delivering an RRC PDU as an RLC SDU to the RLC layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the RLC SDU and onwards; and
- upon reception of an PDCP SDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit of the RRC PDU and onwards; and
- upon reception of an RLC SDU from the RLC layer, the first bit of the RLC SDU shall represent the first bit of the RRC PDU and onwards.

8.3 Basic production

The 'basic production' is obtained by applying UNALIGNED PER to the abstract syntax value (the ASN.1 description) as specified in X.691. It always contains a multiple of 8 bits.

8.4 Extension

The following rules apply with respect to the use of protocol extensions:

- A transmitter compliant with this version of the specification shall, unless explicitly indicated otherwise on a PDU type basis, set the extension part empty. Transmitters compliant with a later version may send non-empty extensions;
- A transmitter compliant with this version of the specification shall set spare bits to zero;

8.5 Padding

If the encoded RRC message does not fill a transport block, the RRC layer shall add padding bits. This applies to PCCH, BCCH and BR-BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.

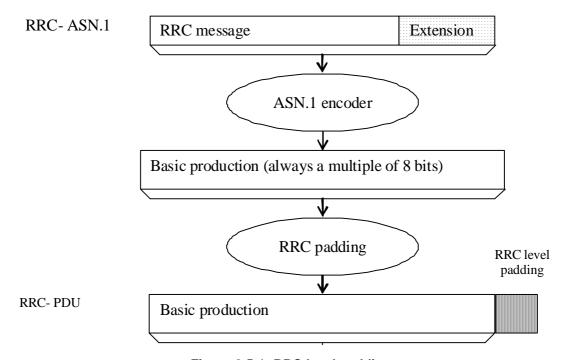


Figure 8.5-1: RRC level padding

9 Specified and default radio configurations

Specified and default configurations are configurations of which the details are specified in the standard. Specified configurations are fixed while default configurations can be modified using dedicated signalling.

9.1 Specified configurations

9.1.1 Logical channel configurations

9.1.1.1 BCCH configuration

Name	Value	Semantics description	Ver
PDCP configuration	N/A		
RLC configuration	TM		
MAC configuration	TM		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.2 CCCH configuration

Parameters

Name	Value	Semantics description	Ver
PDCP configuration	N/A		
RLC configuration	TM		
MAC configuration		Normal MAC headers are used	
Logical channel configuration			
priority	1	Highest priority	
prioritisedBitRate	infinity		
bucketSizeDuration	N/A		
logicalChannelGroup	0		
logicalChannelSR-Mask-r9	release		v920

9.1.1.3 PCCH configuration

Parameters

Name	Value	Semantics description	Ver
PDCP configuration	N/A		
RLC configuration	TM		
MAC configuration	TM		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.4 MCCH and MTCH configuration

Parameters

Name	Value	Semantics description	Ver
PDCP configuration	N/A		
RLC configuration	UM		
sn-FieldLength	size5		
t-Reordering	0		

9.1.1.5 SBCCH configuration

Name	Value	Semantics description	Ver
PDCP configuration	N/A		
RLC configuration	TM		
MAC configuration	TM		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.6 STCH configuration

Parameters

Name	Value	Semantics description	Ver
PDCP configuration		·	
discardTimer	Undefined	Up to UE implementation	
pdcp-SN-Size	16		
maxCID	15		
profiles			
RLC configuration		Uni-directional UM RLC UM window size is set to 0	
		Uni-directional UM RLC UM window size is set to 0 for sidelink communication	v1440
sn-FieldLength	5		
logicalChannelIdentity	Undefined	Selected by the transmitting UE, up to UE implementation	
Logical channel configuration			
priority	Undefined	Selected by the transmitting UE, up to UE implementation	
prioritisedBitRate	Undefined	Selected by the transmitting UE, up to UE implementation	
bucketSizeDuration	Undefined	Selected by the transmitting UE, up to UE implementation	
logicalChannelGroup	3		
t-Reordering	Undefined	Only used for V2X sidelink communication. Selected by the receiving UE, up to UE implementation	v1440
MAC configuration			

9.1.1.7 SC-MCCH and SC-MTCH configuration

Parameters

Name	Value	Semantics description	Ver
PDCP configuration	N/A		
RLC configuration	UM		
sn-FieldLength	size5		
t-Reorderina	0		

9.1.1.8 BR-BCCH configuration

Name	Value	Semantics description	Ver
PDCP configuration	N/A		
RLC configuration	TM		

Name	Value	Semantics description	Ver
MAC configuration	TM		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.2 SRB configurations

9.1.2.1 SRB1

Parameters

Name	Value	Semantics description	Ver
RLC configuration			
logicalChannelIdentity	1		

9.1.2.1a SRB1bis

Parameters

Name	Value	Semantics description	Ver
RLC configuration			
logicalChannelIdentity	3		

9.1.2.2 SRB2

Parameters

Name	Value	Semantics description	Ver
RLC configuration			
logicalChannelIdentity	2		

9.2 Default radio configurations

The following sections only list default values for REL-8 parameters included in protocol version v8.5.0. For all fields introduced in a later protocol version, the default value is "released" unless explicitly specified otherwise. If UE is to apply default configuration while it is configured with some critically extended fields, the UE shall apply the original version with only default values. For the following fields, introduced in a protocol version later than v8.5.0, the default corresponds with "value not applicable":

- codeBookSubsetRestriction-v920;
- pmi-RI-Report;
- NOTE 1: Value "N/A" indicates that the UE does not apply a specific value (i.e. upon switching to a default configuration, E-UTRAN can not assume the UE keeps the previously configured value). This implies that E-UTRAN needs to configure a value before invoking the related functionality.
- NOTE 2: In general, the signalling should preferably support a "release" option for fields introduced after v8.5.0. The "value not applicable" should be used restrictively, mainly limited to for fields which value is relevant only if another field is set to a value other than its default.

9.2.1 SRB configurations

9.2.1.1 SRB1

Parameters

Name	Value	NB-IoT	Semantics description	Ver
RLC configuration CHOICE	am	am		
ul-RLC-Config				
>t-PollRetransmit	ms45	ms25000		
>pollPDU	infinity	N/A		
>pollByte	infinity	N/A		
>maxRetxThreshold	t4	t4		
dl-RLC-Config				
>t-Reordering	ms35	N/A		
>t-StatusProhibit	ms0	N/A		
>enableStatusReportSN-Gap	N/A	disabled		
Logical channel configuration				
priority	1	1	Highest priority	
prioritisedBitRate	infinity	N/A		
bucketSizeDuration	N/A	N/A		
logicalChannelGroup	0	N/A		
logicalChannelSR-Prohibit	N/A	TRUE		

9.2.1.2 SRB2

Name	Value	Semantics description	Ver
RLC configuration CHOICE	am		
ul-RLC-Config			
>t-PollRetransmit	ms45		
>pollPDU	infinity		
>pollByte	infinity		
>maxRetxThreshold	t4		
dl-RLC-Config			
>t-Reordering	ms35		
>t-StatusProhibit	ms0		
Logical channel configuration			

Name	Value	Semantics description	Ver
priority	3		
prioritisedBitRate	infinity		
bucketSizeDuration	N/A		
logicalChannelGroup	0		

9.2.2 Default MAC main configuration

Parameters

Name	Value	NB-IoT	Semantics description	Ver
MAC main configuration				
maxHARQ-tx	n5	N/A		
periodicBSR-Timer	infinity	pp8		
retxBSR-Timer	sf2560	infinity		
ttiBundling	FALSE	N/A		
drx-Config	release	N/A		
phr-Config	release	N/A		

9.2.3 Default semi-persistent scheduling configuration

SPS-Config		
>sps-ConfigDL	release	
>sps-ConfigUL	release	

9.2.4 Default physical channel configuration

Parameters (not applicable for NB-IoT)

Name	Value	Semantics description	Ver
PDSCH-ConfigDedicated			
>p-a	dB0		
PUCCH-ConfigDedicated			
> tdd-AckNackFeedbackMode	bundling	Only valid for TDD mode	
>ackNackRepetition	release		
PUSCH-ConfigDedicated			
>betaOffset-ACK-Index	10		
>betaOffset-RI-Index	12		
>betaOffset-CQI-Index	15		

Name	Value	Semantics description	Ver
UplinkPowerControlDedicated			
>p0-UE-PUSCH	0		
>deltaMCS-Enabled	en0 (disabled)		
>accumulationEnabled	TRUE		
>p0-UE-PUCCH	0		
>pSRS-Offset	7		
> filterCoefficient	fc4		
tpc-pdcch-ConfigPUCCH	release		
tpc-pdcch-ConfigPUSCH	release		
CQI-ReportConfig			
> CQI-ReportPeriodic	release		
> cqi-ReportModeAperiodic	N/A		
> nomPDSCH-RS-EPRE-Offset	N/A		
SoundingRS-UL-ConfigDedicated	release		
AntennaInfoDedicated			
>transmissionMode	tm1, tm2	If the number of PBCH antenna ports is one, tm1 is used as default; otherwise tm2 is used as default	
>codebookSubsetRestriction	N/A		
>ue-TransmitAntennaSelection	release		
SchedulingRequestConfig	release		

Parameters applicable for NB-IoT

Name	Value	Semantics description	Ver
NPUSCH-ConfigDedicated-NB			
> ack-NACK-NumRepetitions > npusch-AllSymbols	N/A TRUE		
UplinkPowerControlDedicated >p0-UE-NPUSCH	0		

9.2.5 Default values timers and constants

Name	Value	Semantics description	Ver
t310	ms1000		
n310	n1		
t311	ms1000		
n311	n1		

9.3 Sidelink pre-configured parameters

9.3.1 Specified parameters

This section only list parameters which value is specified in the standard.

Parameters

Name	Value	Semantics description	Ver
preconfigSync			
>syncTxParameters			
>>alpha	0		
preconfigComm			
>sc-TxParameters			
>>alpha	0		
>dataTxParameters			
>>alpha	0		
v2x-CommPreconfigSync			
>syncTxParameters			
>>alpha	0		
v2x-CommTxPoolList, p2x-			
CommTxPoolList			
>dataTxParameters			
>>alpha	0		

9.3.2 Pre-configurable parameters

This ASN.1 segment is the start of the E-UTRA definitions of pre-configured sidelink parameters.

NOTE 1: Upper layers are assumed to provide a set of pre-configured parameters that are valid at the current UE location if any, see TS 24.334 [69, 10.2].

```
-- ASN1START
EUTRA-Sidelink-Preconf DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
    Additional Spectrum Emission,
    AdditionalSpectrumEmission-v1010,
   ARFCN-ValueEUTRA-r9,
    FilterCoefficient,
   maxCBR-Level-r14,
   maxCBR-Level-1-r14,
    maxFreq,
   maxFreqV2X-r14,
   maxSL-TxPool-r12,
   maxSL-CommRxPoolPreconf-v1310,
   maxSL-CommTxPoolPreconf-v1310,
   maxSL-DiscRxPoolPreconf-r13,
   maxSL-DiscTxPoolPreconf-r13,
    maxSL-V2X-CBRConfig2-r14,
    maxSL-V2X-CBRConfig2-1-r14,
   maxSL-V2X-RxPoolPreconf-r14,
```

```
maxSL-V2X-TxConfig2-r14,
    maxSL-V2X-TxConfig2-1-r14,
   maxSL-V2X-TxPoolPreconf-r14,
    P-Max,
    ReselectionInfoRelay-r13,
    SL-AnchorCarrierFreqList-V2X-r14,
    SL-CBR-Levels-Config-r14,
    SL-CBR-PSSCH-TxConfig-r14,
    SL-CommTxPoolSensingConfig-r14,
    SL-CP-Len-r12,
    SL-HoppingConfigComm-r12,
    SL-OffsetIndicator-r12,
    SL-OffsetIndicatorSync-r12,
    SL-OffsetIndicatorSync-v1430,
    SL-PeriodComm-r12,
    RSRP-RangeSL3-r12,
    SL-PriorityList-r13,
    SL-TF-ResourceConfig-r12,
    SL-TRPT-Subset-r12,
    SL-TxParameters-r12,
    SL-ZoneConfig-r14,
    P0-SL-r12,
    TDD-ConfigSL-r12,
    SubframeBitmapSL-r14,
    SL-P2X-ResourceSelectionConfig-r14,
    SL-RestrictResourceReservationPeriodList-r14,
    SL-SyncAllowed-r14,
    SL-OffsetIndicatorSync-r14,
    SL-Priority-r13
FROM EUTRA-RRC-Definitions;
-- ASN1STOP
```

SL-Preconfiguration

The IE SL-Preconfiguration includes the sidelink pre-configured parameters.

SL-Preconfiguration information elements

```
-- ASN1START
SL-Preconfiguration-r12 ::= SEQUENCE {
    preconfigGeneral-r12 SL-PreconfigGeneral-r12, preconfigSync-r12 SL-PreconfigSync-r12,
                                          SL-PreconfigSync-r12,
    preconfigSync-r12
    preconfigComm-r12
                                         SL-PreconfigCommPoolList4-r12,
            configComm-v1310 SEQUENCE {
commRxPoolList-r13 SL-PreconfigCommRxPoolList-r13,
commTxPoolList-r13 SL-PreconfigCommTxPoolList-r13
    [[ preconfigComm-v1310
                                                                                  OPTIONAL
                                                                                      OPTIONAL,
                                         SEQUENCE {
        preconfigDisc-r13
            discRxPoolList-r13
                                               SL-PreconfigDiscRxPoolList-r13,
            discTxPoolList-r13
                                               SL-PreconfigDiscTxPoolList-r13
                                                                                      OPTIONAL
                                                                                      OPTIONAL,
        preconfigRelay-r13
                                          SL-PreconfigRelay-r13
    11
SL-PreconfigGeneral-r12 ::=
                                 SEQUENCE {
    -- PDCP configuration
    rohc-Profiles-r12
                                           SEOUENCE {
        profile0x0001-r12
                                                   BOOLEAN,
        profile0x0002-r12
                                                    BOOLEAN,
        profile0x0004-r12
                                                   BOOLEAN,
        profile0x0006-r12
                                                   BOOLEAN,
        profile0x0101-r12
                                                   BOOLEAN,
        profile0x0102-r12
                                                    BOOLEAN,
        profile0x0104-r12
                                                    BOOLEAN
    -- Physical configuration
                                           ARFCN-ValueEUTRA-r9,
    carrierFreq-r12
    maxTxPower-r12
                                           P-Max,
    additionalSpectrumEmission-r12
                                          AdditionalSpectrumEmission,
```

```
sl-bandwidth-r12
                                       ENUMERATED {n6, n15, n25, n50, n75, n100},
    tdd-ConfigSL-r12
                                       TDD-ConfigSL-r12,
   reserved-r12
                                       BIT STRING (SIZE (19)),
    [ [
       additionalSpectrumEmission-v1440
                                              AdditionalSpectrumEmission-v1010
                                                                                      OPTIONAL
    11
}
SL-PreconfigSync-r12 ::= SEQUENCE {
    syncCP-Len-r12
                                       SL-CP-Len-r12,
    syncOffsetIndicator1-r12
                                      SL-OffsetIndicatorSync-r12,
    syncOffsetIndicator2-r12
                                       SL-OffsetIndicatorSync-r12,
                                      P0-SL-r12,
    syncTxParameters-r12
    syncTxThreshOoC-r12
                                      RSRP-RangeSL3-r12,
    filterCoefficient-r12
                                       FilterCoefficient,
    syncRefMinHyst-r12
                                      ENUMERATED {dB0, dB3, dB6, dB9, dB12},
    syncRefDiffHyst-r12
                                      ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf},
    [[ syncTxPeriodic-r13
                                           ENUMERATED {true}
                                                                      OPTIONAL
    11
}
SL-PreconfigCommPoolList4-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-PreconfigCommPool-
r12
SL-PreconfigCommRxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-CommRxPoolPreconf-v1310)) OF SL-
PreconfigCommPool-r12
SL-PreconfigCommTxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-CommTxPoolPreconf-v1310)) OF SL-
PreconfigCommPool-r12
SL-PreconfigCommPool-r12 ::=
                                SEQUENCE {
-- This IE is same as SL-CommResourcePool with rxParametersNCell absent
    sc-CP-Len-r12
                                       SL-CP-Len-r12,
    sc-Period-r12
                                       SL-PeriodComm-r12,
    sc-TF-ResourceConfig-r12
                                       SL-TF-ResourceConfig-r12,
    sc-TxParameters-r12
                                      P0-SL-r12,
   data-CP-Len-r12
                                       SL-CP-Len-r12,
   data-TF-ResourceConfig-r12
                                      SL-TF-ResourceConfig-r12,
   dataHoppingConfig-r12
                                      SL-HoppingConfigComm-r12,
    dataTxParameters-r12
                                       P0-SL-r12,
   trpt-Subset-r12
                                       SL-TRPT-Subset-r12,
                                      SL-PriorityList-r13
                                                                  OPTIONAL -- For Tx
    [[ priorityList-r13
    ]]
}
SL-PreconfigDiscRxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-DiscRxPoolPreconf-r13)) OF SL-
PreconfigDiscPool-r13
SL-PreconfigDiscTxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-DiscTxPoolPreconf-r13)) OF SL-
PreconfigDiscPool-r13
SL-PreconfigDiscPool-r13 ::=
                               SEQUENCE {
-- This IE is same as SL-DiscResourcePool with rxParameters absent
                                  SL-CP-Len-r12,
    cp-Len-r13
    discPeriod-r13
                               ENUMERATED {rf4, rf6, rf7, rf8, rf12, rf14, rf16, rf24, rf28,
                                       rf32, rf64, rf128, rf256, rf512, rf1024, spare},
                               INTEGER (0..3),
    numRetx-r13
   numRepetition-r13
                                  INTEGER (1..50).
    tf-ResourceConfig-r13
                                   SL-TF-ResourceConfig-r12,
    txParameters-r13
                                   SEQUENCE {
       txParametersGeneral-r13 P0-SL-r12,
                                  ENUMERATED {p25, p50, p75, p100}
       txProbability-r13
    }
                                                                   OPTIONAL,
SL-PreconfigRelay-r13 ::= SEQUENCE {
    reselectionInfoOoC-r13
                                   ReselectionInfoRelay-r13
-- ASN1STOP
```

SL-Preconfiguration field descriptions

carrierFreq

Indicates the carrier frequency for out of coverage sidelink communication and sidelink discovery. In case of FDD it is uplink carrier frequency and the corresponding downlink frequency can be determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1].

additionalSpectrumEmission

The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, 6.2.4]. If *additionalSpectrumEmissionExt-r14* is configured, the UE only considers *additionalSpectrumEmissionExt-r14* (and ignores *additionalSpectrumEmission-r12*).

commRxPoolList

Indicates a list of reception pools for sidelink communication in addition to the resource pools indicated by preconfigComm.

commTxPoolList

Indicates a list of transmission pools for sidelink communication in addition to the first resource pool within *preconfigComm*.

preconfigComm

Indicates a list of resource pools. The first resource pool in the list is used for both reception and transmission of sidelink communication. The other resource pools, if present, are only used for reception of sidelink communication.

syncRefDiffHyst

Hysteresis when evaluating a SyncRef UE using relative comparison. Value *dB0* corresponds to 0 dB, *dB3* to 3 dB and so on, value *dBinf* corresponds to infinite dB.

syncRefMinHyst

Hysteresis when evaluating a SyncRef UE using absolute comparison. Value *dB0* corresponds to 0 dB, *dB3* to 3 dB and so on.

- NOTE 1: The network may configure one or more of the reception only resource pools in *preconfigComm* to cover reception from in coverage UEs using scheduled resource allocation. For such a resource pool the network should set all bits of *subframeBitmap* to 1 and *offsetIndicator* to indicate the subframe immediately following the sidelink control information.
- NOTE 2: The network should ensure that the resources defined by the first entry in *preconfigComm* (used for transmission by an out of coverage UE) do not overlap with those of the pool(s) covering scheduled transmissions by in coverage UEs. Furthermore, the network should ensure that for none of the entries in *preconfigComm* the resources defined by *sc-TF-ResourceConfig* overlap.

SL-V2X-Preconfiguration

The IE SL-V2X-Preconfiguration includes the sidelink pre-configured parameters used for V2X sidelink communication.

SL-V2X-Preconfiguration information elements

```
-- ASN1START
SL-V2X-Preconfiguration-r14 ::= SEQUENCE {
    v2x-PreconfigFreqList-r14 SL-V2X-PreconfigFreqList-r14,
anchorCarrierFreqList-r14 SL-AnchorCarrierFreqList-V2X-r14
cbr-PreconfigList-r14 SL-CBR-PreconfigTxConfigList-r14
                                                                                             OPTIONAL.
                                                                                             OPTIONAL,
}
SL-CBR-PreconfigTxConfigList-r14 ::=
                                           SEOUENCE {
    cbr-RangeCommonConfigList-r14 SEQUENCE (SIZE (1..maxSL-V2X-CBRConfig2-r14)) OF SL-CBR-Levels-
    sl-CBR-PSSCH-TxConfigList-r14 SEQUENCE (SIZE (1..maxSL-V2X-TxConfig2-r14)) OF SL-CBR-PSSCH-
TxConfig-r14
SL-V2X-PreconfigFreqList-r14 ::=
                                       SEQUENCE (SIZE (1..maxFreqV2X-r14)) OF SL-V2X-PreconfigFreqInfo-
SL-V2X-PreconfigFreqInfo-r14 ::=
                                            SEQUENCE {
    v2x-CommPreconfigGeneral-r14
                                            SL-PreconfigGeneral-r12,
    v2x-CommPreconfigSync-r14
                                            SL-PreconfigV2X-Sync-r14
                                                                                         OPTIONAL,
    v2x-CommRxPoolList-r14
                                            SL-PreconfigV2X-RxPoolList-r14,
    v2x-CommTxPoolList-r14
                                            SL-PreconfigV2X-TxPoolList-r14,
    p2x-CommTxPoolList-r14
                                            SL-PreconfigV2X-TxPoolList-r14,
                                                SL-CommTxPoolSensingConfig-r14
    v2x-ResourceSelectionConfig-r14
                                                                                             OPTIONAL,
```

```
zoneConfig-r14
                                        SL-ZoneConfig-r14
                                                                                 OPTIONAL,
                                        ENUMERATED {gnss, enb},
    syncPriority-r14
    thresSL-TxPrioritization-r14
                                       SL-Priority-r13
                                                                                OPTIONAL,
    offsetDFN-r14
                                        INTEGER (0..1000)
                                                                            OPTIONAL,
}
SL-PreconfiqV2X-RxPoolList-r14 ::= SEQUENCE (SIZE (1..maxSL-V2X-RxPoolPreconf-r14)) OF SL-V2X-
PreconfigCommPool-r14
SL-PreconfigV2X-TxPoolList-r14 ::= SEQUENCE (SIZE (1..maxSL-V2X-TxPoolPreconf-r14)) OF SL-V2X-
PreconfigCommPool-r14
SL-V2X-PreconfigCommPool-r14 ::= SEQUENCE {
-- This IE is same as SL-CommResourcePoolV2X with rxParametersNCell absent
   sl-OffsetIndicator-r14 SL-OffsetIndicator-r12 OPTIONAL,
    sl-Subframe-r14
                                        SubframeBitmapSL-r14,
    adiacencyPSCCH-PSSCH-r14
                                        BOOLEAN.
                                       ENUMERATED {
    sizeSubchannel-r14
                                        n4, n5, n6, n8, n9, n10, n12, n15, n16, n18, n20, n25, n30,
                                        n48, n50, n72, n75, n96, n100, spare13, spare12, spare11,
                                        spare10, spare9, spare8, spare7, spare6, spare5, spare4,
                                        spare3, spare2, spare1},
                                        ENUMERATED {n1, n3, n5, n8, n10, n15, n20, spare1},
   numSubchannel-r14
                                        INTEGER (0..99),
INTEGER (0..99)
    startRB-Subchannel-r14
    startRB-PSCCH-Pool-r14
                                                                    OPTIONAL,
    dataTxParameters-r14
                                       P0-SL-r12,
    zoneID-r14
                                        INTEGER (0..7)
                                                                    OPTIONAL,
                                         INTEGER (0..45)
    threshS-RSSI-CBR-r14
                                                                        OPTIONAL,
    cbr-pssch-TxConfigList-r14
                                        SL-CBR-PPPP-TxPreconfigList-r14 OPTIONAL,
    resourceSelectionConfigP2X-r14
                                       SL-P2X-ResourceSelectionConfig-r14 OPTIONAL,
    syncAllowed-r14
                                       SL-SyncAllowed-r14
                                                                        OPTIONAL,
    restrictResourceReservationPeriod-r14 SL-RestrictResourceReservationPeriodList-r14
    OPTIONAL, -- Need OR
SL-PreconfigV2X-Sync-r14 ::= SEQUENCE {
    syncOffsetIndicators-r14 SL
                                       SL-V2X-SyncOffsetIndicators-r14,
    syncTxParameters-r14
                                        P0-SL-r12,
    syncTxThreshOoC-r14
                                        RSRP-RangeSL3-r12,
    filterCoefficient-r14
                                       FilterCoefficient,
                                        ENUMERATED {dB0, dB3, dB6, dB9, dB12},
ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf},
    syncRefMinHyst-r14
    syncRefDiffHyst-r14
}
SL-V2X-SyncOffsetIndicators-r14 ::= SEQUENCE {
    syncOffsetIndicator1-r14
syncOffsetIndicator2-r14
                                       SL-OffsetIndicatorSync-r14,
                                        SL-OffsetIndicatorSync-r14,
    syncOffsetIndicator3-r14
                                        SL-OffsetIndicatorSync-r14
                                                                            OPTIONAL
SL-CBR-PPPP-TxPreconfigList-r14 ::= SEQUENCE (SIZE (1..8)) OF SL-PPPP-TxPreconfigIndex-r14
SL-PPPP-TxPreconfigIndex-r14 ::= SEQUENCE {
   priorityThreshold-r14 SL-Priority-r13,
    cbr-ConfigIndex-r14
                                    INTEGER(0..maxSL-V2X-CBRConfig2-1-r14),
    cbr-ConfigIndex-r14
tx-ConfigIndexList-r14
                                  SEQUENCE (SIZE (1..maxCBR-Level-r14)) OF Tx-PreconfigIndex-r14
}
Tx-PreconfigIndex-r14 ::=
                                   INTEGER(0..maxSL-V2X-TxConfig2-1-r14)
END
-- ASN1STOP
```

SL-V2X-Preconfiguration field descriptions

adiacencvPSCCH-PSSCH

Indicates whether a UE always transmits PSCCH and PSSCH in adjacent RBs (indicated by TRUE) or it may transmit PSCCH and PSSCH in non-adjacent RBs (indicated by FALSE). This parameter appears only when a pool is configured such that a UE transmits PSCCH and the associated PSSCH in the same subframe.

anchorCarrierFreqList

Indicates carrier frequencies which may include inter-carrier resource configuration for V2X sidelink communication.

cbr-PreconfigList

Indicates the preconfigured list of CBR ranges and the list of PSSCH transmission configurations available to configure congestion control to the UE for V2X sidelink communication.

cbr-pssch-TxConfigList

Indicates the mapping between PPPPs, CBR ranges by using indexes of the entry in *cbr-RangeCommonConfigList* in *cbr-PreconfigList*, and PSSCH transmission parameters and CR limits by using indexes of the entry in *sl-CBR-PSSCH-TxConfigList* in *cbr-PreconfigList*.

numSubchannel

Indicates the number of subchannels in the corresponding resource pool.

offsetDFN

Indicates the timing offset for the UE to determine DFN timing when GNSS is used for timing reference. Value 0 corresponds to 0 milliseconds, value 1 corresponds to 0.001 milliseconds, value 2 corresponds to 0.002 milliseconds, and so on.

resourceSelectionConfigP2X

Indicates the allowed resource selection mechanism(s), i.e. partial sensing and/or random selection, for P2X related V2X sidelink communication.

restrictResourceReservationPeriod

If configured, the field restrictResourceReservationPeriod configured in v2x-ResourceSelectionConfig shall be ignored for transmission on this pool.

sizeSubchannel

Indicates the number of PRBs of each subchannel in the corresponding resource pool. The value n5 denotes 5 PRBs; n6 denotes 6 PRBs and so on. The values n5, n6, n10, n15, n20, n25, n50, n75 and n100 apply in the case of adjacencyPSCCH-PSSCH set to TRUE; the values n4, n5, n6, n8, n9, n10, n12, n15, n16, n18, n20, n30, n48, n72 and n96 apply in the case of adjacencyPSCCH-PSSCH set to FALSE,

sl-OffsetIndicator

Indicates the offset of the first subframe of a resource pool within a SFN cycle. If absent, the resource pool starts from first subframe of SFN=0.

sl-Subframe

Indicates the bitmap of the resource pool, which is is defined by repeating the bitmap within a SFN cycle (see TS 36.213 [23]).

startRB-Subchannel

Indicates the lowest RB index of the subchannel with the lowest index.

startRB-PSCCH-Pool

Indicates the lowest RB index of the PSCCH pool.

syncAllowed

Indicates the allowed synchronization reference(s) which is (are) allowed to use the pre-configured resource pool.

syncPriority 5 1

Indicates the synchronization priority order. In case the UE does not detect any cell which configures synchronization configuration on the carrier frequency in *anchorCarrierFreqList*, if this field is set to *gnss*, the UE shall prioritize GNSS over the UE directly synchronized to eNB; if this field is set to *enb*, the UE shall prioritize the UE directly synchronized to eNB over GNSS.

thresSL-TxPrioritization

Indicates the threshold used to determine whether SL V2X transmission is prioritized over uplink transmission if they overlap in time (see TS 36.321 [6]).

threshS-RSSI-CBR

Indicates the S-RSSI threshold for determining the contribution of a sub-channel to the CBR measurement, as specified in TS 36.214 [48]. Value 0 corresponds to -112 dBm, value 1 to -110 dBm, value n to (-112 + n*2) dBm, and so on.

v2x-CommRxPoolList

Indicates a list of reception pools for V2X sidelink communication.

v2x-CommTxPoolList

Indicates a list of transmission pools for V2X sidelink communication.

v2x-ResourceSelectionConfig

Indicates V2X sidelink communication configurations used for UE autonomous resource selection.

zoneConfig

Indicates zone configurations used for V2X sidelink communication in 5.10.13.2.

zoneID

Indicates the zone ID for which the UE shall use this resource pool as described in 5.10.13.2. The field is absent in v2x-CommRxPoolList and p2x-CommTxPoolList in SL-V2X-PreconfigFreqInfo.

10 Radio information related interactions between network nodes

10.1 General

This section specifies RRC messages that are transferred between network nodes. These RRC messages may be transferred to or from the UE via another Radio Access Technology. Consequently, these messages have similar characteristics as the RRC messages that are transferred across the E-UTRA radio interface, i.e. the same transfer syntax and protocol extension mechanisms apply.

10.2 Inter-node RRC messages

10.2.1 General

This section specifies RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, i.e. a single 'logical channel' is used for all RRC messages transferred across network nodes. The information could originate from or be destined for another RAT.

EUTRA-InterNodeDefinitions

This ASN.1 segment is the start of the E-UTRA inter-node PDU definitions.

```
-- ASN1START
EUTRA-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
    Antenna InfoCommon.
    AntennaInfoDedicated-v10i0,
    ARFCN-ValueEUTRA,
   ARFCN-ValueEUTRA-v9e0,
    ARFCN-ValueEUTRA-r9,
    CellIdentity,
    C-RNTI,
    DL-DCCH-Message,
    DRB-Identity,
    DRB-ToReleaseList,
    FreqBandIndicator-r11,
    InDeviceCoexIndication-r11,
    LWA-Config-r13,
    MasterInformationBlock,
    maxBands,
    maxFreq,
    maxDRB,
    maxSCell-r10,
    maxSCell-r13,
    maxServCell-r10,
    maxServCell-r13,
    MBMSInterestIndication-r11,
    MeasConfig,
    MeasGapConfig,
    MeasGapConfigPerCC-List-r14,
    MeasResultForRSSI-r13,
    MeasResultListWLAN-r13.
    OtherConfig-r9,
    PhysCellId,
    P-Max,
    PowerCoordinationInfo-r12,
    SidelinkUEInformation-r12,
    SL-CommConfig-r12,
    SL-DiscConfig-r12,
    RadioResourceConfigDedicated,
    RCLWI-Configuration-r13,
    RSRP-Range,
```

```
RSRQ-Range,
    RSRQ-Range-v1250,
    RS-SINR-Range-r13,
    SCellToAddModList-r10,
    SCellToAddModListExt-r13,
    SCG-ConfigPartSCG-r12,
    SecurityAlgorithmConfig,
    SCellIndex-r10,
    SCellIndex-r13,
    SCellToReleaseList-r10,
    SCellToReleaseListExt-r13,
    ServCellIndex-r10,
    ServCellIndex-r13,
    ShortMAC-I,
    MeasResultSSTD-r13,
    SL-V2X-ConfigDedicated-r14,
    SystemInformationBlockType1,
    SystemInformationBlockType1-v890-IEs,
    SystemInformationBlockType2,
    UEAssistanceInformation-r11,
    UECapabilityInformation,
    UE-CapabilityRAT-ContainerList,
    UE-RadioPagingInfo-r12,
    WLANConnectionStatusReport-r13,
    WLAN-OffloadConfig-r12
FROM EUTRA-RRC-Definitions;
-- ASN1STOP
```

10.2.2 Message definitions

HandoverCommand

This message is used to transfer the handover command generated by the target eNB.

Direction: target eNB to source eNB/ source RAN

HandoverCommand message

```
-- ASN1START
HandoverCommand ::=
                                  SEQUENCE {
                                  CHOICE {
   criticalExtensions
                                      CHOICE {
           handoverCommand-r8
                                            HandoverCommand-r8-IEs,
           spare7 NULL,
           spare6 NULL, spare5 NULL, spare4 NULL,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                       SEQUENCE {}
   }
HandoverCommand-r8-IEs ::=
                                 SEQUENCE {
                                 OCTET STRING (CONTAINING DL-DCCH-Message),
   handoverCommandMessage
                                     SEQUENCE {}
   nonCriticalExtension
                                                                        OPTIONAL
-- ASN1STOP
```

HandoverCommand field descriptions

handoverCommandMessage

Contains the entire DL-DCCH-Message including the *RRCConnectionReconfiguration* message used to perform handover within E-UTRAN or handover to E-UTRAN, generated (entirely) by the target eNB.

NOTE: The source BSC, in case of inter-RAT handover from GERAN to E-UTRAN, expects that the HandoverCommand message includes DL-DCCH-Message only. Thus, criticalExtensionsFuture, spare1-spare7 and nonCriticalExtension should not be used regardless whether the source RAT is E-UTRAN, UTRAN or GERAN.

HandoverPreparationInformation

This message is used to transfer the E-UTRA RRC information used by the target eNB during handover preparation, including UE capability information.

Direction: source eNB/ source RAN to target eNB

HandoverPreparationInformation message

```
-- ASN1START
HandoverPreparationInformation ::= SEQUENCE {
                                       CHOICE {
   criticalExtensions
                                          CHOICE {
           handoverPreparationInformation-r8 HandoverPreparationInformation-r8-IEs,
           spare7 NULL,
           spare6 NULL, spare5 NULL, spare4 NULL,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
   }
}
HandoverPreparationInformation-r8-IEs ::= SEQUENCE {
   \verb"ue-RadioAccessCapabilityInfo" UE-CapabilityRAT-ContainerList",
                                                      OPTIONAL,
OPTIONAL,
                                      AS-Config
   as-Config
                                                                                 -- Cond HO
   rrm-Config
                                      RRM-Config
   as-Context
                                       AS-Context
                                                             OPTIONAL,
                                                                             -- Cond HO
                                      HandoverPreparationInformation-v920-IEs
   nonCriticalExtension
}
HandoverPreparationInformation-v920-IEs ::= SEQUENCE {
   ue-ConfigRelease-r9
                                       ENUMERATED {
                                       rel9, rel10, rel11, rel12, v10j0, v11e0,
                                                                         OPTIONAL, -- Cond HO2
                                       v1280, rel13, ..., rel14}
   nonCriticalExtension
                                       HandoverPreparationInformation-v9d0-IEs
                                                                                 OPTIONAL
HandoverPreparationInformation-v9d0-IEs ::= SEQUENCE {
   lateNonCriticalExtension
                                     OCTET STRING (CONTAINING HandoverPreparationInformation-
v9j0-IEs) OPTIONAL,
   nonCriticalExtension
                                     HandoverPreparationInformation-v9e0-IEs
                                                                                     OPTIONAL
-- Late non-critical extensions:
HandoverPreparationInformation-v9j0-IEs ::= SEQUENCE {
    -- Following field is only for pre REL-10 late non-critical extensions
                               OCTET STRING
   lateNonCriticalExtension
                                                                      OPTIONAL,
   nonCriticalExtension
                                      HandoverPreparationInformation-v10j0-IEs
                                                                                     OPTIONAL
{\tt HandoverPreparationInformation-v10j0-IEs} \; ::= \; {\tt SEQUENCE} \; \left\{ \right.
                                     AS-Config-v10j0 OPTIONAL,
   as-Config-v10j0
    -- Following field is only for late non-critical extensions from REL-10
   nonCriticalExtension
                                      SEQUENCE {}
}
-- Regular non-critical extensions:
HandoverPreparationInformation-v9e0-IEs ::= SEQUENCE {
                               AS-Config-v9e0
   as-Config-v9e0
                                                                      OPTIONAL,
                                                                                  -- Cond HO2
   nonCriticalExtension
                                      HandoverPreparationInformation-v1130-IEs
                                                                                      OPTIONAL
HandoverPreparationInformation-v1130-IES ::= SEQUENCE {
                                    AS-Context-v1130
   as-context-v1130
nonCriticalExtension
                                                                      OPTIONAL.
                                                                                  -- Cond HO2
                                      HandoverPreparationInformation-v1250-IEs
   OPTIONAL
HandoverPreparationInformation-v1250-IEs ::= SEQUENCE {
```

```
ARFCN-ValueEUTRA-r9 OPTIONAL,
   ue-SupportedEARFCN-r12ARFCN-ValueEas-Config-v1250AS-Config-v1250nonCriticalExtensionHandoverPrep
                                                                         OPTIONAL,
                                                                                     -- Cond HO3
                                                                            -- Cond HO2
                                        HandoverPreparationInformation-v1320-IEs
   OPTTONAL.
HandoverPreparationInformation-v1320-IEs ::= SEQUENCE {
                       AS-Config-v1320
                                       AS-Config-v1320
AS-Context-v1320
                                                                        OPTIONAL,
                                                                                     -- Cond HO2
   as-Config-v1320
                                                                        OPTIONAL,
    as-Context-v1320
                                                                                    -- Cond HO2
    nonCriticalExtension
                                        HandoverPreparationInformation-v1430-IEs
    OPTIONAL
HandoverPreparationInformation-v1430-IEs ::= SEQUENCE {
                           AS-Config-v1430
ENUMERATED {true}
   as-Config-v1430
                                                                         OPTIONAL,
                                                                                      -- Cond HO2
                                                                    OPTIONAL, -- Cond HO2
   makeBeforeBreakReg-r14
   nonCriticalExtension
                                  SEQUENCE {}
                                                                        OPTIONAL
-- ASN1STOP
```

HandoverPreparationInformation field descriptions

as-Config

The radio resource configuration. Applicable in case of intra-E-UTRA handover. If the target receives an incomplete *MeasConfig* and *RadioResourceConfigDedicated* in the *as-Config*, the target eNB may decide to apply the full configuration option based on the *ue-ConfigRelease*.

as-Context

Local E-UTRAN context required by the target eNB.

makeBeforeBreakReq

To request the target eNB to add the *makeBeforeBreak* indication in the *mobilityControlInfo* in case of intra-frequency handover.

rrm-Config

Local E-UTRAN context used depending on the target node's implementation, which is mainly used for the RRM purpose.

ue-ConfigRelease

Indicates the RRC protocol release or version applicable for the current UE configuration. This could be used by target eNB to decide if the full configuration approach should be used. If this field is not present, the target assumes that the current UE configuration is based on the release 8 version of RRC protocol. NOTE 1.

ue-RadioAccessCapabilityInfo

For E-UTRA radio access capabilities, it is up to E-UTRA how the backward compatibility among supportedBandCombinationReduced, supportedBandCombination and supportedBandCombinationAdd is ensured. If supportedBandCombinationReduced and supportedBandCombination/supportedBandCombinationAdd are included into ueCapabilityRAT-Container, it can be assumed that the value of fields, requestedBands, reducedIntNonContCombRequested and requestedCCsXL are consistend with all supported band combination fields. NOTE 2

ue-SupportedEARFCN

Includes UE supported EARFCN of the handover target E-UTRA cell if the target E-UTRA cell belongs to multiple frequency bands.

NOTE 1: The source typically sets the *ue-ConfigRelease* to the release corresponding with the current dedicated radio configuration. The source may however also consider the common radio resource configuration e.g. in case interoperability problems would appear if the UE temporary continues extensions of this part of the configuration in a target PCell not supporting them.

NOTE 2: The following table indicates per source RAT whether RAT capabilities are included or not.

Source RAT	E-UTRA capabilites	UTRA capabilities	GERAN capabilities
UTRAN	Included	May be included, ignored by eNB if received	May be included
GERAN CS	Excluded	May be included, ignored by eNB if received	Included
GERAN PS	Excluded	May be included, ignored by eNB if received	Included
E-UTRAN	Included	May be included	May be included

Conditional presence	Explanation
НО	The field is mandatory present in case of handover within E-UTRA; otherwise the field is
	not present.
HO2	The field is optional present in case of handover within E-UTRA; otherwise the field is not
	present.
H03	The field is optional present in case of handover from GERAN to E-UTRA, otherwise the
	field is not present.

SCG-Config

This message is used to transfer the SCG radio configuration generated by the SeNB.

Direction: Secondary eNB to master eNB

SCG-Config message

```
-- ASN1START
SCG-Config-r12 ::=
                                    SEQUENCE {
                                        CHOICE {
    criticalExtensions
                                           CHOICE {
       c1
            scg-Config-r12
                                            SCG-Config-r12-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
                                            SEQUENCE {}
        criticalExtensionsFuture
}
SCG-Config-r12-IEs ::=
                                   SEQUENCE {
                                       SCG-ConfigPartSCG-r12
    scg-RadioConfig-r12
                                                                            OPTIONAL,
    nonCriticalExtension
                                        SEQUENCE {}
                                                                            OPTIONAL
-- ASN1STOP
```

SCG-Config field descriptions

scg-RadioConfig-r12

Includes the change of the dedicated SCG configuration and, upon addition of an SCG cell, the common SCG configuration.

The SeNB only includes a new SCG cell in response to a request from MeNB, but may include release of an SCG cell release or release of the SCG part of an SCG/Split DRB without prior request from MeNB. The SeNB does not use this field to initiate release of the SCG.

SCG-ConfigInfo

This message is used by MeNB to request the SeNB to perform certain actions e.g. to establish, modify or release an SCG, and it may include additional information e.g. to assist the SeNB with assigning the SCG configuration.

Direction: Master eNB to secondary eNB

SCG-ConfigInfo message

```
SCG-ConfigInfo-r12-IEs ::=
                                       SEQUENCE {
    radioResourceConfigDedMCG-r12 RadioResourceConfigDedicated
                                                                              OPTIONAL,
    sCellToAddModListMCG-r12 SCellToAddModList-r10 measGapConfig-r12 MeasGapConfig
                                                                                OPTIONAL,
                                                                                 OPTIONAL,
    powerCoordinationInfo-r12
                                      PowerCoordinationInfo-r12
                                                                                OPTIONAL,
    scg-RadioConfig-r12
                                        SCG-ConfigPartSCG-r12
                                                                                 OPTIONAL,
    eutra-CapabilityInfo-r12
    eutra-CapabilityInfo-r12 OCTET STRING (CONTAINING UECapabilityInformation)
scg-ConfigRestrictInfo-r12 SCG-ConfigRestrictInfo-r12 OPTIONAL,
mbmsInterestIndication-r12 OCTET STRING (CONTAINING
                                                                                                  OPTIONAL,
                                           MBMSInterestIndication-r11) OPTIONAL, asResultServCellListSCG-r12 OPTIONAL,
    measResultServCellListSCG-r12 MeasResultServCellListSCG-r12
                                        DRB-InfoListSCG-r12
                                                                                OPTIONAL,
    drb-ToAddModListSCG-r12
                                  DRB-TOReleaseList
    drb-ToReleaseListSCG-r12
                                                                                OPTIONAL,
    sCellToAddModListSCG-r12
                                        SCellToAddModListSCG-r12
                                                                                OPTIONAL,
    sCellToReleaseListSCG-r12
                                       SCellToReleaseList-r10
                                                                               OPTIONAL,
    p-Max-r12
                                             P-Max
                                                                                     OPTIONAL.
                                       SCG-ConfigInfo-v1310-IEs
    nonCriticalExtension
                                                                               OPTIONAL
}
                                       SEQUENCE {
SCG-ConfigInfo-v1310-IEs ::=
    sCellToAddModListMCG-Ext-r13 MeasResultSSTD-r13
measResultSomedate

MeasResultSSTD-r13
    measResultSSTD-r13
                                                                                 OPTIONAL,
                                            SCellToAddModListExt-r13
                                                                                     OPTIONAL,
    measResultServCellListSCG-Ext-r13 MeasResultServCellListSCG-Ext-r13
                                                                                   OPTIONAL,
                                            SCellToAddModListSCG-Ext-r13
    sCellToAddModListSCG-Ext-r13
                                                                                         OPTIONAL.
    sCellToReleaseListSCG-Ext-r13 SCellToReleaseListExt-r13
                                                                                OPTIONAL,
    nonCriticalExtension
                                      SCG-ConfigInfo-v1330-IEs
                                                                               OPTIONAL
    -ConfigInfo-v1330-IEs ::= SEQUENCE {
measResultListRSSI-SCG-r13 MeasResultListRSSI-SCG-r1
SCG-ConfigInfo-v1430-IEs
SCG-ConfigInfo-v1330-IEs ::=
                                                                               OPTIONAL,
                                        MeasResultListRSSI-SCG-r13
                                                                                                   OPTIONAL
}
    makeBeforeBreakSCG-Req-r14 ENUMERATED
measGapConfigPerCC-List MeasGapConfigPerConduction
SCG-ConfigInfo-v1430-IEs ::=
                                        ENUMERATED {true}
                                                                                 OPTIONAL,
                                       MeasGapConfigPerCC-List-r14
                                                                                 OPTIONAL,
                                        SEQUENCE {}
                                                                                 OPTIONAL
DRB-InfoListSCG-r12 ::=
                                       SEQUENCE (SIZE (1..maxDRB)) OF DRB-InfoSCG-r12
                                  SEQUENCE {
DRB-InfoSCG-r12 ::=
    eps-BearerIdentity-r12
                                       INTEGER (0..15)
                                                                       OPTIONAL, -- Cond DRB-Setup
                                       DRB-Identity,
    drb-Identity-r12
    drb-Type-r12
                                        ENUMERATED {split, scg} OPTIONAL,
                                                                                     -- Cond DRB-Setup
}
SCellToAddModListSCG-r12 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF Cell-ToAddMod-r12
SCellToAddModListSCG-Ext-r13 ::=
                                      SEQUENCE (SIZE (1..maxSCell-r13)) OF Cell-ToAddMod-r12
Cell-ToAddMod-r12 ::=
                                        SEOUENCE {
   sCellIndex-r12
                                            SCellIndex-r10,
    cellIdentification-r12
                                             SEQUENCE {
         physCellId-r12
                                                 PhysCellId,
                                                 ARFCN-ValueEUTRA-r9
         dl-CarrierFreg-r12
                                                                            OPTIONAL.
                                                                                          -- Cond SCellAdd
    measResultCellToAdd-r12
                                            SEOUENCE {
        rsrpResult-r12
                                                 RSRP-Range,
         rsrqResult-r12
                                                 RSRQ-Range
                                                                            OPTIONAL, -- Cond SCellAdd2
    }
           sCellIndex-r13
                                                SCellIndex-r13
                                                                                 OPTIONAL.
    11
        measResultCellToAdd-v1310
                                             SEQUENCE {
             rs-sinr-Result-r13
                                                     RS-SINR-Range-r13
                                                                            OPTIONAL -- Cond SCellAdd2
    11
}
MeasResultServCellListSCG-r12 ::= SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServCellSCG-
MeasResultServCellListSCG-Ext-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF
MeasResultServCellSCG-r12
MeasResultServCellSCG-r12 ::= SEQUENCE {
```

```
servCellId-r12
                                        ServCellIndex-r10,
                                        SEQUENCE {
    measResultSCell-r12
       rsrpResultSCell-r12
                                           RSRP-Range,
       rsrqResultSCell-r12
                                           RSRQ-Range
          servCellId-r13
                                                ServCellIndex-r13
                                                                        OPTIONAL,
    [ [
           sResultSCell-v1310
rs-sinr-ResultSCell-r13
       measResultSCell-v1310
                                           SEOUENCE {
                                              RS-SINR-Range-r13
                                                                    OPTIONAL
    ]]
MeasResultListRSSI-SCG-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultRSSI-SCG-r13
MeasResultRSSI-SCG-r13 ::=
                                  SEOUENCE {
    servCellId-r13
                                        ServCellIndex-r13.
    measResultForRSSI-r13
                                        MeasResultForRSSI-r13
SCG-ConfigRestrictInfo-r12 ::=
                                  SEQUENCE {
    maxSCH-TB-BitsDL-r12
                                       INTEGER (1..100),
    maxSCH-TB-BitsUL-r12
                                        INTEGER (1..100)
-- ASN1STOP
```

SCG-ConfigInfo field descriptions

drb-ToAddModListSCG

Includes DRBs the SeNB is requested to establish or modify (DRB type change).

drb-ToReleaseListSCG

Includes DRBs the SeNB is requested to release.

makeBeforeBreakSCG-Req

To request the target eNB to add the *makeBeforeBreakSCG* indication in the *mobilityControlInfoSCG* in case of intra-frequency SCG change.

maxSCH-TB-BitsXL

Indicates the maximum DL-SCH/UL-SCH TB bits that may be scheduled in a TTI. Specified as a percentage of the value defined for the applicable UE category.

measGapConfig

Includes the current measurement gap configuration.

measResultListRSSI-SCG

Includes RSSI measurement results of SCG (serving) cells

measResultSSTD

Includes measurement results of UE SFN and Subframe Timing Difference between the PCell and the PSCell.

measResultServCellListSCG

Includes measurement results of SCG (serving) cells.

radioResourceConfigDedMCG

Includes the current dedicated MCG radio resource configuration.

sCellIndex

If sCellIndex-r13 is present, sCellIndex-r12 shall be ignored.

sCellToAddModListMCG, sCellToAddModListMCG-Ext

Includes the current MCG SCell configuration. Field sCellToAddModListMCG is used to add the first 4 SCells with sCellIndex-r10 while sCellToAddModListMCG-Ext is used to add the rest.

s Cell To Add ModList SCG, s Cell To Add ModList SCG-Ext

Includes SCG cells the SeNB is requested to establish. Measurement results may be provided for these cells. Field sCellToAddModListSCG is used to add the first 4 SCells with sCellIndex-r12 while sCellToAddModListSCG-Ext is used to add the rest.

sCellToReleaseListSCG, sCellToReleaseListSCG-Ext

Includes SCG cells the SeNB is requested to release.

scg-RadioConfig

Includes the current dedicated SCG configuration.

scg-ConfigRestrictInfo

Includes fields for which MeNB explictly indicates the restriction to be observed by SeNB.

servCellId

If servCellId-r13 is present, servCellId-r12 shall be ignored.

p-Max

Cell specific value i.e. as broadcast by PCell.

Conditional presence	Explanation
DRB-Setup	The field is mandatory present in case DRB establishment is requested; otherwise the
	field is not present.
SCellAdd	The field is mandatory present in case SCG cell establishment is requested; otherwise
	the field is not present.
SCellAdd2	The field is optional present in case SCG cell establishment is requested; otherwise the
	field is not present.

UEPagingCoverageInformation

This message is used to transfer UE paging coverage information, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

UEPagingCoverageInformation message

```
-- ASN1START
UEPagingCoverageInformation ::= SEQUENCE {
                         CHOICE {
   criticalExtensions
                                        CHOICE {
                                                  UEPagingCoverageInformation-r13-IEs,
           uePagingCoverageInformation-r13
           spare7 NULL,
           spare6 NULL, spare5 NULL, spare4 NULL,
           spare3 NULL, spare2 NULL, spare1 NULL
       criticalExtensionsFuture
                                           SEQUENCE {}
}
UEPagingCoverageInformation-r13-IEs ::= SEQUENCE {
                                           INTEGER (1..256) OPTIONAL,
   mpdcch-NumRepetition-r13
   {\tt nonCriticalExtension}
                                           SEQUENCE {}
                                                              OPTIONAL
-- ASN1STOP
```

UEPagingCoverageInformation field descriptions

mpdcch-NumRepetition

Number of repetitions for MPDCCH. The value is an estimate of the required number of repetitions for MPDCCH for paging.

UERadioAccessCapabilityInformation

This message is used to transfer UE radio access capability information, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

UERadioAccessCapabilityInformation message

```
-- ASN1START
UERadioAccessCapabilityInformation ::= SEQUENCE {
    criticalExtensions
                                        CHOICE {
       c1
                                            CHOICE {
            ueRadioAccessCapabilityInformation-r8
                                                UERadioAccessCapabilityInformation-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                            SEQUENCE { }
    }
UERadioAccessCapabilityInformation-r8-IEs ::= SEQUENCE {
   ue-RadioAccessCapabilityInfo OCTET STRING (CONTAINING UECapabilityInformation),
```

```
nonCriticalExtension SEQUENCE {}
OPTIONAL
-- ASN1STOP
```

UERadioAccessCapabilityInformation field descriptions

ue-RadioAccessCapabilityInfo

Including E-UTRA, GERAN, and CDMA2000-1xRTT Bandclass radio access capabilities (separated). UTRA radio access capabilities are not included. For E-UTRA radio access capabilities, it is up to E-UTRA how the backward compatibility among supportedBandCombinationReduced, supportedBandCombination and supportedBandCombinationAdd is ensured. If supportedBandCombinationReduced and supportedBandCombination/supportedBandCombinationAdd are included into ueCapabilityRAT-Container, it can be assumed that the value of fields, requestedBands, reducedIntNonContCombRequested and requestedCCsXL are consistent with all supported band combination fields.

UERadioPagingInformation

This message is used to transfer radio paging information, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

UERadioPagingInformation message

```
-- ASN1START
UERadioPagingInformation ::= SEQUENCE {
    criticalExtensions
                                       CHOICE {
                                           CHOICE {
       c1
            ueRadioPagingInformation-r12
                                                   UERadioPagingInformation-r12-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                           SEQUENCE { }
}
UERadioPagingInformation-r12-IEs ::= SEQUENCE {
    ue-RadioPagingInfo-r12
                                    OCTET STRING (CONTAINING UE-RadioPagingInfo-r12),
    nonCriticalExtension
                                       UERadioPagingInformation-v1310-IEs
UERadioPagingInformation-v1310-IEs ::= SEQUENCE {
                                         SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11
    supportedBandListEUTRAForPaging-r13
OPTIONAL.
   nonCriticalExtension
                                           SEQUENCE {}
                                                                                   OPTIONAL
-- ASN1STOP
```

UERadioPagingInformation field descriptions

ue-RadioPagingInfo

The field is used to transfer UE capability information used for paging. The eNB generates the *ue-RadioPagingInfo* and the contained UE capability information is absent when not supported by the UE.

supportedBandListEUTRAForPaging

Indicates the UE supported frequency bands which is derived by the eNB from UE-EUTRA-Capability.

10.3 Inter-node RRC information element definitions

AS-Config

The AS-Config IE contains information about RRC configuration information in the source eNB which can be utilized by target eNB to determine the need to change the RRC configuration during the handover preparation phase. The

information can also be used after the handover is successfully performed or during the RRC connection reestablishment or resume.

AS-Config information element

```
-- ASN1START
AS-Config ::=
                           SEQUENCE {
    sourceMeasConfig
                                       MeasConfig,
                                       RadioResourceConfigDedicated,
    sourceRadioResourceConfig
    sourceSecurityAlgorithmConfig
                                      SecurityAlgorithmConfig,
    sourceUE-Identity
                                       C-RNTI,
    sourceMasterInformationBlock
                                      MasterInformationBlock,
    sourceSystemInformationBlockType1 SystemInformationBlockType1(WITH COMPONENTS
                                           {..., nonCriticalExtension ABSENT}),
    \verb|sourceSystemInformationBlockType2| SystemInformationBlockType2|,
    antennaInfoCommon
                                       AntennaInfoCommon,
    sourceDl-CarrierFreq
                                       ARFCN-ValueEUTRA,
    [[ sourceSystemInformationBlockType1Ext
                                               OCTET STRING (CONTAINING
                                              SystemInformationBlockType1-v890-IEs) OPTIONAL,
                                          OtherConfig-r9
       sourceOtherConfig-r9
    -- sourceOtherConfig-r9 should have been optional. A target eNB compliant with this transfer
    -- syntax should support receiving an AS-Config not including this extension addition group
    -- e.g. from a legacy source eNB
    ]],
    [[ sourceSCellConfigList-r10
                                          SCellToAddModList-r10
                                                                          OPTIONAL
       sourceConfigSCG-r12
                                           SCG-Config-r12
                                                              OPTIONAL
    ]]
}
AS-Config-v9e0 ::=
                               SEQUENCE {
                                ARFCN-ValueEUTRA-v9e0
    sourceDl-CarrierFreq-v9e0
AS-Config-v10j0 ::=
                               SEQUENCE {
    antennaInfoDedicatedPCell-v10i0
                                    AntennaInfoDedicated-v10i0
                                                                          OPTIONAL
AS-Config-v1250 ::=
                               SEQUENCE {
    sourceWlan-OffloadConfig-r12 WLAN-OffloadConfig-r12
                                                                          OPTIONAL,
   sourceSL-CommConfig-r12
sourceSL-DiscConfig-r12
                                       SL-CommConfig-r12
                                       SL-DiscConfig-r12
                                                                          OPTIONAL
}
AS-Config-v1320 ::=
                              SEQUENCE {
                                  SCellToAddModListExt-r13
    sourceSCellConfigList-r13
                                                                          OPTIONAL,
    sourceRCLWI-Configuration-r13
                                      RCLWI-Configuration-r13
                                                                          OPTIONAL
AS-Config-v1430 ::=
                               SEQUENCE {
    sourceSL-V2X-CommConfig-r14 SL-V2X-ConfigDedicated-r14
                                                                                  OPTIONAL.
    sourceLWA-Config-r14
                                                                          OPTIONAL,
                                       LWA-Config-r13
    sourceWLAN-MeasResult-r14
                                      MeasResultListWLAN-r13
                                                                          OPTIONAL
-- ASN1STOP
```

NOTE: The *AS-Config* re-uses information elements primarily created to cover the radio interface signalling requirements. Consequently, the information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the *MasterInformationBlock*.

AS-Config field descriptions

antennalnfoCommon

This field provides information about the number of antenna ports in the source PCell.

sourceDL-CarrierFreq

Provides the parameter Downlink EARFCN in the source PCell, see TS 36.101 [42]. If the source eNB provides AS-Config-v9e0, it sets sourceDI-CarrierFreq (i.e. without suffix) to maxEARFCN.

sourceLWA-Config

LWA configuration in the source PCell when handover is triggered.

sourceOtherConfig

Provides other configuration in the source PCell.

sourceMasterInformationBlock

MasterInformationBlock transmitted in the source PCell.

sourceMeasConfig

Measurement configuration in the source cell. The measurement configuration for all measurements existing in the source eNB when handover is triggered shall be included. See 10.5.

sourceRCLWI-Configuration

RCLWI Configuration in the source PCell.

sourceSL-CommConfig

This field covers the sidelink communication configuration.

sourceSL-DiscConfig

This field covers the sidelink discovery configuration.

sourceRadioResourceConfig

Radio configuration in the source PCell. The radio resource configuration for all radio bearers existing in the source PCell when handover is triggered shall be included. See 10.5.

sourceSCellConfigList

Radio resource configuration (common and dedicated) of the SCells configured in the source eNB.

sourceSecurityAlgorithmConfig

This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell.

sourceSystemInformationBlockType1

SystemInformationBlockType1 (or SystemInformationBlockType1-BR) transmitted in the source PCell.

sourceSystemInformationBlockType2

SystemInformationBlockType2 transmitted in the source PCell.

sourceSL-V2X-CommConfig

Indicates the V2X sidelink communication related configurations configured in the source eNB.

sourceWLAN-MeasResult

WLAN measurement results in the source PCell when handover is triggered.

AS-Context

The IE AS-Context is used to transfer local E-UTRAN context required by the target eNB.

AS-Context information element

```
-- ASN1START
AS-Context ::=
                                        SEQUENCE {
   reestablishmentInfo
                                            ReestablishmentInfo
                                                                        OPTIONAL
                                                                                     -- Cond HO
AS-Context-v1130 ::=
                                        SEQUENCE {
    idc-Indication-r11
                                            OCTET STRING (CONTAINING
                                            InDeviceCoexIndication-r11) OPTIONAL,
                                                                                     -- Cond HO2
    mbmsInterestIndication-r11
                                            OCTET STRING (CONTAINING
                                            MBMSInterestIndication-r11) OPTIONAL,
                                                                                    -- Cond HO2
    powerPrefIndication-r11
                                            OCTET STRING (CONTAINING
                                            UEAssistanceInformation-r11)
                                                                            OPTIONAL,
                                                                                        -- Cond HO2
    [[ sidelinkUEInformation-r12
                                                OCTET STRING (CONTAINING
                                                SidelinkUEInformation-r12) OPTIONAL
                                                                                        -- Cond HO2
    11
}
AS-Context-v1320 ::=
                                        SEQUENCE {
    wlanConnectionStatusReport-r13
                                            OCTET STRING (CONTAINING
```

```
WLANConnectionStatusReport-r13) OPTIONAL -- Cond HO2
}
-- ASN1STOP
```

AS-Context field descriptions	
idc-Indication	
Including information used for handling the IDC problems.	
reestablishmentInfo	
Including information needed for the RRC connection re-establishment.	

Conditional presence	Explanation
НО	The field is mandatory present in case of handover within E-UTRA; otherwise the field is
	not present.
HO2	The field is optional present in case of handover within E-UTRA; otherwise the field is not
	present.

ReestablishmentInfo

The ReestablishmentInfo IE contains information needed for the RRC connection re-establishment.

ReestablishmentInfo information element

```
-- ASN1START
ReestablishmentInfo ::=
                                   SEQUENCE {
                                      PhysCellId,
    sourcePhysCellId
    targetCellShortMAC-I
                                        ShortMAC-I,
    additionalReestabInfoList
                                       AdditionalReestabInfoList
                                                                                OPTIONAL,
AdditionalReestabInfoList ::=
                                   SEQUENCE ( SIZE (1..maxReestabInfo) ) OF AdditionalReestabInfo
AdditionalReestabInfo ::= SEQUENCE{
    cellIdentity
                                        CellIdentity,
    key-eNodeB-Star
                                        Key-eNodeB-Star,
    shortMAC-I
                                        ShortMAC-I
Key-eNodeB-Star ::=
                                   BIT STRING (SIZE (256))
-- ASN1STOP
```

ReestablishmentInfo field descriptions

additionalReestabInfoList

Contains a list of shortMAC-I and KeNB* for cells under control of the target eNB, required for potential reestablishment by the UE in these cells to succeed.

Key-eNodeB-Star

Parameter KeNB*: See TS 33.401 [32, 7.2.8.4]. If the cell identified by *cellIdentity* belongs to multiple frequency bands, the source eNB selects the DL-EARFCN for the KeNB* calculation using the same logic as UE uses when selecting the DL-EARFCN in IDLE as defined in section 6.2.2. This parameter is only used for X2 handover, and for S1 handover, it shall be ignored by target eNB.

sourcePhyCellId

The physical cell identity of the source PCell, used to determine the UE context in the target eNB at re-establishment.

targetCellShortMAC-I

The ShortMAC-I for the handover target PCell, in order for potential re-establishment to succeed.

– RRM-Config

The *RRM-Config* IE contains information about UE specific RRM information before the handover which can be utilized by target eNB.

RRM-Config information element

```
-- ASN1START
RRM-Config ::=
                          SEQUENCE {
   ue-InactiveTime
                              ENUMERATED {
                                  s1, s2, s3, s5, s7, s10, s15, s20,
                                  s25, s30, s40, s50, min1, min1s20c, min1s40,
                                  min2, min2s30, min3, min3s30, min4, min5, min6,
                                  min7, min8, min9, min10, min12, min14, min17, min20,
                                  min24, min28, min33, min38, min44, min50, hr1,
                                  hr1min30, hr2, hr2min30, hr3, hr3min30, hr4, hr5, hr6,
                                  hr8, hr10, hr13, hr16, hr20, day1, day1hr12, day2,
                                  day2hr12, day3, day4, day5, day7, day10, day14, day19,
                                  day24, day30, dayMoreThan30}
                                                                    OPTIONAL,
   [[ candidateCellInfoList-r10 CandidateCellInfoList-r10
                                                                OPTIONAL
CandidateCellInfoList-r10 ::=
                             SEQUENCE (SIZE (1..maxFreq)) OF CandidateCellInfo-r10
CandidateCellInfo-r10 ::=
                          SEQUENCE {
     - cellIdentification
   physCellId-r10
                                 PhysCellId,
   dl-CarrierFreq-r10
                                 ARFCN-ValueEUTRA,
    -- available measurement results
                    RSRP-Range
   rsrpResult-r10
                                                    OPTIONAL,
   rsrqResult-r10
                                 RSRQ-Range
                                                    OPTIONAL,
   [[ dl-CarrierFreq-v1090
                                     ARFCN-ValueEUTRA-v9e0
                                                                OPTIONAL
   [[ rsrqResult-v1250
                                    RSRQ-Range-v1250
                                                                OPTIONAL
   ]],
                                RS-SINR-Range-r13
       rs-sinr-Result-r13
   11
                                                                OPTIONAL
   ]]
-- ASN1STOP
```

RRM-Config field descriptions

candidateCellInfoList

A list of the best cells on each frequency for which measurement information was available, in order of decreasing RSRP

dl-CarrierFreq

The source includes dl-CarrierFreq-v1090 if and only if dl-CarrierFreq-r10 is set to maxEARFCN.

ue-InactiveTime

Duration while UE has not received or transmitted any user data. Thus the timer is still running in case e.g., UE measures the neighbour cells for the HO purpose. Value s1 corresponds to 1 second, s2 corresponds to 2 seconds and so on. Value min1 corresponds to 1 minute, value min1s20 corresponds to 1 minute and 20 seconds, value min1s40 corresponds to 1 minute and 40 seconds and so on. Value hr1 corresponds to 1 hour, hr1min30 corresponds to 1 hour and 30 minutes and so on.

10.4 Inter-node RRC multiplicity and type constraint values

Multiplicity and type constraints definitions

```
-- ASN1START

maxReestabInfo INTEGER ::= 32 -- Maximum number of KeNB* and shortMAC-I forwarded
-- at handover for re-establishment preparation
-- ASN1STOP
```

End of EUTRA-InterNodeDefinitions

```
-- ASN1START
```

```
END
-- ASN1STOP
```

10.5 Mandatory information in AS-Config

The AS-Config transferred between source eNB and target-eNB shall include all IEs necessary to describe the AS context. The conditional presence in section 6 is only applicable for eNB to UE communication.

The "need" or "cond" statements are not applied in case of sending the IEs from source eNB to target eNB. Some fields shall be included regardless of the "need" or "cond" e.g. *discardTimer*. The *AS-Config* re-uses information elements primarily created to cover the radio interface signalling requirements. The information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the *MasterInformationBlock*.

All the fields in the AS-Config as defined in 10.3 that are introduced after v9.2.0 and that are optional for eNB to UE communication shall be included, if the functionality is configured. The fields in the AS-Config that are defined before and including v9.2.0 shall be included as specified in the following.

Within the *sourceRadioResourceConfig, sourceMeasConfig* and *sourceOtherConfig*, the source eNB shall include fields that are optional for eNB to UE communication, if the functionality is configured unless explicitly specified otherwise in the following:

- in accordance with a condition that is explicitly stated to be applicable; or
- a default value is defined for the concerned field; and the configured value is the same as the default value that is defined; or
- the need of the field is OP and the current UE configuration corresponds with the behaviour defined for absence of the field;

The following fields, if the functionality is configured, are not mandatory for the source eNB to include in the *AS-Config* since delta signalling by the target eNB for these fields is not supported:

- semiPersistSchedC-RNTI
- measGapConfig

For the measurement configuration, a corresponding operation as 5.5.6.1 and 5.5.2.2a is executed by target eNB.

10.6 Inter-node NB-IoT messages

10.6.1 General

This section specifies NB-IoT RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, i.e. a single 'logical channel' is used for all NB-IoT RRC messages transferred across network nodes.

NB-IoT-InterNodeDefinitions

This ASN.1 segment is the start of the NB-IoT inter-node PDU definitions.

```
-- ASN1START

NBIOT-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
C-RNTI,
PhysCellId,
SecurityAlgorithmConfig,
ShortMAC-I

FROM EUTRA-RRC-Definitions
```

```
AdditionalReestabInfoList

FROM EUTRA-InterNodeDefinitions

CarrierFreq-NB-r13,
RadioResourceConfigDedicated-NB-r13,
UE-Capability-NB-r13,
UE-RadioPagingInfo-NB-r13

FROM NBIOT-RRC-Definitions;

-- ASN1STOP
```

10.6.2 Message definitions

HandoverPreparationInformation-NB

This message is used to transfer the UE context from the eNB where the RRC connection has been suspended and transfer it to the eNB where the RRC Connection has been requested to be resumed.

Direction: source eNB to target eNB

HandoverPreparationInformation-NB message

```
-- ASN1START
HandoverPreparationInformation-NB ::= SEQUENCE {
    criticalExtensions
                                          CHOICE {
                                               CHOICE {
           handoverPreparationInformation-r13
                                                  HandoverPreparationInformation-NB-IEs,
           spare3 NULL, spare1 NULL
       criticalExtensionsFuture
                                          SEOUENCE { }
}
HandoverPreparationInformation-NB-IEs ::= SEQUENCE {
   ue-RadioAccessCapabilityInfo-r13 UE-Capability-NB-r13,
   as-Config-r13
                                           AS-Config-NB,
   rrm-Config-r13
                                          RRM-Config-NB
                                                                          OPTIONAL,
                                                                          OPTIONAL,
   as-Context-r13
                                          AS-Context-NB
    {\tt nonCriticalExtension}
                                           SEQUENCE {}
                                                                          OPTIONAL
-- ASN1STOP
```

HandoverPreparationInformation-NB field descriptions

as-Config

The radio resource configuration.

as-Context

The local E-UTRAN context required by the target eNB.

rrm-Config

The local E-UTRAN context used depending on the target node's implementation, which is mainly used for the RRM purpose.

ue-RadioAccessCapabilityInfo

The NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5].

UEPagingCoverageInformation-NB

This message is used to transfer UE paging coverage information for NB-IoT, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

UEPagingCoverageInformation-NB message

```
-- ASN1START
```

```
UEPagingCoverageInformation-NB ::= SEQUENCE {
    criticalExtensions
                                           CHOICE{
       c1
            uePagingCoverageInformation-r13
                                                    UEPagingCoverageInformation-NB-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                            SEQUENCE {}
    }
}
UEPagingCoverageInformation-NB-IEs ::= SEQUENCE {
   the possible value(s) can differ from those sent on Uu
                                           INTEGER (1..2048) OPTIONAL,
    npdcch-NumRepetitionPaging-r13
    nonCriticalExtension
                                            SEQUENCE {}
                                                                OPTIONAL
}
-- ASN1STOP
```

UEPagingCoverageInformation-NB field descriptions

npdcch-NumRepetitionPaging

Number of repetitions for NPDCCH, see TS 36.211 [21]. This value is an estimate of the required number of repetitions for NPDCCH.

UERadioAccessCapabilityInformation-NB

This message is used to transfer UE NB-IoT Radio Access capability information, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

UERadioAccessCapabilityInformation-NB message

```
-- ASN1START
UERadioAccessCapabilityInformation-NB ::= SEQUENCE {
    criticalExtensions
                                           CHOICE
                                                CHOICE {
       c1
            ueRadioAccessCapabilityInformation-r13
                                                   UERadioAccessCapabilityInformation-NB-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
                                               SEQUENCE {}
        criticalExtensionsFuture
    }
}
UERadioAccessCapabilityInformation-NB-IES ::= SEQUENCE {
   ue-RadioAccessCapabilityInfo-r13
                                               OCTET STRING (CONTAINING UE-Capability-NB-r13),
   nonCriticalExtension
                                                SEQUENCE {}
                                                                                        OPTIONAL
-- ASN1STOP
```

UERadioAccessCapabilityInformation-NB field descriptions

ue-RadioAccessCapabilityInfo

The NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5].

UERadioPagingInformation-NB

This message is used to transfer NB-IoT radio paging information, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

UERadioPagingInformation-NB message

```
-- ASN1START
```

```
UERadioPagingInformation-NB ::= SEQUENCE {
                                      CHOICE {
    criticalExtensions
                                          CHOICE {
       c1
           ueRadioPagingInformation-r13
                                                   UERadioPagingInformation-NB-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
        criticalExtensionsFuture
                                           SEQUENCE {}
}
UERadioPagingInformation-NB-IEs ::= SEQUENCE {
    ue-RadioPagingInfo-r13
                                       OCTET STRING (CONTAINING UE-RadioPagingInfo-NB-r13),
    nonCriticalExtension
                                       SEOUENCE { }
                                                                                   OPTIONAL
-- ASN1STOP
```

UERadioPagingInformation-NB field descriptions

ue-RadioPagingInfo

The field is used to transfer UE NB-IoT capability information used for paging. The eNB generates the *ue-RadioPagingInfo* and the contained UE capability information is absent when not supported bythe UE.

10.7 Inter-node NB-IoT RRC information element definitions

AS-Config-NB

The AS-Config-NB IE contains information about NB-IoT RRC configuration information in the source eNB which can be utilized by target eNB.

AS-Config-NB information element

```
-- ASN1START

AS-Config-NB ::= SEQUENCE {
    sourceRadioResourceConfig-r13 RadioResourceConfigDedicated-NB-r13,
    sourceSecurityAlgorithmConfig-r13 SecurityAlgorithmConfig,
    sourceUE-Identity-r13 C-RNTI,
    sourceDl-CarrierFreq-r13 CarrierFreq-NB-r13,
    ...
}

-- ASN1STOP
```

AS-Config-NB field descriptions

sourceDL-CarrierFreq

Provides the parameter Downlink EARFCN in the source PCell, see TS 36.101 [42].

sourceRadioResourceConfig

Radio configuration in the source PCell. The radio resource configuration for all radio bearers existing in the source PCell shall be included. See 10.9.

sourceSecurityAlgorithmConfig

This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell.

AS-Context-NB

The IE AS-Context-NB is used to transfer the UE context required by the target eNB.

AS-Context-NB information element

```
-- ASN1START

AS-Context-NB ::= SEQUENCE {
    reestablishmentInfo-r13 ReestablishmentInfo-NB OPTIONAL,
    ...
```

```
}
-- ASN1STOP
```

AS-Context-NB field descriptions

reestablishmentInfo

Including information needed for the RRC connection re-establishment.

ReestablishmentInfo-NB

The ReestablishmentInfo-NB IE contains information needed for the RRC connection re-establishment.

ReestablishmentInfo-NB information element

ReestablishmentInfo-NB field descriptions

additionalReestabInfoList

Contains a list of shortMAC-I and KeNB* for cells under control of the target eNB, required for potential reestablishment by the UE in these cells to succeed.

sourcePhyCellId

The physical cell identity of the source PCell, used to determine the UE context in the target eNB at re-establishment.

targetCellShortMAC-I

The ShortMAC-I for the target PCell, in order for potential re-establishment to succeed.

– RRM-Config-NB

The RRM-Config-NB IE contains information about UE specific RRM information which can be utilized by target eNB.

RRM-Config-NB information element

```
-- ASN1START
RRM-Config-NB ::=
                                SEQUENCE {
                                ENUMERATED {
   ue-InactiveTime
                                    s1, s2, s3, s5, s7, s10, s15, s20,
                                    s25, s30, s40, s50, min1, min1s20, min1s40,
                                    min2, min2s30, min3, min3s30, min4, min5, min6,
                                    min7, min8, min9, min10, min12, min14, min17, min20,
                                    min24, min28, min33, min38, min44, min50, hr1,
                                    hr1min30, hr2, hr2min30, hr3, hr3min30, hr4, hr5, hr6,
                                    hr8, hr10, hr13, hr16, hr20, day1, day1hr12, day2,
                                    day2hr12, day3, day4, day5, day7, day10, day14, day19,
                                    day24, day30, dayMoreThan30}
                                                                        OPTIONAL,
 - ASN1STOP
```

RRM-Config-NB field descriptions

ue-InactiveTime

Duration while UE has not received or transmitted any user data. Value s1 corresponds to 1 second, s2 corresponds to 2 seconds and so on. Value min1 corresponds to 1 minute, value min1s20 corresponds to 1 minute and 20 seconds, value min1s40 corresponds to 1 minute and 40 seconds and so on. Value hr1 corresponds to 1 hour, hr1min30 corresponds to 1 hour and 30 minutes and so on.

10.8 Inter-node RRC multiplicity and type constraint values

- Multiplicity and type constraints definitions
- End of NB-IoT-InterNodeDefinitions

-- ASN1START
END
-- ASN1STOP

10.9 Mandatory information in AS-Config-NB

The AS-Config-NB transferred between source eNB and target-eNB shall include all IEs necessary to describe the AS context. The conditional presence in section 6 is only applicable for eNB to UE communication.

The "Need" or "Cond" statements are not applied in case of sending the IEs from source eNB to target eNB. Some information elements shall be included regardless of the "Need" or "Cond" e.g. *discardTimer*. The *AS-Config-NB* reuses information elements primarily created to cover the radio interface signalling requirements.

Within the *sourceRadioResourceConfig*, the source eNB shall include fields that are optional for eNB to UE communication, if the functionality is configured unless explicitly specified otherwise in the following:

- in accordance with a condition that is explicitly stated to be applicable; or
- a default value is defined for the concerned field; and the configured value is the same as the default value that is defined; or
- the need of the field is OP and the current UE configuration corresponds with the behaviour defined for absence of the field:

11 UE capability related constraints and performance requirements

11.1 UE capability related constraints

The following table lists constraints regarding the UE capabilities that E-UTRAN is assumed to take into account.

Parameter	Description	Value	NB-IoT
#DRBs	The number of DRBs that a UE shall support	8	(0, 1, 2)
			NOTE1

Parameter	ter Description		NB-IoT
#RLC-AM	The number of RLC AM entities that a UE shall support		(2, 3)
			NOTE1
#minCellperMeasObjec tEUTRA	The minimum number of neighbour cells (excluding black list cells) that a UE shall be able to store within a MeasObjectEUTRA. NOTE.	32	N/A
#minBlackCellRangesp erMeasObjectEUTRA	The minimum number of blacklist cell PCI ranges that a UE shall be able to store within a MeasObjectEUTRA	32	N/A
#minCellperMeasObjec tUTRA	The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectUTRA. NOTE.		N/A
#minCellperMeasObjec tGERAN	The minimum number of neighbour cells that a UE shall be able to store within a measObjectGERAN. NOTE.		N/A
#minCellperMeasObjec tCDMA2000	The minimum number of neighbour cells that a UE shall be able to store within a measObjectCDMA2000. NOTE.	32	N/A
#minCellTotal	The minimum number of neighbour cells (excluding black list cells) that UE shall be able to store in total in all measurement objects configured	256	N/A
which the UE i most (# minCe respectively.	reporting, the limit regarding the cells E-UTRAN can configure incl s requested to report CGI i.e. the amount of neighbour cells that ca llperMeasObjectRAT - 1), where RAT represents EUTRA/UTRA/G	n be include	ed is at
NOTE1: #DRBs based	on UE capability, #RLC-AM =#DRBs + 2.		

11.2 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following tables, by means of a value N:

N = the number of 1ms subframes from the end of reception of the E-UTRAN -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> E-UTRAN response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation).

NOTE: No processing delay requirements are specified for RN-specific procedures.

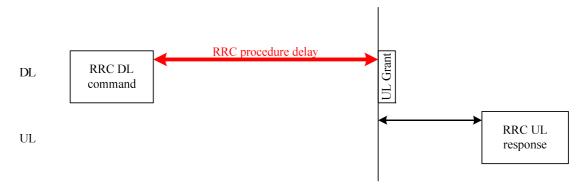


Figure 11.2-1: Illustration of RRC procedure delay

Table 11.2-1: UE performance requirements for RRC procedures for UEs other than NB-IoT UEs

Procedure title:	E-UTRAN -> UE	UE -> E-UTRAN	N	Notes
RRC Connection Contr		1	1	1
RRC connection establishment	RRCConnectionSetu p or RRCConnectionResu	RRCConnectionSetupCo mplete or RRCConnectionResumeC	15	
RRC connection	RRCConnectionRele	omplete	NA	
release RRC connection re- configuration (radio resource configuration)	ase RRCConnectionReco nfiguration	RRCConnectionReconfigu rationComplete	15	
RRC connection re- configuration (measurement configuration)	RRCConnectionReco nfiguration	RRCConnectionReconfigu rationComplete	15	
RRC connection re- configuration (intra- LTE mobility)	RRCConnectionReco nfiguration	RRCConnectionReconfigu rationComplete	15	
RRC connection reconfiguration (SCell addition/release)	RRCConnectionReconfiguration	RRCConnectionReconfigu rationComplete	20	
RRC connection reconfiguration (SCG establishment/ release, SCG cell addition/ release)	RRCConnectionReco nfiguration	RRCConnectionReconfigu rationComplete	20	
RRC connection re- establishment	RRCConnectionRees tablishment	RRCConnectionReestabli shmentComplete	15	
Initial security activation	SecurityModeComma nd	SecurityModeCommandC omplete/SecurityModeCo mmandFailure	10	
Initial security activation + RRC connection re- configuration (RB establishment)	SecurityModeComma nd, RRCConnectionReco nfiguration	RRCConnectionReconfigu rationComplete	20	The two DL messages are transmitted in the same TTI
Paging	Paging		NA	
Inter RAT mobility				
Handover to E-UTRA	RRCConnectionReco nfiguration (sent by other RAT)	RRCConnectionReconfigu rationComplete	NA	The performance of this procedure is specified in [50] in case of handover from GSM and [29], [30] in case of handover from UTRA.
Handover from E- UTRA	MobilityFromEUTRA Command		NA	The performance of this procedure is specified in [16]
Handover from E- UTRA to CDMA2000	HandoverFromEUTR APreparationRequest (CDMA2000)		NA	Used to trigger the handover preparation procedure with a CDMA2000 RAT. The performance of this procedure is specified in [16]
Measurement procedu	res	MagaziromantDairari	NIA.	<u> </u>
Measurement Reporting Other procedures		MeasurementReport	NA	
Other procedures	LIEConobility English	LIEConobility Information	10	T
UE capability transfer Counter check	UECapabilityEnquiry CounterCheck	UECapabilityInformation CounterCheckResponse	10	
Proximity indication	OUUI II OI I CUK	ProximityIndication	NA	+
i roaming mulcation	l	i roximitymulcation	INA	_1

Procedure title:	E-UTRAN -> UE	UE -> E-UTRAN	N	Notes
UE information	UEInformationReque st	UEInformationResponse	15	
MBMS counting	MBMSCountingRequ est	MBMSCountingResponse	NA	
MBMS interest indication		MBMSInterestIndication	NA	
In-device coexistence indication		InDeviceCoexIndication	NA	
UE assistance information		UEAssistanceInformation	NA	
SCG failure information		SCGFailureInformation	NA	
Sidelink UE information		SidelinkUEInformation	NA	
WLAN Connection Status Reporting		WLANConnectionStatusR eport	NA	
Delay Budget Report		DelayBudgetReport	NA	

Table 11.2-2: UE performance requirements for RRC procedures for NB-IoT UEs

Procedure title:	E-UTRAN -> UE	UE -> E-UTRAN	N	Notes
RRC Connection Contr	ol Procedures			•
RRC connection establishment	RRCConnectionSetu p-NB or RRCConnectionResu me-NB	RRCConnectionSetupCo mplete-NB or RRCConnectionResumeC omplete-NB	45	
RRC connection release	RRCConnectionRele ase-NB		NA	
RRC connection re- configuration (radio resource configuration)	RRCConnectionReconfiguration-NB	RRCConnectionReconfigu rationComplete-NB	45	
RRC connection re- establishment	RRCConnectionRees tablishment-NB	RRCConnectionReestabli shmentComplete-NB	45	
Initial security activation	SecurityModeComma nd	SecurityModeCommandC omplete/SecurityModeCo mmandFailure	35	
Initial security activation + RRC connection re- configuration (RB establishment)	SecurityModeComma nd, RRCConnectionReco nfiguration-NB	RRCConnectionReconfigu rationComplete-NB	55	The two DL messages are transmitted in the same TTI
Paging	Paging-NB		NA	
Other procedures				
UE capability transfer	UECapabilityEnquiry- NB	UECapabilityInformation- NB	35	

11.3 Void

Annex A (informative): Guidelines, mainly on use of ASN.1

Editor's note No agreements have been reached concerning the extension of RRC PDUs so far. Any statements in this section about the protocol extension mechanism should be considered as FFS.

A.1 Introduction

The following clauses contain guidelines for the specification of RRC protocol data units (PDUs) with ASN.1.

A.2 Procedural specification

A.2.1 General principles

The procedural specification provides an overall high level description regarding the UE behaviour in a particular scenario.

It should be noted that most of the UE behaviour associated with the reception of a particular field is covered by the applicable parts of the PDU specification. The procedural specification may also include specific details of the UE behaviour upon reception of a field, but typically this should be done only for cases that are not easy to capture in the PDU section e.g. general actions, more complicated actions depending on the value of multiple fields.

Likewise, the procedural specification need not specify the UE requirements regarding the setting of fields within the messages that are send to E-UTRAN i.e. this may also be covered by the PDU specification.

A.2.2 More detailed aspects

The following more detailed conventions should be used:

- Bullets:
 - Capitals should be used in the same manner as in other parts of the procedural text i.e. in most cases no capital applies since the bullets are part of the sentence starting with 'The UE shall:'
 - All bullets, including the last one in a sub-clause, should end with a semi-colon i.e. an ';'
- Conditions
 - Whenever multiple conditions apply, a semi-colon should be used at the end of each conditions with the exception of the last one, i.e. as in 'if cond1; or cond2:

A.3 PDU specification

A.3.1 General principles

A.3.1.1 ASN.1 sections

The RRC PDU contents are formally and completely described using abstract syntax notation (ASN.1), see X.680 [13], X.681 (02/2002) [14].

The complete ASN.1 code is divided into a number of ASN.1 sections in the specifications. In order to facilitate the extraction of the complete ASN.1 code from the specification, each ASN.1 section begins with a text paragraph consisting entirely of an *ASN.1 start tag*, which consists of a double hyphen followed by a single space and the text string "ASN1START" (in all upper case letters). Each ASN.1 section ends with a text paragraph consisting entirely of an *ASN.1 stop tag*, which consists of a double hyphen followed by a single space and the text "ASN1STOP" (in all upper case letters):

-- ASN1START

-- ASN1STOP

The text paragraphs containing the ASN.1 start and stop tags should not contain any ASN.1 code significant for the complete description of the RRC PDU contents. The complete ASN.1 code may be extracted by copying all the text paragraphs between an ASN.1 start tag and the following ASN.1 stop tag in the order they appear, throughout the specification.

NOTE: A typical procedure for extraction of the complete ASN.1 code consists of a first step where the entire RRC PDU contents description (ultimately the entire specification) is saved into a plain text (ASCII) file format, followed by a second step where the actual extraction takes place, based on the occurrence of the ASN.1 start and stop tags.

A.3.1.2 ASN.1 identifier naming conventions

The naming of identifiers (i.e., the ASN.1 field and type identifiers) should be based on the following guidelines:

- Message (PDU) identifiers should be ordinary mixed case without hyphenation. These identifiers, *e.g.*, the *RRCConnectionModificationCommand*, should be used for reference in the procedure text. Abbreviated forms of these identifiers should not be used.
- Type identifiers other than PDU identifiers should be ordinary mixed case, with hyphenation used to set off acronyms only where an adjacent letter is a capital, *e.g.*, *EstablishmentCause*, *SelectedPLMN* (not *Selected-PLMN*, since the "d" in "Selected" is lowercase), *InitialUE-Identity* and *MeasSFN-SFN-TimeDifference*.
- Field identifiers shall start with a lowercase letter and use mixed case thereafter, *e.g.*, *establishmentCause*. If a field identifier begins with an acronym (which would normally be in upper case), the entire acronym is lowercase (*plmn-Identity*, not *pLMN-Identity*). The acronym is set off with a hyphen (*ue-Identity*, not *ueIdentity*), in order to facilitate a consistent search pattern with corresponding type identifiers.
- Identifiers that are likely to be keywords of some language, especially widely used languages, such as C++ or Java, should be avoided to the extent possible.
- Identifiers, other than PDU identifiers, longer than 25 characters should be avoided where possible. It is recommended to use abbreviations, which should be done in a consistent manner i.e. use 'Meas' instead of 'Measurement' for all occurrences. Examples of typical abbreviations are given in table A.3.1.2.1-1 below.
- For future extension: When an extension is introduced a suffix is added to the identifier of the concerned ASN.1 field and/ or type. A suffix of the form "-rX" is used, with X indicating the release, for ASN.1 fields or types introduced in a later release (i.e. a release later than the original/ first release of the protocol) as well as for ASN.1 fields or types for which a revision is introduced in a later release replacing a previous version, e.g., Foor9 for the Rel-9 version of the ASN.1 type Foo. A suffix of the form "-rXb" is used for the first revision of a field that it appears in the same release (X) as the original version of the field, "-rXc" for a second intra-release revision and so on. A suffix of the form "-vXYZ" is used for ASN.1 fields or types that only are an extension of a corresponding earlier field or type (see sub-clause A.4), e.g., AnElement-v10b0 for the extension of the ASN.1 type AnElement introduced in version 10.11.0 of the specification. A number 0...9, 10, 11, etc. is used to represent the first part of the version number, indicating the release of the protocol. Lower case letters a, b, c, etc. are used to represent the second (and third) part of the version number if they are greater than 9. In the procedural specification, in field descriptions as well as in headings suffices are not used, unless there is a clear need to distinguish the extension from the original field.
- More generally, in case there is a need to distinguish different variants of an ASN.1 field or IE, a suffix should be added at the end of the identifiers e.g. *MeasObjectUTRA*, *ConfigCommon*. When there is no particular need to distinguish the fields (e.g. because the field is included in different IEs), a common field identifier name may be used. This may be attractive e.g. in case the procedural specification is the same for the different variants.

Abbreviation	Abbreviated word
Comm	Communication
Conf	Confirmation
Config	Configuration
Disc	Discovery
DL	Downlink
Ext	Extension
Freq	Frequency
Id	Identity
Ind	Indication
Info	Information
Meas	Measurement
Neigh	Neighbour(ing)
Param(s)	Parameter(s)
Persist	Persistent
Phys	Physical
Proc	Process
Reestab	Reestablishment
Req	Request
Rx	Reception
Sched	Scheduling
Sync	Synchronisation
Thresh	Threshold
Tx/ Transm	Transmission
UL	Uplink

Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

NOTE: The table A.3.1.2.1-1 is not exhaustive. Additional abbreviations may be used in ASN.1 identifiers when needed.

A.3.1.3 Text references using ASN.1 identifiers

A text reference into the RRC PDU contents description from other parts of the specification is made using the ASN.1 field or type identifier of the referenced element. The ASN.1 field and type identifiers used in text references should be in the *italic font style*. The "do not check spelling and grammar" attribute in Word should be set. Quotation marks (i.e., " ") should not be used around the ASN.1 field or type identifier.

A reference to an RRC PDU type should be made using the corresponding ASN.1 type identifier followed by the word "message", e.g., a reference to the *RRCConnectionRelease* message.

A reference to a specific part of an RRC PDU, or to a specific part of any other ASN.1 type, should be made using the corresponding ASN.1 field identifier followed by the word "field", e.g., a reference to the *prioritisedBitRate* field in the example below.

```
-- /example/ ASN1START

LogicalChannelConfig ::= SEQUENCE {
   ul-SpecificParameters SEQUENCE {
      priority Priority,
      prioritisedBitRate PrioritisedBitRate,
      bucketSizeDuration BucketSizeDuration,
      logicalChannelGroup INTEGER (0..3)
   }
}

-- ASN1STOP
```

NOTE: All the ASN.1 start tags in the ASN.1 sections, used as examples in this annex to the specification, are deliberately distorted, in order not to include them when the ASN.1 description of the RRC PDU contents is extracted from the specification.

A reference to a specific type of information element should be made using the corresponding ASN.1 type identifier preceded by the acronym "IE", e.g., a reference to the IE *LogicalChannelConfig* in the example above.

References to a specific type of information element should only be used when those are generic, i.e., without regard to the particular context wherein the specific type of information element is used. If the reference is related to a particular context, e.g., an RRC PDU type (message) wherein the information element is used, the corresponding field identifier in that context should be used in the text reference.

A reference to a specific value of an ASN.1 field should be made using the corresponding ASN.1 value without using quotation marks around the ASN.1 value, e.g., 'if the *status* field is set to value *true*'.

A.3.2 High-level message structure

Within each logical channel type, the associated RRC PDU (message) types are alternatives within a CHOICE, as shown in the example below.

```
-- /example/ ASN1START
DL-DCCH-Message ::= SEQUENCE {
                           DL-DCCH-MessageType
DL-DCCH-MessageType ::= CHOICE {
                           CHOICE {
        dlInformationTransfer
                                               DLInformationTransfer,
       handoverFromEUTRAPreparationRequest
                                               HandoverFromEUTRAPreparationRequest,
       mobilityFromEUTRACommand
                                               MobilityFromEUTRACommand,
        rrcConnectionReconfiguration
                                               RRCConnectionReconfiguration,
        rrcConnectionRelease
                                               RRCConnectionRelease,
       securityModeCommand
                                               SecurityModeCommand,
       ueCapabilityEnquiry
                                               UECapabilityEnquiry,
       sparel NULL
    messageClassExtension SEQUENCE {}
  ASN1STOP
```

A nested two-level CHOICE structure is used, where the alternative PDU types are alternatives within the inner level *c1* CHOICE.

Spare alternatives (i.e., *spare1* in this case) may be included within the *c1* CHOICE to facilitate future extension. The number of such spare alternatives should not extend the total number of alternatives beyond an integer-power-of-two number of alternatives (i.e., eight in this case).

Further extension of the number of alternative PDU types is facilitated using the *messageClassExtension* alternative in the outer level CHOICE.

A.3.3 Message definition

Each PDU (message) type is specified in an ASN.1 section similar to the one shown in the example below.

Hooks for *critical* and *non-critical* extension should normally be included in the PDU type specification. How these hooks are used is further described in sub-clause A.4.

Critical extensions are characterised by a redefinition of the PDU contents and need to be governed by a mechanism for protocol version agreement between the encoder and the decoder of the PDU, such that the encoder is prevented from sending a critically extended version of the PDU type, which is not comprehended by the decoder.

Critical extension of a PDU type is facilitated by a two-level CHOICE structure, where the alternative PDU contents are alternatives within the inner level *c1* CHOICE. Spare alternatives (i.e., *spare3* down to *spare1* in this case) may be included within the *c1* CHOICE. The number of spare alternatives to be included in the original PDU specification should be decided case by case, based on the expected rate of critical extension in the future releases of the protocol.

Further critical extension, when the spare alternatives from the original specifications are used up, is facilitated using the *criticalExtensionsFuture* in the outer level CHOICE.

In PDU types where critical extension is not expected in the future releases of the protocol, the inner level *c1* CHOICE and the spare alternatives may be excluded, as shown in the example below.

Non-critical extensions are characterised by the addition of new information to the original specification of the PDU type. If not comprehended, a non-critical extension may be skipped by the decoder, whilst the decoder is still able to complete the decoding of the comprehended parts of the PDU contents.

Non-critical extensions at locations other than the end of the message or other than at the end of a field contained in a BIT or OCTET STRING are facilitated by use of the ASN.1 extension marker "...". The original specification of a PDU type should normally include the extension marker at the end of the sequence of information elements contained.

Non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING are facilitated by use of an empty sequence that is marked OPTIONAL e.g. as shown in the following example:

```
-- /example/ ASNISTART

RRCMessage-r8-IEs ::= SEQUENCE {
    field1 InformationElement1,
    field2 InformationElement2,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASNISTOP
```

The ASN.1 section specifying the contents of a PDU type may be followed by a *field description* table where a further description of, e.g., the semantic properties of the fields may be included. The general format of this table is shown in the example below. The field description table is absent in case there are no fields for which further description needs to be provided e.g. because the PDU does not include any fields, or because an IE is defined for each field while there is nothing specific regarding the use of this IE that needs to be specified.

	%PDU-Typeldentifier% field descriptions
%field identifier%	
Field description.	
%field identifier%	
Field description.	

The field description table has one column. The header row shall contain the ASN.1 type identifier of the PDU type.

The following rows are used to provide field descriptions. Each row shall include a first paragraph with a *field identifier* (in *bold and italic* font style) referring to the part of the PDU to which it applies. The following paragraphs at the same row may include (in regular font style), e.g., semantic description, references to other specifications and/or specification of value units, which are relevant for the particular part of the PDU.

The parts of the PDU contents that do not require a field description shall be omitted from the field description table.

A.3.4 Information elements

Each IE (information element) type is specified in an ASN.1 section similar to the one shown in the example below.

```
-- /example/ ASN1START
PRACH-ConfigSIB ::=
                                    SEQUENCE {
                                        INTEGER (0..1023),
   rootSequenceIndex
    prach-ConfigInfo
                                        PRACH-ConfigInfo
PRACH-Config ::=
                                    SEOUENCE {
                                        INTEGER (0..1023),
    rootSequenceIndex
   prach-ConfigInfo
                                        PRACH-ConfigInfo
                                                                             OPTIONAL
                                                                                         -- Need ON
PRACH-ConfigInfo ::=
                                    SEQUENCE {
    prach-ConfigIndex
                                        ENUMERATED {ffs},
    highSpeedFlag
                                        ENUMERATED {ffs},
                                        ENUMERATED (ffs)
    zeroCorrelationZoneConfig
-- ASN1STOP
```

IEs should be introduced whenever there are multiple fields for which the same set of values apply. IEs may also be defined for other reasons e.g. to break down a ASN.1 definition in to smaller pieces.

A group of closely related IE type definitions, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in this example, are preferably placed together in a common ASN.1 section. The IE type identifiers should in this case have a common base, defined as the *generic type identifier*. It may be complemented by a suffix to distinguish the different variants. The "*PRACH-Config*" is the generic type identifier in this example, and the "*SIB*" suffix is added to distinguish the variant. The sub-clause heading and generic references to a group of closely related IEs defined in this way should use the generic type identifier.

The same principle should apply if a new version, or an extension version, of an existing IE is created for *critical* or *non-critical* extension of the protocol (see sub-clause A.4). The new version, or the extension version, of the IE is included in the same ASN.1 section defining the original. A suffix is added to the type identifier, using the naming conventions defined in sub-clause A.3.1.2, indicating the release or version of the where the new version, or extension version, was introduced.

Local IE type definitions, like the IE *PRACH-ConfigInfo* in the example above, may be included in the ASN.1 section and be referenced in the other IE types defined in the same ASN.1 section. The use of locally defined IE types should be encouraged, as a tool to break up large and complex IE type definitions. It can improve the readability of the code. There may also be a benefit for the software implementation of the protocol end-points, as these IE types are typically provided by the ASN.1 compiler as independent data elements, to be used in the software implementation.

An IE type defined in a local context, like the IE *PRACH-ConfigInfo*, should not be referenced directly from other ASN.1 sections in the RRC specification. An IE type which is referenced in more than one ASN.1 section should be defined in a separate sub-clause, with a separate heading and a separate ASN.1 section (possibly as one in a set of

closely related IE types, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in the example above). Such IE types are also referred to as 'global IEs'.

NOTE: Referring to an IE type, that is defined as a local IE type in the context of another ASN.1 section, does not generate an ASN.1 compilation error. Nevertheless, using a locally defined IE type in that way makes the IE type definition difficult to find, as it would not be visible at an outline level of the specification. It should be avoided.

The ASN.1 section specifying the contents of one or more IE types, like in the example above, may be followed by a *field description* table, where a further description of, e.g., the semantic properties of the fields of the information elements may be included. This table may be absent, similar as indicated in sub-clause A.3.3 for the specification of the PDU type. The general format of the *field description* table is the same as shown in sub-clause A.3.3 for the specification of the PDU type.

A.3.5 Fields with optional presence

A field with optional presence may be declared with the keyword DEFAULT. It identifies a default value to be assumed, if the sender does not include a value for that field in the encoding:

```
-- /example/ ASN1START

PreambleInfo ::= SEQUENCE {
   numberOfRA-Preambles INTEGER (1..64) DEFAULT 1,
   ...
}

-- ASN1STOP
```

Alternatively, a field with optional presence may be declared with the keyword OPTIONAL. It identifies a field for which a value can be omitted. The omission carries semantics, which is different from any normal value of the field:

```
-- /example/ ASN1START

PRACH-Config ::= SEQUENCE {
   rootSequenceIndex INTEGER (0..1023),
   prach-ConfigInfo PRACH-ConfigInfo OPTIONAL -- Need ON
}

-- ASN1STOP
```

The semantics of an optionally present field, in the case it is omitted, should be indicated at the end of the paragraph including the keyword OPTIONAL, using a short comment text with a need statement. The need statement includes the keyword "Need", followed by one of the predefined semantics tags (OP, ON or OR) defined in sub-clause 6.1. If the semantics tag OP is used, the semantics of the absent field are further specified either in the field description table following the ASN.1 section, or in procedure text.

The addition of OPTIONAL keywords for capability groups is based on the following guideline. If there is more than one field in the lower level IE, then OPTIONAL keyword is added at the group level. If there is only one field in the lower level IE, OPTIONAL keyword is not added at the group level.

A.3.6 Fields with conditional presence

A field with conditional presence is declared with the keyword OPTIONAL. In addition, a short comment text shall be included at the end of the paragraph including the keyword OPTIONAL. The comment text includes the keyword "Cond", followed by a condition tag associated with the field ("UL" in this example):

```
-- /example/ ASN1START

LogicalChannelConfig ::= SEQUENCE {
   ul-SpecificParameters SEQUENCE {
      priority INTEGER (0),
      ...
   } OPTIONAL -- Cond UL
}

-- ASN1STOP
```

When conditionally present fields are included in an ASN.1 section, the field description table after the ASN.1 section shall be followed by a *conditional presence* table. The conditional presence table specifies the conditions for including the fields with conditional presence in the particular ASN.1 section.

Conditional presence	Explanation
UL	Specification of the conditions for including the field associated with the condition
	tag = "UL". Semantics in case of optional presence under certain conditions may
	also be specified.

The conditional presence table has two columns. The first column (heading: "Conditional presence") contains the condition tag (in *italic* font style), which links the fields with a condition tag in the ASN.1 section to an entry in the table. The second column (heading: "Explanation") contains a text specification of the conditions and requirements for the presence of the field. The second column may also include semantics, in case of an optional presence of the field, under certain conditions i.e. using the same predefined tags as defined for optional fields in A.3.5.

Conditional presence should primarily be used when presence of a field despends on the presence and/ or value of other fields within the same message. If the presence of a field depends on whether another feature/ function has been configured, while this function can be configured indepedently e.g. by another message and/ or at another point in time, the relation is best reflected by means of a statement in the field description table.

If the ASN.1 section does not include any fields with conditional presence, the conditional presence table shall not be included.

Whenever a field is only applicable in specific cases e.g. TDD, use of conditional presence should be considered.

A.3.7 Guidelines on use of lists with elements of SEQUENCE type

Where an information element has the form of a list (the SEQUENCE OF construct in ASN.1) with the type of the list elements being a SEQUENCE data type, an information element shall be defined for the list elements even if it would not otherwise be needed.

For example, a list of PLMN identities with reservation flags is defined as in the following example:

rather than as in the following (bad) example, which may cause generated code to contain types with unpredictable names:

```
-- /bad example/ ASN1START

PLMN-IdentityList ::= SEQUENCE (SIZE (1..6)) OF SEQUENCE {
   plmn-Identity PLMN-Identity,
   cellReservedForOperatorUse ENUMERATED {reserved, notReserved}
}

-- ASN1STOP
```

A.4 Extension of the PDU specifications

A.4.1 General principles to ensure compatibility

It is essential that extension of the protocol does not affect interoperability i.e. it is essential that implementations based on different versions of the RRC protocol are able to interoperate. In particular, this requirement applies for the following kind of protocol extensions:

- Introduction of new PDU types (i.e. these should not cause unexpected behaviour or damage).
- Introduction of additional fields in an extensible PDUs (i.e. it should be possible to ignore uncomprehended extensions without affecting the handling of the other parts of the message).
- Introduction of additional values of an extensible field of PDUs. If used, the behaviour upon reception of an uncomprehended value should be defined.

It should be noted that the PDU extension mechanism may depend on the logical channel used to transfer the message e.g. for some PDUs an implementation may be aware of the protocol version of the peer in which case selective ignoring of extensions may not be required.

The non-critical extension mechanism is the primary mechanism for introducing protocol extensions i.e. the critical extension mechanism is used merely when there is a need to introduce a 'clean' message version. Such a need appears when the last message version includes a large number of non-critical extensions, which results in issues like readability, overhead associated with the extension markers. The critical extension mechanism may also be considered when it is complicated to accommodate the extensions by means of non-critical extension mechanisms.

A.4.2 Critical extension of messages and fields

The mechanisms to critically extend a message are defined in A.3.3. There are both "outer branch" and "inner branch" mechanisms available. The "outer branch" consists of a CHOICE having the name *criticalExtensions*, with two values, *c1* and *criticalExtensionsFuture*. The *criticalExtensionsFuture* branch consists of an empty SEQUENCE, while the c1 branch contains the "inner branch" mechanism.

The "inner branch" structure is a CHOICE with values of the form "MessageName-rX-IEs" (e.g., "RRCConnectionReconfiguration-r8-IEs") or "spareX", with the spare values having type NULL. The "-rX-IEs" structures contain the complete structure of the message IEs for the appropriate release; i.e., the critical extension branch for the Rel-10 version of a message includes all Rel-8 and Rel-9 fields (that are not obviated in the later version), rather than containing only the additional Rel-10 fields.

The following guidelines may be used when deciding which mechanism to introduce for a particular message, i.e. only an 'outer branch', or an 'outer branch' in combination with an 'inner branch' including a certain number of spares:

- For certain messages, e.g. initial uplink messages, messages transmitted on a broadcast channel, critical extension may not be applicable.
- An outer branch may be sufficient for messages not including any fields.
- The number of spares within inner branch should reflect the likelihood that the message will be critically extended in future releases (since each release with a critical extension for the message consumes one of the spare values). The estimation of the critical extension likelyhood may be based on the number, size and changeability of the fields included in the message.
- In messages where an inner branch extension mechanism is available, all spare values of the inner branch should be used before any critical extensions are added using the outer branch.

The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release

```
-- /example/ ASN1START -- Original release

RRCMessage ::= SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions CHOICE {
        c1 CHOICE {
```

```
-- /example/ ASN1START
                                        -- Later release
RRCMessage ::=
                                        SEQUENCE {
    rrc-TransactionIdentifier
                                            RRC-TransactionIdentifier,
    criticalExtensions
                                        CHOICE {
                                            CHOICE {
           rrcMessage-r8
                                                RRCMessage-r8-IEs,
           rrcMessage-r10
                                                RRCMessage-r10-IEs,
            rrcMessage-r11
                                                RRCMessage-r11-IEs,
           rrcMessage-r14
                                                RRCMessage-r14-IEs
                                        CHOICE {
        later
            с2
                                                 CHOICE {
                                                     RRCMessage-r16-IEs,
                rrcMessage-r16
                spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
                spare3 NULL, spare2 NULL, spare1 NULL
            criticalExtensionsFuture
                                                     SEQUENCE {}
-- ASN1STOP
```

It is important to note that critical extensions may also be used at the level of individual fields i.e. a field may be replaced by a critically extended version. When sending the extended version, the original version may also be included (e.g. original field is mandatory, EUTRAN is unaware if UE supports the extended version). In such cases, a UE supporting both versions may be required to ignore the original field. The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release

```
-- /example/ ASN1START
                                       -- Original release
                                       SEQUENCE {
RRCMessage ::=
   rrc-TransactionIdentifier
                                           RRC-TransactionIdentifier,
    criticalExtensions
                                       CHOICE {
                                           CHOICE {
       c1
           rrcMessage-r8
                                              RRCMessage-r8-IEs,
           spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture
                                           SEQUENCE { }
RRCMessage-rN-IEs ::= SEQUENCE {
                                       ENUMERATED {
   field1-rN
                                           value1, value2, value3, value4} OPTIONAL,
                                                                                       -- Need ON
    field2-rN
                                       InformationElement2-rN
                                                                          OPTIONAL,
                                       RRCConnectionReconfiguration-vMxy-IEs OPTIONAL
    nonCriticalExtension
}
RRCConnectionReconfiguration-vMxy-IEs ::= SEQUENCE {
   field2-rM
                                      InformationElement2-rM
                                                                       OPTIONAL, -- Cond NoField2rN
                                       SEQUENCE {}
   nonCriticalExtension
                                                                       OPTIONAL
-- ASN1STOP
```

Conditional presence	Explanation
NoField2rN	The field is optionally present, need ON, if field2-rN is absent. Otherwise the field is not
	present

Finally, it is noted that a critical extension may be introduced in the same release as the one in which the original field was introduced e.g. to correct an essential ASN.1 error. In such cases a UE capability may be introduced, to assist E-UTRAN in deciding whether or not to use the critically extension.

A.4.3 Non-critical extension of messages

A.4.3.1 General principles

The mechanisms to extend a message in a non-critical manner are defined in A.3.3. W.r.t. the use of extension markers, the following additional guidelines apply:

- When further non-critical extensions are added to a message that has been critically extended, the inclusion of these non-critical extensions in earlier critical branches of the message should be avoided when possible.
- The extension marker ("...") is the primary non-critical extension mechanism that is used unless a length determinant is not required. Examples of cases where a length determinant is not required:
 - at the end of a message,
 - at the end of a structure contained in a BIT STRING or OCTET STRING
- When an extension marker is available, non-critical extensions are preferably placed at the location (e.g. the IE) where the concerned parameter belongs from a logical/ functional perspective (referred to as the 'default extension location')
- It is desirable to aggregate extensions of the same release or version of the specification into a group, which should be placed at the lowest possible level.
- In specific cases it may be preferrable to place extensions elsewhere (referred to as the 'actual extension location') e.g. when it is possible to aggregate several extensions in a group. In such a case, the group should be placed at the lowest suitable level in the message. <TBD: ref to seperate example>
- In case placement at the default extension location affects earlier critical branches of the message, locating the extension at a following higher level in the message should be considered.
- In case an extension is not placed at the default extension location, an IE should be defined. The IE's ASN.1 definition should be placed in the same ASN.1 section as the default extension location. In case there are intermediate levels in-between the actual and the default extension location, an IE may be defined for each level. Intermediate levels are primarily introduced for readability and overview. Hence intermediate levels need not allways be introduced e.g. they may not be needed when the default and the actual extension location are within the same ASN.1 section. <TBD: ref to seperate example>

A.4.3.2 Further guidelines

Further to the general principles defined in the previous section, the following additional guidelines apply regarding the use of extension markers:

- Extension markers within SEQUENCE
 - Extension markers are primarily, but not exclusively, introduced at the higher nesting levels
 - Extension markers are introduced for a SEQUENCE comprising several fields as well as for information elements whose extension would result in complex structures without it (e.g. re-introducing another list)
 - Extension markers are introduced to make it possible to maintain important information structures e.g. parameters relevant for one particular RAT
 - Extension markers are also used for size critical messages (i.e. messages on BCCH, BR-BCCH, PCCH and CCCH), although introduced somewhat more carefully
 - The extension fields introduced (or frozen) in a specific version of the specification are grouped together using double brackets.
- Extension markers within ENUMERATED

- Spare values are used until the number of values reaches the next power of 2, while the extension marker caters for extension beyond that limit
- A suffix of the form "vXYZ" is used for the identifier of each new value, e.g. "value-vXYZ".
- Extension markers within CHOICE:
 - Extension markers are introduced when extension is foreseen and when comprehension is not required by the receiver i.e. behaviour is defined for the case where the receiver cannot comprehend the extended value (e.g. ignoring an optional CHOICE field). It should be noted that defining the behaviour of a receiver upon receiving a not comprehended choice value is not required if the sender is aware whether or not the receiver supports the extended value.
 - A suffix of the form "vXYZ" is used for the identifier of each new choice value, e.g. "choice-vXYZ".

Non-critical extensions at the end of a message/ of a field contained in an OCTET or BIT STRING:

- When a nonCriticalExtension is actually used, a "Need" statement should not be provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions. For simplicity, it is recommended not to provide a "Need" statement when the field is not actually used either.

Further, more general, guidelines:

- In case a need statement is not provided for a group, a "Need" statement is provided for all individual extension fields within the group i.e. including for fields that are not marked as OPTIONAL. The latter is to clarify the action upon absence of the whole group.

A.4.3.3 Typical example of evolution of IE with local extensions

The following example illustrates the use of the extension marker for a number of elementary cases (sequence, enumerated, choice). The example also illustrates how the IE may be revised in case the critical extension mechanism is used.

NOTE In case there is a need to support further extensions of release n while the ASN.1 of release (n+1) has been frozen, without requiring the release n receiver to support decoding of release (n+1) extensions, more advanced mechanisms are needed e.g. including multiple extension markers.

```
-- /example/ ASN1START
InformationElement1 ::=
                                    SEOUENCE {
                                       ENUMERATED {
   field1
                                           value1, value2, value3, value4-v880,
                                            ..., value5-v960 },
   field2
        field2a
                                           BOOLEAN,
        field2b
                                            InformationElement2b,
        field2c-v960
                                            InformationElement2c-r9
   },
   [[ field3-r9
                                            InformationElement3-r9
                                                                        OPTIONAL
                                                                                        -- Need OR
   [[ field3-v9a0
                                            InformationElement3-v9a0 OPTIONAL,
                                                                                        -- Need OR
                                                                    OPTIONAL
                                            InformationElement4
        field4-r9
                                                                                        -- Need OR
   11
InformationElement1-r10 ::=
                                    SEQUENCE {
                                        ENUMERATED {
   field1
                                            value1, value2, value3, value4-v880,
                                            value5-v960, value6-v1170, spare2, spare1, ... },
   field2
                                        CHOICE {
       field2a
                                           BOOLEAN,
       field2b
                                            InformationElement2b.
       field2c-v960
                                            InformationElement2c-r9,
       field2d-v12b0
                                            INTEGER (0..63)
                                        InformationElement3-r10
   field3-r9
                                                                        OPTIONAL,
                                                                                    -- Need OR
   field4-r9
                                        InformationElement4
                                                                        OPTIONAL,
                                                                                    -- Need OR
   field5-r10
                                        BOOLEAN,
```

```
field6-r10 InformationElement6-r10 OPTIONAL, -- Need OR
...,
[[ field3-v1170 InformationElement3-v1170 OPTIONAL -- Need OR
]]
}
-- ASN1STOP
```

Some remarks regarding the extensions of *InformationElement1* as shown in the above example:

- The InformationElement1 is initially extended with a number of non-critical extensions. In release 10 however, a critical extension is introduced for the message using this IE. Consequently, a new version of the IE InformationElement1 (i.e. InformationElement1-r10) is defined in which the earlier non-critical extensions are incorporated by means of a revision of the original field.
- The *value4-v880* is replacing a spare value defined in the original protocol version for *field1*. Likewise *value6-v1170* replaces *spare3* that was originally defined in the r10 version of *field1*
- Within the critically extended release 10 version of *InformationElement1*, the names of the original fields/ IEs are not changed, unless there is a real need to distinguish them from other fields/ IEs. E.g. the *field1* and *InformationElement4* were defined in the original protocol version (release 8) and hence not tagged. Moreover, the *field3-r9* is introduced in release 9 and not re-tagged; although, the *InformationElement3* is also critically extended and therefore tagged *InformationElement3-r10* in the release 10 version of InformationElement1.

A.4.3.4 Typical examples of non critical extension at the end of a message

The following example illustrates the use of non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING i.e. when an empty sequence is used.

```
-- /example/ ASN1START
RRCMessage-r8-IEs ::=
                                SEQUENCE {
    field1
                                     InformationElement1,
    field2
                                     InformationElement2,
    field3
                                     InformationElement3
                                                                          OPTIONAL,
                                                                                      -- Need ON
    nonCriticalExtension
                                     RRCMessage-v860-IEs
                                                                          OPTIONAL
}
RRCMessage-v860-IEs ::=
                                SEQUENCE {
    field4-v860
                                     InformationElement4
                                                                          OPTIONAL,
                                                                                      -- Need OP
                                     BOOLEAN
    field5-v860
                                                                          OPTIONAL,
                                                                                      -- Cond C54
    nonCriticalExtension
                                     RRCMessage-v940-IEs
                                                                          OPTIONAL
RRCMessage-v940-IEs ::=
                                 SEQUENCE {
    field6-v940
                                     InformationElement6-r9
                                                                              OPTIONAL,
                                                                                           -- Need OR
    nonCriticalExtensions
                                     SEQUENCE {}
                                                                              OPTIONAL
-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

The InformationElement4 is introduced in the original version of the protocol (release 8) and hence no suffix is used.

A.4.3.5 Examples of non-critical extensions not placed at the default extension location

The following example illustrates the use of non-critical extensions in case an extension is not placed at the default extension location.

ParentIE-WithEM

The IE *ParentIE-WithEM* is an example of a high level IE including the extension marker (EM). The root encoding of this IE includes two lower level IEs *ChildIE1-WithoutEM* and *ChildIE2-WithoutEM* which not include the extension marker. Consequently, non-critical extensions of the Child-IEs have to be included at the level of the Parent-IE.

The example illustrates how the two extension IEs *ChildIE1-WithoutEM-vNx0* and *ChildIE2-WithoutEM-vNx0* (both in release N) are used to connect non-critical extensions with a default extension location in the lower level IEs to the actual extension location in this IE.

ParentlE-WithEM information element

```
-- /example/ ASN1START
ParentIE-WithEM ::=
                                    SEQUENCE {
     - Root encoding, including:
    childIE1-WithoutEM
                                         ChildIE1-WithoutEM
                                                                         OPTIONAL,
                                                                                           - Need ON
    childIE2-WithoutEM
                                         ChildIE2-WithoutEM
                                                                         OPTIONAL.
                                                                                          -- Need ON
    [[ childIE1-WithoutEM-vNx0
                                             ChildIE1-WithoutEM-vNx0
                                                                         OPTIONAL,
                                                                                          -- Need ON
        childIE2-WithoutEM-vNx0
                                             ChildIE2-WithoutEM-vNx0
                                                                         OPTIONAL
                                                                                          -- Need ON
    11
-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

- The fields *childIEx-WithoutEM-vNx0* may not really need to be optional (depends on what is defined at the next lower level).
- In general, especially when there are several nesting levels, fields should be marked as optional only when there
 is a clear reason.

ChildIE1-WithoutEM

The IE *ChildIE1-WithoutEM* is an example of a lower level IE, used to control certain radio configurations including a configurable feature which can be setup or released using the local IE *ChIE1-ConfigurableFeature*. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature. The example is based on the following assumptions:

- when initially configuring as well as when modifying the new field, the original fields of the configurable feature have to be provided also i.e. as if the extended ones were present within the setup branch of this feature.
- when the configurable feature is released, the new field should be released also.
- when omitting the original fields of the configurable feature the UE continues using the existing values (which is
 used to optimise the signalling for features that typically continue unchanged upon handover).
- when omitting the new field of the configurable feature the UE releases the existing values and discontinues the
 associated functionality (which may be used to support release of unsupported functionality upon handover to an
 eNB supporting an earlier protocol version).

The above assumptions, which affect the use of conditions and need codes, may not always apply. Hence, the example should not be re-used blindly.

ChildIE1-WithoutEM information elements

```
-- /example/ ASN1START

ChildIel-WithouteM ::= SEQUENCE {
    -- Root encoding, including: chIEl-ConfigurableFeature ChIEl-ConfigurableFeature OPTIONAL -- Need ON
}
```

Conditional presence	Explanation
ConfigF	The field is optional present, need OR, in case of chIE1-ConfigurableFeature is included
	and set to "setup"; otherwise the field is not present and the UE shall delete any existing
	value for this field.

ChildIE2-WithoutEM

The IE *ChildIE2-WithoutEM* is an example of a lower level IE, typically used to control certain radio configurations. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature.

ChildIE2-WithoutEM information element

```
-- /example/ ASN1START

ChildIE2-WithoutEM ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        -- Root encoding
    }
}

ChildIE2-WithoutEM-vNx0 ::= SEQUENCE {
    chiE2-NewField-rN INTEGER (0..31) OPTIONAL -- Cond Configf
}
```

Conditional presence	Explanation
ConfigF	The field is optional present, need OR, in case of chIE2-ConfigurableFeature is included
	and set to "setup"; otherwise the field is not present and the UE shall delete any existing
	value for this field.

A.5 Guidelines regarding inclusion of transaction identifiers in RRC messages

The following rules provide guidance on which messages should include a Transaction identifier

- 1: DL messages on CCCH that move UE to RRC-Idle should not include the RRC transaction identifier.
- 2: All network initiated DL messages by default should include the RRC transaction identifier.
- 3: All UL messages that are direct response to a DL message with an RRC Transaction identifier should include the RRC Transaction identifier.
- 4: All UL messages that require a direct DL response message should include an RRC transaction identifier.

5: All UL messages that are not in response to a DL message nor require a corresponding response from the network should not include the RRC Transaction identifier.

A.6 Protection of RRC messages (informative)

The following list provides information which messages can be sent (unprotected) prior to security activation and which messages can be sent unprotected after security activation. Those messages indicated "-" in "P" column should never be sent unprotected by eNB or UE. Further requirements are defined in the procedural text.

- P...Messages that can be sent (unprotected) prior to security activation
- A I...Messages that can be sent without integrity protection after security activation
- A C...Messages that can be sent unciphered after security activation
- NA... Message can never be sent after security activation

Message	Р	A-I	A-C	Comment
CSFBParametersRequestCDMA20 00	+	-	-	
CSFBParametersResponseCDMA	+	-	-	
2000 CounterCheck				
	-	-	-	
CounterCheckResponse	-		-	
DelayBudgetReport DLInformationTransfer	-	-	-	
	+	-	-	
HandoverFromEUTRAPreparation Request (CDMA2000)	-	-	-	
InDeviceCoexIndication	-	-	-	
InterFreqRSTDMeasurementIndica tion	-	-	-	
LoggedMeasurementsConfiguratio n	-	-	-	
MasterInformationBlock	+	+	+	
MBMSCountingRequest	+	+	+	
MBMSCountingResponse	-	-	-	
MBMSInterestIndication	+	-	-	
MBSFNAreaConfiguration	+	+	+	
MeasurementReport	-	-	-	Measurement configuration may be sent prior to security activation. But: In order to protect privacy of UEs, MEASUREMENT REPORT is only sent from the UE after successful security activation.
MobilityFromEUTRACommand	-	-	-	
Paging	+	+	+	
ProximityIndication	-	-	-	
RNReconfiguration	-	-	-	
RNReconfigurationComplete	-	-	-	
RRCConnectionReconfiguration	+	-	-	The message shall not be sent unprotected before security activation if it is used to perform handover or to establish SRB2 and DRBs
RRCConnectionReconfigurationComplete	+	-	-	Unprotected, if sent as response to RRCConnectionReconfiguration which was sent before security activation
RRCConnectionReestablishment	-	+	+	This message is not protected by PDCP operation.
RRCConnectionReestablishmentC omplete	-	-	-	
RRCConnectionReestablishmentR eject	-	+	+	One reason to send this may be that the security context has been lost, therefore sent as unprotected.
RRCConnectionReestablishmentR equest	-	-	+	This message is not protected by PDCP operation. However, a short MAC-I is included.
RRCConnectionReject	+	NA	NA	
RRCConnectionRelease	+	-	-	Justification for P: If the RRC connection only for signalling not requiring DRBs or ciphered messages, or the signalling connection has to be released prematurely, this message is sent as unprotected.
RRCConnectionRequest	+	NA	NA	
RRCConnectionResume	-	-	+	When this message is transmitted, security is activated but suspended. Integrity verification is done after the message received by RRC.
RRCConnectionResumeRequest	-	-	+	This message is not protected by PDCP operation. However, a short MAC-I is included.
RRCConnectionResumeComplete	-	-	-	
RRCConnectionSetup	+	NA	NA	
RRCConnectionSetupComplete	+	NA	NA	
SCGFailureInformation	-	-	-	
SCPTMConfiguration	+	+	+	

Message	Р	A-I	A-C	Comment
SecurityModeCommand	+	NA	NA	Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC)
SecurityModeComplete	-	NA	NA	Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure.
SecurityModeFailure	+	NA	NA	Neither integrity protection nor ciphering applied.
SidelinkUEInformation	+	-	-	
SystemInformation	+	+	+	
SystemInformationBlockType1	+	+	+	
UEAssistanceInformation	-	-	-	
UECapabilityEnquiry	+	-	-	
UECapabilityInformation	+	-	-	
UEInformationRequest	-	-	-	
UEInformationResponse	-	-	-	In order to protect privacy of UEs, UEInformationResponse is only sent from the UE after successful security activation
ULHandoverPreparationTransfer (CDMA2000)	-	-	-	This message should follow HandoverFromEUTRAPreparationRequest
ULInformationTransfer	+	-	-	
WLANConnectionStatusReport	-	-	-	

A.7 Miscellaneous

The following miscellaneous conventions should be used:

- References: Whenever another specification is referenced, the specification number and optionally the relevant subclause, table or figure, should be indicated in addition to the pointer to the References section e.g. as follows: 'see TS 36.212 [22, 5.3.3.1.6]'.
- UE capabilities: TS 36.306 [5] specifies that E-UTRAN should in general respect the UE's capabilities. Hence there is no need to include statement clarifying that E-UTRAN, when setting the value of a certain configuration field, shall respect the related UE capabilities unless there is a particular need e.g. particularly complicated cases.

Annex B (normative): Release 8 and 9 AS feature handling

B.1 Feature group indicators

This annex contains the definitions of the bits in fields *featureGroupIndicators* (in Table B.1-1) and *featureGroupIndRel9Add* (in Table B.1-1a).

In this release of the protocol, the UE shall include the fields *featureGroupIndicators* in the IE *UE-EUTRA-Capability* and *featureGroupIndRel9Add* in the IE *UE-EUTRA-Capability-v9a0*. All the functionalities defined within the field *featureGroupIndicators* defined in Table B.1-1 or Table B.1-1a are mandatory for the UE (with exceptions for category M1 and M2 UEs), if the related capability (frequency band, RAT, SR-VCC or Inter-RAT ANR) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table B.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table B.1-1 or Table B.1-1a, which have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table B.1-1 or Table B.1-1a, as zero (0).

If the optional fields *featureGroupIndicators* or *featureGroupIndRel9Add* are not included by a UE of a future release, the network may assume that all features pertaining to the RATs supported by the UE, respectively listed in Table B.1-1 or Table B.1-1a and deployed in the network, have been implemented and tested by the UE.

In Table B.1-1, a 'VoLTE capable UE' corresponds to a UE which is IMS voice capable and a 'MCPTT capable UE' corresponds to a UE which supports MCPTT voice application as defined in TS 23.179 [73].

The indexing in Table B.1-1a starts from index 33, which is the leftmost bit in the field featureGroupIndRel9Add.

Table B.1-1: Definitions of feature group indicators

Index of indicator (bit number)	Definition (description of the supported functionality, if indicator set to one)	Notes	If indicated "Yes" the feature shall be implemented and successfully tested for this version of the specification	FDD/ TDD diff
1 (leftmost bit)	- Intra-subframe frequency hopping for PUSCH scheduled by UL grant - DCI format 3a (TPC commands for PUCCH and PUSCH with single bit power adjustments) - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI	- set to 1 by category M1 and M2 UEs that have implemented and successfully tested "Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI"		Yes
2	- Simultaneous CQI and ACK/NACK on PUCCH, i.e. PUCCH format 2a and 2b - Absolute TPC command for PUSCH - Resource allocation type 1 for PDSCH - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected subband CQI without PMI - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.		Yes
3	- 5bit RLC UM SN - 7bit PDCP SN	- can only be set to 1 if the UE has set bit number 7 to 1.	Yes, if UE supports VoLTE, MCPTT, or both.	No

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Yes, if UE supports	
SRVCC to EUTRAN	
from GERAN.	

4	- Short DRX cycle	- can only be set to 1 if the UE has set bit number 5 to 1.		Yes
5	- Long DRX cycle - DRX command MAC control element		Yes	No
6	- Prioritised bit rate		Yes	No
7	- RLC UM	- can only be set to 0 if the UE does neither support VoLTE nor MCPTT	Yes, if UE supports VoLTE, MCPTT, or both. Yes, if UE supports SRVCC to EUTRAN from GERAN.	No
8	- EUTRA RRC_CONNECTED to UTRA FDD or UTRA TDD CELL_DCH PS handover, if the UE supports either only UTRAN FDD or only UTRAN TDD - EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD	- can only be set to 1 if the UE has set bit number 22 to 1	Yes (except for category M1 and M2 UEs) for FDD, if UE supports UTRA FDD.	Yes
9	- EUTRA RRC_CONNECTED to GERAN GSM_Dedicated handover	- related to SR-VCC - can only be set to 1 if the UE has set bit number 23 to 1	Yes (except for category M1 and M2 UEs), if UE supports SRVCC to EUTRAN from GERAN.	Yes
10	- EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order - EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order with NACC (Network Assisted Cell Change)			Yes
11	- EUTRA RRC_CONNECTED to CDMA2000 1xRTT CS Active handover	- related to SR-VCC - can only be set to 1 if the UE has sets bit number 24 to 1		Yes
12	- EUTRA RRC_CONNECTED to CDMA2000 HRPD Active handover	- can only be set to 1 if the UE has set bit number 26 to 1		Yes
13	- Inter-frequency handover (within FDD or TDD)	- can only be set to 1 if the UE has set bit number 25 to 1	Yes (except for category M1 and M2 UEs), unless UE only supports band 13	No
14	- Measurement reporting event: Event A4 - Neighbour > threshold - Measurement reporting event: Event A5 - Serving < threshold1 & Neighbour > threshold2		Yes (except for category M1 and M2 UEs)	No
15	- Measurement reporting event: Event B1 – Neighbour > threshold for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1 - Measurement reporting event: Event B1 – Neighbour > threshold for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively - Measurement reporting event: Event B1 – Neighbour > threshold for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively	- can only be set to 1 if the UE has set at least one of the bit number 22, 23, 24, 26 or 39 to 1 even if the UE sets bits 41, it shall still set bit 15 to 1 if measurement reporting event B1 is tested for all RATs supported by UE - If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.	Yes for FDD, if UE supports only UTRAN FDD and does not support UTRAN TDD or GERAN or 1xRTT or HRPD	Yes

16	Intro fraguancy posicidies!	If a sate == - 1 14 ==	Vaa	NI.
16	- Intra-frequency periodical	- If a category M1 or	Yes	No
	measurement reporting where	M2 UE does not		
	triggerType is set to periodical and	support this feature		
	purpose is set to reportStrongestCells	group, this bit shall be set to 0.		
	- Inter-frequency periodical	set to U.		
	measurement reporting where			
	triggerType is set to periodical and			
	purpose is set to reportStrongestCells, if the UE has set bit number 25 to 1			
	the OE has set bit humber 25 to 1			
	- Inter-RAT periodical measurement			
	reporting where <i>triggerType</i> is set to			
	periodical and purpose is set to			
	reportStrongestCells for UTRAN FDD or			
	UTRAN TDD, if the UE supports either			
	only UTRAN FDD or only UTRAN TDD			
	and has set bit number 22 to 1			
	and had set bit humber 22 to 1			
	- Inter-RAT periodical measurement			
	reporting where <i>triggerType</i> is set to			
	periodical and purpose is set to			
	reportStrongestCells for UTRAN FDD or			
	UTRAN TDD, if the UE supports both			
	UTRAN FDD and UTRAN TDD and has			
	set bit number 22 or 39 to 1, respectively			
	- Inter-RAT periodical measurement			
	reporting where triggerType is set to			
	periodical and purpose is set to			
	reportStrongestCells for GERAN, 1xRTT			
	or HRPD, if the UE has set bit number			
	23, 24 or 26 to 1, respectively.			
	NOTE: Event triggered periodical			
	NOTE: Event triggered periodical			
	reporting (i.e., with <i>triggerType</i> set to			
	event and with reportAmount > 1) is a			
	mandatory functionality of event			
	triggered reporting and therefore not the			
17	subject of this bit. Intra-frequency ANR features including:	- can only be set to 1	Yes	No
	- Intra-frequency periodical	if the UE has set bit	. 55	140
	measurement reporting where	number 5 to 1.		
	triggerType is set to periodical and	- If a category M1 or		
	purpose is set to reportStrongestCells	M2 UE does not		
	- Intra-frequency periodical	support this feature		
	measurement reporting where	group, this bit shall be		
	triggerType is set to periodical and	set to 0.		
	purpose is set to reportCGI			
18	Inter-frequency ANR features including:	- can only be set to 1	Yes, unless UE only	No
	- Inter-frequency periodical	if the UE has set bit	supports band 13	
	measurement reporting where	number 5 and bit		
	triggerType is set to periodical and	number 25 to 1.		
	purpose is set to reportStrongestCells	- If a category M1 or		
	- Inter-frequency periodical	M2 UE does not		
	measurement reporting where	support this feature		
	triggerType is set to periodical and	group, this bit shall be		
i	purpose is set to reportCGI	set to 0.		

10	Inter DAT AND feetures including:	can only be get to 1		Voc
19	Inter-RAT ANR features including: Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells for GERAN, if the UE has set bit number 23 to 1 Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1 Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON for 1xRTT or HRPD, if the UE has set bit number 24 or 26 to 1, respectively Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1 Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN FDD and has set bit number 22 to 1 Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for UTRAN FDD and has set bit number 22 or 39 to 1, respectively Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for UTRAN FDD and has set bit number 23, 24 or 26 to 1, respectively Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively	- can only be set to 1 if the UE has set bit number 5 to 1 and the UE has set at least one of the bit number 22, 23, 24 or 26 to 1 even if the UE sets bits 33 to 37, it shall still set bit 19 to 1 if inter-RAT ANR features are tested for all RATs for which inter-RAT measurement reporting is indicated as tested		Yes
20	If bit number 7 is set to 0: - SRB1 and SRB2 for DCCH + 8x AM DRB If bit number 7 is set to 1: - SRB1 and SRB2 for DCCH + 8x AM DRB If bit number 7 is set to 1: - SRB1 and SRB2 for DCCH + 8x AM DRB - SRB1 and SRB2 for DCCH + 5x AM DRB + 3x UM DRB NOTE: UE which indicate support for a DRB combination also support all subsets of the DRB combination. Therefore, release of DRB(s) never results in an unsupported DRB combination.	- Regardless of what bit number 7 and bit number 20 is set to, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB - Regardless of what bit number 20 is set to, if bit number 7 is set to 1, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB + 1x UM DRB	Yes	No

	1 5 1 6 11 1 11		T	
21	 Predefined intra- and inter-subframe frequency hopping for PUSCH with N_sb > 1 Predefined inter-subframe frequency hopping for PUSCH with N_sb > 1 	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.		No
22	- UTRAN FDD or UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports either only UTRAN FDD or only UTRAN TDD - UTRAN FDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.	Yes for FDD, if UE supports UTRA FDD	Yes
23	- GERAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.		Yes
24	1xRTT measurements, reporting and measurement reporting event B2 in E- UTRA connected mode	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.	Yes for FDD, if UE supports enhanced 1xRTT CSFB for FDD Yes for TDD, if UE supports enhanced 1xRTT CSFB for TDD	Yes
25	- Inter-frequency measurements and reporting in E-UTRA connected mode NOTE: The UE setting this bit to 1 and indicating support for FDD and TDD frequency bands in the UE capability signalling implements and is tested for FDD measurements while the UE is in TDD, and for TDD measurements while the UE is in FDD.	- A category M1 or M2 UE shall set this bit to 1 only if ceMeasurements-r14 is supported.	Yes, unless UE only supports band 13	No
26	- HRPD measurements, reporting and measurement reporting event B2 in E- UTRA connected mode	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.	Yes for FDD, if UE supports HRPD	Yes
27	- EUTRA RRC_CONNECTED to UTRA FDD or UTRA TDD CELL_DCH CS handover, if the UE supports either only UTRAN FDD or only UTRAN TDD - EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD	- related to SR-VCC - can only be set to 1 if the UE has set bit number 8 to 1 and supports SR-VCC from EUTRA defined in TS 24.008 [49] - If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.	Yes for FDD, if UE supports VoLTE and UTRA FDD	Yes
28	- TTI bundling	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.	Yes for FDD	Yes
29	- Semi-Persistent Scheduling	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.		Yes
30	- Handover between FDD and TDD	- can only be set to 1 if the UE has set bit number 13 to 1		No

31	- Indicates whether the UE supports the mechanisms defined for cells broadcasting multi band information i.e. comprehending <i>multiBandInfoList</i> , disregarding in RRC_CONNECTED the related system information fields and understanding the EARFCN signalling for all bands, that overlap with the bands supported by the UE, and that are defined in the earliest version of TS 36.101 [42] that includes all UE supported bands.	Yes	No
32	Undefined		

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD.

Table B.1-1a: Definitions of feature group indicators

	D. C. de	N. de	16 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	500/
Index of indicator (bit number)	Definition (description of the supported functionality, if indicator set to one)	Notes	If indicated "Yes" the feature shall be implemented and successfully tested for this version of the specification	FDD/ TDD diff
33 (leftmost bit)	Inter-RAT ANR features for UTRAN FDD including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI	- can only be set to 1 if the UE has set bit number 5 and bit number 22 to 1.		Yes
34	Inter-RAT ANR features for GERAN including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCells - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI	- can only be set to 1 if the UE has set bit number 5 and bit number 23 to 1.		Yes
35	Inter-RAT ANR features for 1xRTT including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI	- can only be set to 1 if the UE has set bit number 5 and bit number 24 to 1.		Yes
36	Inter-RAT ANR features for HRPD including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI	- can only be set to 1 if the UE has set bit number 5 and bit number 26 to 1.		Yes
37	Inter-RAT ANR features for UTRAN TDD including: - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportStrongestCellsForSON - Inter-RAT periodical measurement reporting where triggerType is set to periodical and purpose is set to reportCGI	- can only be set to 1 if the UE has set bit number 5 and at least one of the bit number 22 (for UEs supporting only UTRA TDD) or the bit number 39 to 1.		Yes
38	- EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD	- can only be set to 1 if the UE has set bit number 39 to 1		Yes
39	- UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.		Yes

40	- EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD	- related to SR-VCC - can only be set to 1 if the UE has set bit number 38 to 1		Yes
41	Measurement reporting event: Event B1 - Neighbour > threshold for UTRAN FDD, if the UE supports UTRAN FDD and has set bit number 22 to 1	- If a category M1 or M2 UE does not support this feature group, this bit shall be set to 0.	Yes for FDD, unless UE has set bit number 15 to 1	Yes
42	- DCI format 3a (TPC commands for PUCCH and PUSCH with single bit power adjustments)	- If a category M1 or M2UE supports this feature group, this bit shall be set to 1. For a UE of all other categories, this bit shall be set to 0.		Yes
43	Undefined			
44	Undefined			
45	Undefined			
46	Undefined			
47	Undefined			
48	Undefined			
49	Undefined			
50	Undefined			
51	Undefined			
52	Undefined			
53	Undefined			
54	Undefined			
55	Undefined			
56	Undefined			
57	Undefined			
58	Undefined			
59	Undefined			
60	Undefined			
61	Undefined			
62	Undefined			
63	Undefined			
64	Undefined			

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD. Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.

Clarification for mobility from EUTRAN and inter-frequency handover within EUTRAN

There are several feature groups related to mobility from E-UTRAN and inter-frequency handover within EUTRAN. The description of these features is based on the assumption that we have 5 main "functions" related to mobility from E-UTRAN:

- A. Support of measurements and cell reselection procedure in idle mode
- B. Support of RRC release with redirection procedure in connected mode
- C. Support of Network Assisted Cell Change in connected mode
- D. Support of measurements and reporting in connected mode
- E. Support of handover procedure in connected mode

All functions can be applied for mobility to Inter-frequency to EUTRAN, GERAN, UTRAN, CDMA2000 HRPD and CDMA2000 1xRTT except for function C) which is only applicable for mobility to GERAN. Table B.1-2 below summarises the mobility functions that are supported based on the UE capability signaling (band support) and the setting of the feature group support indicators.

Table B.1-2: Mobility from E-UTRAN

Feature	GERAN	UTRAN	HRPD	1xRTT	EUTRAN
A. Measurements and cell reselection procedure in E-UTRA idle mode	Supported if GERAN band support is indicated	Supported if UTRAN band support is indicated	Supported if CDMA2000 HRPD band support is indicated	Supported if CDMA2000 1xRTT band support is indicated	Supported for supported bands
B. RRC release with blind redirection procedure in E-UTRA connected mode	Supported if GERAN band support is indicated	Supported if UTRAN band support is indicated	Supported if CDMA2000 HRPD band support is indicated	Supported if CDMA2000 1xRTT band support is indicated	Supported for supported bands
C. Cell Change Order (with or without) Network Assisted Cell Change) in E- UTRA connected mode	Group 10	N.A.	N.A.	N.A.	N.A.
D. Inter-frequency/RAT measurements, reporting and measurement reporting event B2 (for inter-RAT) in E-UTRA connected mode	Group 23	Group 22/39	Group 26	Group 24	Group 25
E. Inter-frequency/RAT handover procedure in E-UTRA connected mode	Group 9 (GSM_connected handover) Separate UE capability bit defined in TS 36.306 [5] for PS handover	Group 8/38 (PS handover) or Group 27/40 (SRVCC handover)	Group 12	Group 11	Group 13 (within FDD TDD) Group 30 (between FD and TDD)

In case measurements and reporting function is not supported by UE, the network may still issue the mobility procedures redirection (B) and CCO (C) in a blind fashion.

B.2 CSG support

In this release of the protocol, it is mandatory for the UE to support a minimum set of CSG functionality consisting of:

- Identifying whether a cell is CSG or not;
- Ignoring CSG cells in cell selection/reselection.

Additional CSG functionality in AS, i.e. the requirement to detect and camp on CSG cells when the "CSG whitelist" is available or when manual CSG selection is triggered by the user, are related to the corresponding NAS features. This additional AS functionality consists of:

- Manual CSG selection;
- Autonomous CSG search;
- Implicit priority handling for cell reselection with CSG cells.

It is possible that this additional CSG functionality in AS is not supported or tested in early UE implementations.

Note that since the above AS features relate to idle mode operations, the capability support is not signalled to the network. For these reasons, no "feature group indicator" is assigned to this feature to indicate early support in Rel-8.

Annex C (normative): Release 10 AS feature handling

C.1 Feature group indicators

This annex contains the definitions of the bits in field featureGroupIndRel10.

In this release of the protocol, the UE shall include the field *featureGroupIndRel10* in the IE *UE-EUTRA-Capability-v1020-IEs*. All the functionalities defined within the field *featureGroupIndRel10* defined in Table C.1-1 are mandatory for the UE, if the related capability (spatial multiplexing in UL, PDSCH transmission mode 9, carrier aggregation, handover to EUTRA, or RAT) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table C.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table C.1-1 have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table C.1-1, as zero (0).

If the optional field *featureGroupIndRel10* is not included by a UE of a future release, the network may assume that all features, listed in Table C.1-1 and deployed in the network, have been implemented and tested by the UE.

The indexing in Table C.1-1 starts from index 101, which is the leftmost bit in the field featureGroupIndRel10.

Table C.1-1: Definitions of feature group indicators

Index of indicator	Definition (description of the supported functionality, if indicator set to one)	Notes	If indicated "Yes" the feature shall be implemented and successfully tested for this version of the specification	FDD/ TDD diff
101 (leftmost bit)	- DMRS with OCC (orthogonal cover code) and SGH (sequence group hopping) disabling	- if the UE supports two or more layers for spatial multiplexing in UL, this bit shall be set to 1 If a category 0 or 1bis UE does not support this feature, this bit shall be set to 0.		No
102	- Trigger type 1 SRS (aperiodic SRS) transmission (Up to X ports) NOTE: X = number of supported layers on given band			Yes
103	- PDSCH transmission mode 9 when up to 4 CSI reference signal ports are configured and when not operating in CE mode	- for Category 8 UEs, this bit shall be set to 1.		Yes
104	- PDSCH transmission mode 9 for TDD when 8 CSI reference signal ports are configured and when not operating in CE mode	- if the UE does not support TDD, this bit is irrelevant (capability signalling exists for FDD for this feature), and this bit shall be set to 0 for Category 8 UEs, this bit shall be set to 1.		No

105	- Periodic CQI/PMI/RI reporting on	- this bit can be set to 1 only	Yes
	PUCCH: Mode 2-0 – UE selected	if indices 2 (Table B.1-1) and	
	subband CQI without PMI, when	103 are set to 1.	
	PDSCH transmission mode 9 is	- For UEs capable of TDD-	
	configured	FDD CA, this bit can be set	
	- Periodic CQI/PMI/RI reporting on	to 1 for both FDD and TDD if	
	PUCCH: Mode 2-1 – UE selected	index 2 is set to 1 for both	
	subband CQI with single PMI, when	FDD and TDD, and index	
	PDSCH transmission mode 9 and up	103 is set to 1 for at least	
	to 4 CSI reference signal ports are	one of FDD and TDD duplex	
	configured	modes.	

400	Devicedia COI/DMI/DI/DTI mana anti	this hit say he set to 4 and	1	Vaa
106	- Periodic CQI/PMI/RI/PTI reporting on	- this bit can be set to 1 only		Yes
	PUCCH: Mode 2-1 – UE selected	if the UE supports PDSCH		
	subband CQI with single PMI, when	transmission mode 9 with 8		
	PDSCH transmission mode 9 and 8	CSI reference signal ports		
	CSI reference signal ports are	(i.e., for TDD, if index 104 is		
	configured	set to 1, and for FDD, if tm9-		
		With-8Tx-FDD-r10 is set to		
		'supported') and if index 2		
		(Table B.1-1) is set to 1.		
		- For UEs capable of TDD-		
		FDD CA, this bit can be set		
		to 1 for both FDD and TDD if		
		at least one of index 104 and		
		tm9-With-8Tx-FDD-r10 is set		
		to 1/'supported', and if index 2 is set to 1 for both FDD		
107	Appriodic COL/DMI/DI reporting on	and TDD.		Voc
107	- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected	- this bit can be set to 1 only		Yes
		if indices 1 (Table B.1-1) and 103 are set to 1.		
	subband CQI without PMI, when PDSCH transmission mode 9 is	- For UEs capable of TDD-		
	configured	FDD CA, this bit can be set		
	- Aperiodic CQI/PMI/RI reporting on	to 1 for both FDD and TDD if		
	PUSCH: Mode 2-2 – UE selected	index 1 is set to 1 for both		
	subband CQI with multiple PMI, when	FDD and TDD, and index		
	PDSCH transmission mode 9 and up	103 is set to 1 for at least		
	to 4 CSI reference signal ports are	one of FDD and TDD duplex		
	configured	modes.		
108	- Aperiodic CQI/PMI/RI reporting on	- this bit can be set to 1 only		Yes
100	PUSCH: Mode 2-2 – UE selected	if the UE supports PDSCH		103
	subband CQI with multiple PMI, when	transmission mode 9 with 8		
	PDSCH transmission mode 9 and 8	CSI reference signal ports		
	CSI reference signal ports are	(i.e., for TDD, if index 104 is		
	configured	set to 1, and for FDD, if tm9-		
	- Samuel	With-8Tx-FDD-r10 is set to		
		'supported') and if index 1		
		(Table B.1-1) is set to 1.		
		- For UEs capable of TDD-		
		FDD CA, this bit can be set		
		to 1 for both FDD and TDD if		
		at least one of index 104 and		
		tm9-With-8Tx-FDD-r10 is set		
		to 1/'supported', and if index		
		1 is set to 1 for both FDD		
		and TDD.		
109	- Periodic CQI/PMI/RI reporting on	- this bit can be set to 1 only		Yes
	PUCCH Mode 1-1, submode 1	if the UE supports PDSCH		
		transmission mode 9 with 8		
		CSI reference signal ports		
		(i.e., for TDD, if index 104 is		
		set to 1, and for FDD, if tm9-		
		With-8Tx-FDD-r10 is set to		
		'supported').		
		- For UEs capable of TDD-		
		FDD CA, this bit can be set		
		to 1 for both FDD and TDD if		
		at least one of index 104 and		
		tm9-With-8Tx-FDD-r10 is set		
		to 1/'supported'.		1

440	Dania dia COU/DMI/DI nana atia na an	Alain hit and ha ant to A and a		V
110	- Periodic CQI/PMI/RI reporting on	- this bit can be set to 1 only		Yes
	PUCCH Mode 1-1, submode 2	if the UE supports PDSCH		
		transmission mode 9 with 8		
		CSI reference signal ports		
		(i.e., for TDD, if index 104 is		
		set to 1, and for FDD, if tm9-		
		With-8Tx-FDD-r10 is set to		
		'supported').		
		- For UEs capable of TDD-		
		FDD CA, this bit can be set		
		to 1 for both FDD and TDD if at least one of index 104 and		
		tm9-With-8Tx-FDD-r10 is set		
		to 1/'supported'.		
111	- Measurement reporting trigger Event	- this bit can be set to 1 only		Yes
' ' '	A6	if the UE supports carrier		163
	7.0	aggregation.		
112	- SCell addition within the handover to	- this bit can be set to 1 only		Yes
112	EUTRA procedure	if the UE supports carrier		163
	LO TRA Procedure	aggregation and the		
		handover to EUTRA		
		procedure.		
113	- Trigger type 0 SRS (periodic SRS)	- this bit can be set to 1 only		Yes
110	transmission on X Serving Cells	if the UE supports carrier		100
	and the second s	aggregation in UL.		
	NOTE: X = number of supported			
	component carriers in a given band			
	combination			
114	- Reporting of both UTRA CPICH	- this bit can be set to 1 only		No
	RSCP and Ec/N0 in a Measurement	if index 22 (Table B.1-1) is		
	Report	set to 1.		
115	- time domain ICIC RLM/RRM	- If a category M1 or M2 UE		Yes
	measurement subframe restriction for	does not support this feature		
	the serving cell	group, this bit shall be set to		
	- time domain ICIC RRM measurement	0.		
	subframe restriction for neighbour cells			
	- time domain ICIC CSI measurement			
	subframe restriction			
116	- Relative transmit phase continuity for	- this bit can be set to 1 only		Yes
	spatial multiplexing in UL	if the UE supports two or		
		more layers for spatial		
447		multiplexing in UL.		
117	Undefined			
118	Undefined			
119 120	Undefined			
	Undefined			
121 122	Undefined			
123	Undefined Undefined			
123	Undefined			
124	Undefined			
125	Undefined			
127	Undefined			
128	Undefined Undefined			
129				
130	Undefined			
131	Undefined			
132	Undefined		1	

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD. Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.

Annex D (informative): Descriptive background information

D.1 Signalling of Multiple Frequency Band Indicators (Multiple FBI)

D.1.1 Mapping between frequency band indicator and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequency bands in *SystemInformationBlockType1* by means of an example as shown in Figure D.1.1-1. In this example:

- E-UTRAN cell belongs to band B90 and also bands B6, B7, B91, and B92.
- The freqBandIndicatorPriority field is not present in SystemInformationBlockType1.
- E-UTRAN uses B64 to indicate the presence of B90 in freqBandIndicator-v9e0.
- For the MFBI list of this cell, E-UTRAN uses B64 in MultiBandInfoList to indicate the position and priority of the bands in MultiBandInfoList-v9e0.
- The UE, after reading *SystemInformationBlockType1*, generates an MFBI list with priority of B91, B6, B92, and B7. If the UE supports the frequency band in the *freqBandIndicator-v9e0* IE it applies that frequency band. Otherwise, the UE applies the first listed band in the MFBI list which it supports.

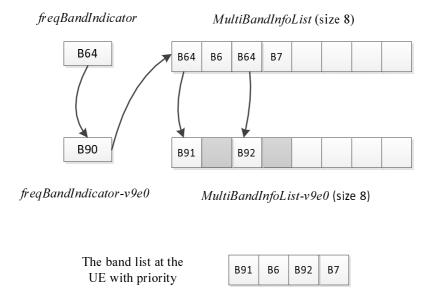


Figure D.1.1-1: Mapping of frequency bands to MultiBandInfoList/MultiBandInfoList-v9e0

D.1.2 Mapping between inter-frequency neighbour list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequencies signalled in *SystemInformationBlockType5* by means of an example as shown in Figure D.1.2-1. In this example:

E-UTRAN includes 4 frequencies (EARFCNs): the bands associated with f1 and f4 belong to bands lower than 64; the bands associated with f2 and f3 belong to bands larger than 64. The reserved EARFCN value of 65535 is used to indicate the presence of *ARFCN-ValueEUTRA-v9e0*.

- The band associated with f1 has two overlapping bands, B1 and B2 (lower than 64); the band associated with f2 has one overlapping band, B91; the band associated with f3 has four overlapping bands B3, B4, B92, and B93; the band associated with f4 does not have overlapping bands.
- E-UTRAN includes 4 lists in both *interFreqCarrierFreqList-v8h0* and *interFreqCarrierFreqList-v9e0* and ensure the order of the lists is matching. Each list corresponds to one EARFCN and contains up to 8 bands. The first list corresponds to f1, the second list corresponds to f2, and so on. The grey lists mean not including *MultiBandInfoList* or *MultiBandInfoList-v9e0*, i.e. the corresponding EARFCN does not have any overlapping frequency bands in *MultiBandInfoList* or *MultiBandInfoList-v9e0*.

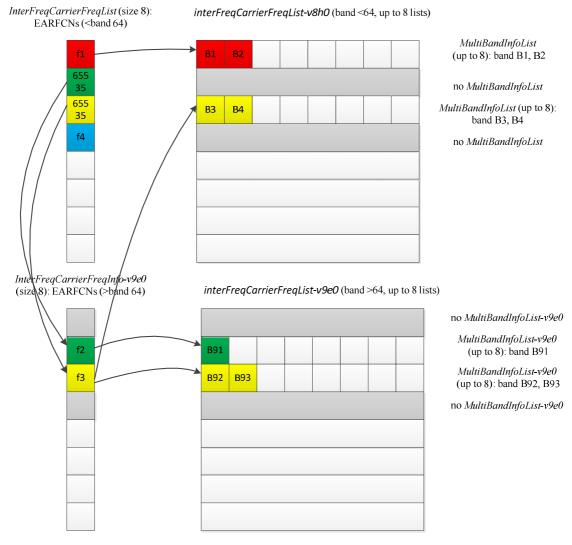


Figure D.1.2-1: Mapping of EARFCNs to MultiBandInfoList/MultiBandInfoList-v9e0

D.1.3 Mapping between UTRA FDD frequency list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the UTRA FDD frequencies signalled in *SystemInformationBlockType6* by means of an example as shown in Figure D.1.3-1. In this example:

- E-UTRAN includes 4 UTRA FDD frequencies (UARFCNs).
- The bands associated with f1 and f4 have no overlapping bands. The band associated with f2 has two overlapping bands, B1 and B2. The band associated with f3 has one overlapping band, B3.
- E-UTRAN includes 4 lists in *carrierFreqListUTRA-FDD-v8h0* with the first and fourth entry not including *MultiBandInfoList*.

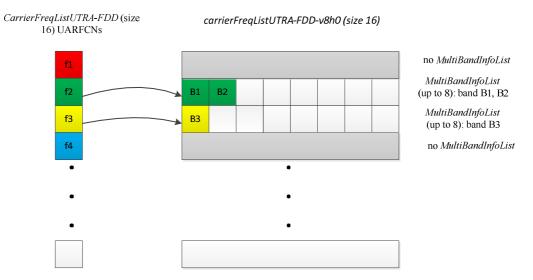


Figure D.1.3-1: Mapping of UARFCNs to MultiBandInfoList

Annex E (normative): TDD/FDD differentiation of FGIs/capabilities in TDD-FDD CA

Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature/capability for which it indicates support within the FGI/capability signalling.

A UE that indicates support for TDD/ FDD CA:

- For the fields for which the UE is allowed to indicate different support for FDD and TDD, the UE shall support the feature on the PCell and/or SCell(s), as specified in tables E-1, E-2 and E-3 in accordance to the following rules:
 - PCell: the UE shall support the feature for the PCell, if the UE indicates support of the feature for the PCell duplex mode;
 - SCell: the UE shall support the feature for SCell(s), if the UE indicates support of the feature for the SCell duplex mode;
 - Per serving cell: the UE shall support the feature for a serving cell if the UE indicates support of the feature for the serving cell's duplex mode;
 - All serving cells: UE shall support the feature if the UE indicates support of the feature for both TDD and FDD duplex modes;
- For the fields where the UE is not allowed to indicate different support for FDD and TDD, the UE shall support the feature for PCell and SCell(s) if the UE indicates support of the feature via the common FGI/capability bit.

Table E-1: Rel-8/9 FGIs for which FDD/TDD differentiation is allowed (from Annex B)

Index of	Classification
indicator	
1	Per serving cell
2	All serving cells
4	All serving cells
8	PCell
9	PCell
10	PCell
11	PCell
12	PCell
15	PCell
19	PCell
22	PCell
23	PCell
24	PCell
26	PCell
27	PCell
28	PCell
29	PCell
33	PCell
34	PCell
35	PCell
36	PCell
37	PCell
38	PCell
39	PCell
40	PCell
41	PCell

Table E-2: Rel-10 FGIs for which FDD/TDD differentiation is allowed (from Annex C)

Index of indicator	Classification
102	Per serving cell
103	Per serving cell
105	All serving cells
106	All serving cells
107	All serving cells
108	All serving cells
109	All serving cells
110	All serving cells
111	SCell
112	PCell
113	Per serving cell
115	PCell
116	Per serving cell

Table E-3: Rel-12 UE-EUTRA capabilities for which FDD/TDD differentiation is allowed

UE-EUTRA-Capability	Classification
crossCarrierScheduling	All serving cells
e-CSFB-1XRTT	PCell
e-CSFB-ConcPS-Mob1XRTT	PCell
e-CSFB-dual-1XRTT	PCell
ePDCCH	Per serving cell
e-RedirectionUTRA	PCell
e-RedirectionUTRA-TDD	PCell
inDeviceCoexInd	All serving cells
interFreqRSTD-Measurement	PCell
interFreqSI-AcquisitionForHO	PCell
interRAT-PS-HO-ToGERAN	PCell
intraFreqSI-AcquisitionForHO	PCell
mbms-Scell	SCell
mbms-NonServingCell	SCell
multiACK-CSIreporting	PCell
multiClusterPUSCH-WithinCC	Per serving cell
otdoa-UE-Assisted	PCell
pmi-Disabling	Per serving cell
rsrqMeasWideband	Per serving cell
simultaneousPUCCH-PUSCH	All serving cells
ss-CCH-InterfHandl	PCell
txDiv-PUCCH1b-ChSelect	PCell
ue-TxAntennaSelectionSupported	Per serving cell
utran-SI-AcquisitionForHO	PCell

Annex F (normative): UE requirements on ASN.1 comprehension

This subclause specifies UE requirements regarding the ASN.1 transfer syntax support i.e. the ASN.1 definitions to be comprehended by the UE.

A UE that indicates release X in field *accessStratumRelease* shall comprehend the entire transfer syntax (ASN.1) of release X, in particular at least the first version upon ASN.1 freeze. The UE is however not required to support dedicated signalling related transfer syntax associated with optional features it does not support.

In case a UE that indicates release X in field *accessStratumRelease* supports a feature specified in release X+ N (i.e. early UE implementation) additional requirements apply.

Cricitical extensions (dedicated signaling)

If the early implemented feature involves one or more critical extensions (i.e. case of dedicated signaling), the UE shall comprehend the parts of the transfer syntax (ASN.1) of release X+ N that are related to the feature implemented early. This in particular concerns the ASN.1 parts related to configuration of the feature. The UE obviously also has to support the ASN.1 parts related to indicating support of the feature (in UE capabilities).

If configuration of an early implemented feature introduced in release X+ N involves a message or field that has been critically extended, the UE shall support configuration of all features supported by the UE that are associated with subfields of this critical extension. Apart from the early implemented feature(s), the UE need however not support functionality beyond what is defined in the release the UE indicates in access stratum release.

Let's consider the example of a UE indicating value X in field *accessStratumRelease* that supports the features associated with fields A1, A3 and A5 of *InformationElementA* (see ASN.1 below). The feature implemented early is associated with field A5, and can only be configured by the –rX+N version of *InformationElementA*. In such case, the UE should support configuration of the features associated with fields A1, A3 and A5 by the –rX+N version of *InformationElementA*. If however one of the features was modified, e.g. the feature associated with *fieldA3*, E-UTRAN should assume the UE only supports the feature according to the release it indicated in field *accessStratumRelease* (X). I.e. UE is neither required to support the additional code-point (n80-vX+N0) nor the additional sub-field (fieldA3a).

```
InformationElementA-rX ::=
                             SEQUENCE {
                                  InformationElementA1-rX
   fieldA1-rX
                                                                    OPTIONAL,
                                                                                -- Need ON
   fieldA2-rX
                                                                               -- Need OR
                                  InformationElementA2-rX
                                                                    OPTIONAL,
   fieldA3-rX
                                  InformationElementA3-rX
                                                                    OPTIONAL
                                                                                -- Need OR
InformationElementA-rX+N ::= SEQUENCE {
   fieldA1-rX+N
                                 InformationElementA1-rX
                                                                  OPTIONAL,
                                                                                -- Need ON
   fieldA2-rX+N
                                  InformationElementA2-rX
                                                                    OPTIONAL,
                                                                                -- Need OR
   fieldA3-rX+N
                                  InformationElementA3-rX+N
                                                                    OPTIONAL,
                                                                                -- Need OR
                                                                    OPTIONAL,
   fieldA4-rX+N
                                  InformationElementA4-rX+N
                                                                                -- Need OR
   fieldA5-rX+N
                                  InformationElementA5-rX+N
                                                                    OPTIONAL
                                                                                -- Need OR
InformationElementA3-rX+N ::= SEQUENCE {
                     InformationElementAla-rX
   fieldAla-rX+N
                                                                  OPTIONAL.
                                                                                -- Need ON
                                 ENUMERATED {n10, n20, n40,
   fieldA2a-rX+N
                                       n80-vX+N0}
                                                                        OPTIONAL, -- Need OR
                                                                    OPTIONAL -- Need OR
   fieldA3a-rX+N
                                  InformationElementA3a-rX+N
}
```

Non-cricitical extensions (broadcast signaling)

If the early implemented feature involves one or more non-critical extensions in broadcast signaling (i.e. system information), the UE shall comprehend the parts of the transfer syntax (ASN.1) of release X+N that are related to the feature implemented early. The SIB(s) containing the release X+N fields related to the early implemented features may also include other extensions concerning releases from X upto X+N. The UE shall comprehend such intermediate fields (but again is not required to support the functionality associated with these intermediate fields, in case this concerns optional features not supported by the UE).

Annex G (informative): Change history

						Change history	
Date	TSG #	TSG Doc.	CR	Rev	Cat	Subject/Comment	New _.
10/007	DD 00	DD 070000					version
		RP-070920 RP-080163	-	4		Approved at TSG-RAN #38 and placed under Change Control	8.0.0 8.1.0
		RP-080163	0001 0002	2		CR to 36.331 with Miscellaneous corrections CR to 36.331 to convert RRC to agreed ASN.1 format	8.1.0
		RP-080361	0002	1		CR to 36.331 on Miscellaneous clarifications/ corrections	8.2.0
		RP-080693	0005			CR on Miscellaneous corrections and clarifications	8.3.0
		RP-081021	0006	_		Miscellaneous corrections and clarifications	8.4.0
		RP-090131	0007	1_		Correction to the Counter Check procedure	8.5.0
00/2000		RP-090131	0008	1-		CR to 36.331-UE Actions on Receiving SIB11	8.5.0
		RP-090131	0009	1		Spare usage on BCCH	8.5.0
		RP-090131	0010	-		Issues in handling optional IE upon absence in GERAN NCL	8.5.0
	RP-43	RP-090131	0011	-		CR to 36.331 on Removal of useless RLC re-establishment at RB release	8.5.0
	RP-43	RP-090131	0012	1		Clarification to RRC level padding at PCCH and BCCH	8.5.0
	RP-43	RP-090131	0013	-		Removal of Inter-RAT message	8.5.0
		RP-090131	0014	-		Padding of the SRB-ID for security input	8.5.0
		RP-090131	0015	-		Validity of ETWS SIB	8.5.0
	RP-43	RP-090131	0016	1		Configuration of the Two-Intervals-SPS	8.5.0
	RP-43	RP-090131	0017	-		Corrections on Scaling Factor Values of Qhyst	8.5.0
		RP-090131	0018	1		Optionality of srsMaxUppts	8.5.0
		RP-090131	0019	-		CR for discussion on field name for common and dedicated IE	8.5.0
		RP-090131	0020	-		Corrections to Connected mode mobility	8.5.0
		RP-090131	0021	1		Clarification regarding the measurement reporting procedure	8.5.0
		RP-090131 RP-090131	0022	1		Corrections on s-Measure R1 of CR0023 (R2-091029) on combination of SPS and TTI bundling for	8.5.0 8.5.0
						TDD	
		RP-090131	0024	-		L3 filtering for path loss measurements	8.5.0
		RP-090131	0025	1		S-measure handling for reportCGI	8.5.0
		RP-090131	0026	1		Measurement configuration clean up	8.5.0
		RP-090131	0027	ļ-		Alignment of measurement quantities for UTRA	8.5.0
		RP-090131	0028	-		CR to 36.331 on L1 parameters ranges alignment	8.5.0
		RP-090131	0029	-		Default configuration for transmissionMode	8.5.0
		RP-090131	0030	-		CR to 36.331 on RRC Parameters for MAC, RLC and PDCP	8.5.0
		RP-090131	0031 0032	1		CR to 36.331 - Clarification on Configured PRACH Freq Offset	8.5.0 8.5.0
		RP-090131 RP-090131	0032	1		Clarification on TTI bundling configuration Update of R2-091039 on Inter-RAT UE Capability	8.5.0
		RP-090131	0033	1		Feature Group Support Indicators	8.5.0
		RP-090133	0034	1		Corrections to RLF detection	8.5.0
		RP-090131	0037	1_		Indication of Dedicated Priority	8.5.0
		RP-090131	0038	2		Security Clean up	8.5.0
		RP-090131	0039	-		Correction of TTT value range	8.5.0
		RP-090131	0040	-		Correction on CDMA measurement result IE	8.5.0
		RP-090131	0041	1		Clarification of Measurement Reporting	8.5.0
	RP-43	RP-090131	0042	-		Spare values in DL and UL Bandwidth in MIB and SIB2	8.5.0
		RP-090131	0044	1		Clarifications to System Information Block Type 8	8.5.0
		RP-090131	0045	-		Reception of ETWS secondary notification	8.5.0
		RP-090131	0046	1		Validity time for ETWS message Id and Sequence No	8.5.0
		RP-090131	0047	-		CR for Timers and constants values used during handover to E-UTRA	8.5.0
		RP-090131	0048	-		Inter-RAT Security Clarification	8.5.0
		RP-090131	0049	-		CR to 36.331 on consistent naming of 1xRTT identifiers	8.5.0
		RP-090131	0050	-		Capturing RRC behavior regarding NAS local release	8.5.0
		RP-090131	0051	-		Report CGI before T321 expiry and UE null reporting	8.5.0
		RP-090131 RP-090131	0052 0053	1		System Information and 3 hour validity Inter-Node AS Signalling	8.5.0 8.5.0
		RP-090131	0053	 		Set of values for the parameter "messagePowerOffsetGroupB"	8.5.0
		RP-090131	0055	 -		CR to paging reception for ETWS capable UEs in RRC_CONNECTED	8.5.0
		RP-090131	0056	1		CR for CSG related items in 36.331	8.5.0
		RP-090131	0057	1		SRS common configuration	8.5.0
		RP-090131	0058	1-		RRC processing delay	8.5.0
		RP-090131	0059	-		CR for HNB Name	8.5.0
		RP-090131	0060	3		Handover to EUTRA delta configuration	8.5.0
		RP-090131	0063	-		Delivery of Message Identifier and Serial Number to upper layers for ETWS	8.5.0
	RP-43	RP-090131	0066	<u> </u>		Clarification on the maximum size of cell lists	8.5.0
		RP-090131	0067	-		Missing RRC messages in 'Protection of RRC messages'	8.5.0
		RP-090131	0069	1		Clarification on NAS Security Container	8.5.0
		RP-090131	0071	1-		Extension of range of CQI/PMI configuration index	8.5.0
		RP-090131	0072	1		Access barring alleviation in RRC connection establishment	8.5.0
		RP-090367	0077	6		Corrections to feature group support indicators	8.5.0
		RP-090131	0078	-		CR from email discussion to capture DRX and TTT handling	8.5.0
	RP-43	RP-090131	0079	1		Need Code handling on BCCH messages	8.5.0
	RP-43	RP-090131	0080	-	I	Unification of T300 and T301 and removal of miscallaneous FFSs	8.5.0

DD 42	RP-090131	0004	14 1	Dranged CD modifying the gode point definitions of	10.5.0
RP-43	RP-090131	0084	1	Proposed CR modifying the code-point definitions of neighbourCellConfiguration	8.5.0
RP-43	RP-090131	0087	2	Remove Redundant Optionality in SIB8	8.5.0
	RP-090131	0089	-	Corrections to the generic error handling	8.5.0
	RP-090131	0090	-	Configurability of T301	8.5.0
	RP-090131	0091	1	Correction related to TTT	8.5.0
	RP-090131	0095	-	CR for 36.331 on SPS-config	8.5.0
	RP-090131	0096	2	CR for Deactivation of periodical measurement	8.5.0
	RP-090131	0099	2	SMC and reconfiguration	8.5.0
	RP-090131	0101	-	TDD handover	8.5.0
	RP-090131 RP-090131	0102 0106	-	Corrections to system information acquisition Some Corrections and Clarifications to 36.331	8.5.0 8.5.0
	RP-090131	0100	-	Clarification on the Maximum number of ROHC context sessions	8.5.0
IXI 43	1000101	0103		parameter	0.0.0
RP-43	RP-090131	0110	-	Transmission of rrm-Config at Inter-RAT Handover	8.5.0
	RP-090131	0111	1	Use of SameRefSignalsInNeighbor parameter	8.5.0
	RP-090131	0112	-	Default serving cell offset for measurement event A3	8.5.0
	RP-090131	0114	-	dl-EARFCN missing in HandoverPreparationInformation	8.5.0
	RP-090131	0115	-	Cleanup of references to 36.101	8.5.0
	RP-090131	0117	-	Correction to the value range of UE-Categories	8.5.0
	RP-090131	0122 0124	1	Correction on RRC connection re-establishment	8.5.0
	RP-090131 RP-090131	0124	-	Performing Measurements to report CGI for CDMA2000 CDMA2000-SystemTimeInfo in VarMeasurementConfiguration	8.5.0 8.5.0
	RP-090131	0125	-	UE Capability Information for CDMA2000 1xRTT	8.5.0
	RP-090131	0126	-	CDMA2000 related editorial changes	8.5.0
	RP-090131	0128	 - 	Draft CR to 36.331 on State mismatch recovery at re-establishment	8.5.0
	RP-090131	0129	1	Draft CR to 36.331 on Renaming of AC barring related IEs	8.5.0
	RP-090131	0130	2	Draft CR to 36.331 on Inheriting of dedicated priorities at inter-RAT	8.5.0
RD-42	RP-090131	0135	<u> </u>	reselection Proposed CR to 36.331 Description alignment for paging parameter, nB	8.5.0
	RP-090131	0139	2	Miscellaneous corrections and clarifications resulting from ASN.1 review	8.5.0
	RP-090131	0141	1	Correction regarding Redirection Information fo GERAN	8.5.0
	RP-090131	0142	-	Further ASN.1 review related issues	8.5.0
	RP-090131	0143	-	Periodic measurements	8.5.0
	RP-090131	0144	1	Further analysis on code point "OFF" for ri-ConfigIndex	8.5.0
	RP-090131	0145	1	Adding and deleting same measurement or configuration in one message	8.5.0
RP-43	RP-090131	0147	-	Corrections to IE dataCodingScheme in SIB11	8.5.0
	RP-090131	0148	-	Clarification on Mobility from E-UTRA	8.5.0
	RP-090131	0149	-	36.331 CR related to "not applicable"	8.5.0
	RP-090131	0150	1	UE radio capability transfer	8.5.0
RP-43	RP-090131	0151	-	CR to 36.331 on value of CDMA band classes	8.5.0
	RP-090131	0152	-	Corrections to DRB modification	8.5.0
	RP-090131 RP-090131	0153 0155	-	Correction to presence condition for pdcp-config TDD HARQ-ACK feedback mode	8.5.0 8.5.0
	RP-090131	0157	-	Corrections regarding use of carrierFreq for CDMA (SIB8) and GERAN	8.5.0
DD 10	DD 00000/			(measObject)	
	RP-090321	0156	1	Sending of GERAN SI/PSI information at Inter-RAT Handover	8.5.0
	RP-090339	0158	-	Clarification of CSG support	8.5.0
	RP-090516 RP-090516	0159	2	Octet alignment of VarShortMAC-Input	8.6.0
	RP-090516 RP-090516	0160 0161	3	Minor corrections to the feature grouping Security clarification	8.6.0 8.6.0
	RP-090516	0162	1	Sending of GERAN SI/PSI information at Inter-RAT Handover	8.6.0
	RP-090516	0163	1	Correction of UE measurement model	8.6.0
	RP-090516	0164	-	Restricting the reconfiguration of UM RLC SN field size	8.6.0
	RP-090516	0165	1		8.6.0
	RP-090516	0166		36.331 CR - Handling of expired TAT and failed D-SR	8.6.0
	RP-090516	0167	1	Proposed CR to 36.331 Clarification on mandatory information in AS-	8.6.0
DD 44	RP-090516	0168	2	Config Miscellaneous small corrections	8.6.0
	RP-090516 RP-090516	0168	_	Clarification on the basis of delta signalling	8.6.0
	RP-090516	0173	-		8.6.0
	RP-090516	0180	2	Handling of Measurement Context During HO Preparation	8.6.0
	RP-090516	0181	-	Clarification of key-eNodeB-Star in AdditionalReestabInfo	8.6.0
RP-44					8.6.0
		0182	1	UE Capability Transfer	
RP-44	RP-090516 RP-090516		1	UE Capability Transfer Clarification regarding mobility from E-UTRA in-between SMC and	8.6.0
RP-44 RP-44	RP-090516 RP-090516	0182 0186	1	Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup	8.6.0
RP-44 RP-44	RP-090516 RP-090516 RP-090516	0182 0186 0188	1	Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup Correction and completion of specification conventions	8.6.0 8.6.0
RP-44 RP-44 RP-44	RP-090516 RP-090516 RP-090516 RP-090516	0182 0186 0188 0195	1 2	Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup Correction and completion of specification conventions RB combination in feature group indicator	8.6.0 8.6.0 8.6.0
RP-44 RP-44 RP-44 RP-44	RP-090516 RP-090516 RP-090516 RP-090516 RP-090516	0182 0186 0188 0195 0196	1	Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup Correction and completion of specification conventions RB combination in feature group indicator CR for need code for fields in mobilityControlInfo	8.6.0 8.6.0 8.6.0
RP-44 RP-44 RP-44 RP-44 RP-44	RP-090516 RP-090516 RP-090516 RP-090516 RP-090497	0182 0186 0188 0195 0196 0197	1 2	Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup Correction and completion of specification conventions RB combination in feature group indicator CR for need code for fields in mobilityControlInfo Alignment of pusch-HoppingOffset with 36.211	8.6.0 8.6.0 8.6.0 8.6.0 8.6.0
RP-44 RP-44 RP-44 RP-44 RP-44 RP-44	RP-090516 RP-090516 RP-090516 RP-090516 RP-090516	0182 0186 0188 0195 0196	1 2	Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup Correction and completion of specification conventions RB combination in feature group indicator CR for need code for fields in mobilityControlInfo	8.6.0 8.6.0 8.6.0

	DD 45	DD 000006	0201		Clarification on measurement object configuration for serving frequency	0.7.0
		RP-090906	0201	-		8.7.0
		RP-090906	0202	-	Correction regarding SRVCC	8.7.0
		RP-090906 RP-090906	0203 0204	1	Indication of DRB Release during HO Correction regarding application of dedicated resource configuration upon	8.7.0 8.7.0
	KF-45	KF-090900	0204	1	handover	0.7.0
	RP-45	RP-090906	0205	1_	REL-9 protocol extensions in RRC	8.7.0
		RP-090906	0206	1_ 1	In-order delivery of NAS PDUs at RRC connection reconfiguration	8.7.0
		RP-090906	0207		Correction on Threshold of Measurement Event	8.7.0
		RP-090906	0210		Clarification on dedicated resource of RA procedure	8.7.0
		RP-090906	0210	1	Cell barring when MasterInformationBlock or SystemInformationBlock1 is	8.7.0
	KF -43	KF-090900	0213	1	missing	0.7.0
	RP-45	RP-090915	0218	1_	Security threat with duplicate detection for ETWS	8.7.0
		RP-090906	0224	1_ 1	Clarification on supported handover types in feature grouping	8.7.0
		RP-090906	0250	1	Handling of unsupported / non-comprehended frequency band and	8.7.0
	1(1 -45	111 -030300	0230	'	emission requirement	0.7.0
	PD-45	RP-090906	0251	l_	RB combinations in feature group indicator 20	8.7.0
09/2009		RP-090934	0220	1	Introduction of Per-QCI radio link failure timers (option 1)	9.0.0
03/2003		RP-090926	0222	-	Null integrity protection algorithm	9.0.0
		RP-090926	0223	_	Emergency Support Indicator in BCCH	9.0.0
		RP-090934	0230	2	CR to 36.331 for Enhanced CSFB to 1xRTT with concurrent PS handover	9.0.0
		RP-090934	0230	_	REL-9 on Miscellaneous editorial corrections	9.0.0
		RP-090934 RP-090934	0243	1	Periodic CQI/PMI/RI masking	9.0.0
		RP-090934 RP-090933	0252	1	Introduction of CMAS	9.0.0
12/2009		RP-090933 RP-091346	0252	1	(Rel-9)-clarification on the description of redirectedCarrierInfo	9.0.0
12/2009		RP-091346	0253	1		9.1.0
	AP-40	NF-091346	0254		Adding references to RRC processing delay for inter-RAT mobility messages	9.1.0
	DD 46	RP-091314	0256	 	Alignment of srs-Bandwidth with 36.211	9.1.0
-				5	Baseline CR capturing eMBMS agreements	9.1.0
		RP-091341 RP-091343	0257 0258	5	Capturing agreements on inbound mobility	9.1.0
				3		
		RP-091314 RP-091346	0260	-	Clarification of preRegistrationZoneID/secondaryPreRegistrationZoneID	9.1.0
			0261	-	Clarification on NCC for IRAT HO	9.1.0
		RP-091314	0263	-	Clarification on P-max	9.1.0
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		RP-100305	0332	<u> - </u>	Clarification on MCCH change notification	9.2.0
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09/2010		RP-100845	0440	-	Correction to 3GPP2 reference for interworking with cdma2000 1x	9.4.0
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	KP-50	RP-101197	0485	<u> - </u>	Clarification regarding reconfiguration of the quantityConfig	9.5.0

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	RP-50	RP-101210	0493	-	The field descriptions of MeasObjectEUTRA	9.5.0
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		RP-101214	0478	-	Addition of UE-EUTRA-Capability descriptions	10.0.0
		RP-101214	0481	-	Clarification on Default Configuration for CQI-ReportConfig	10.0.0
	RP-50	RP-101215	0487	-	CR to 36.331 adding e1xCSFB support for dual Rx/Tx UE	10.0.0
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	RP-50	RP-101228	0489	1	Introduction of relays in RRC	10.0.0
	RP-50	RP-101214	0490	1	Priority indication for CSFB with re-direction	10.0.0
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		RP-101214	0513	-	Combined Quantity Report for IRAT measurement of UTRAN	10.0.0
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03/2011		RP-110202	0534	1	Stage-3 CR for MBMS enhancement	10.1.0
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-		RP-110282 RP-110280		-		10.1.0
-			0537	-	Correction to the field description of nB	10.1.0
-		RP-110289	0538	-	CR on impact on UP with remove&add approach_2	10.1.0
		RP-110282	0539	-	CR to 36.331 on corrections for MDT	10.1.0
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		RP-110282	0549	1	Memory size for logged measurements capable UE	10.1.0
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	RP-51	RP-110280	0557	1	Some Corrections on measurement	10.1.0
	RP-51	RP-110291	0558	-	Stored system information for RNs	10.1.0
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-		RP-110289	0584	 _ 	Correction of configuration description in SIB2	10.1.0
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-		RP-110205	0588	1	36331_CRxxxx Support of Delay Tolerant access requests	10.1.0
-		RP-110203	0590	<u> </u>	Update of R2-110807 on CSI measurement resource restriction for time	10.1.0
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-		RP-110290	0592	-	Corrections on UE capability related parameters	10.1.0
<u> </u>		RP-110282	0596	-	Validity time for location information in Immediate MDT	10.1.0
-		RP-110280	0597	-	CR to 36.331 adding UE capability indicator for dual Rx/Tx e1xCSFB	10.1.0
		RP-110289	0598	-	Miscellaneous corrections to CA	10.1.0
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	RP-51	RP-110280	0603	-	Correction of use of RRCConnectionReestablishment message for	10.1.0
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		RP-110282	0604	-	CR to 36.331 on MDT neighbour cell measurements logging	10.1.0
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		RP-110282	0615	<u> - </u>	Release of Logged Measurement Configuration	10.1.0
		RP-110280	0616	<u> </u> _]	Some corrections on TS 36.331	10.1.0
	RP-51	RP-110280	0623	<u> </u> -	AC barring procedure clean up	10.1.0
	RP-51	RP-110282	0624	-	Counter proposal to R2-110826 on UE capabilities for MDT	10.1.0
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	RP-51	RP-110289	0629	2	Measurement on the deactivated SCells	10.1.0
	RP-51	RP-110282	0632	1	Trace configuration paremeters for Logged MDT	10.1.0
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		RP-110282	0637	i_ i	User consent for MDT	10.1.0
		RP-110280	0638	1_	Correction on the range of CQI resource index	10.1.0
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	RP-51	RP-110290	0641	1	UE capability signaling structure w.r.t carrier aggregation, MIMO and	10.1.0
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		RP-110289	0642	1	Normal PHR and the multiple uplink carriers	10.1.0
	RP-51	RP-110280	0643	1	Corrections to TS36.331 on SIB2 handling	10.1.0
	RP-51	RP-110280	0644	1	Adding a Power Management indication in PHR	10.1.0
		RP-110289	0646	1	Clarification for CA and TTI bundling in RRC	10.1.0
		RP-110443	0648	1	Updates to FGI settings	10.1.0
06/2011		RP-110836	0651	<u> </u>	Add MBMS counting procedure to processing delay requirement for RRC	10.2.0
00/2011	KF-32	KF-110030	0031	-	procedure Section 11.2	10.2.0
-	DD 50	RP-110830	0653	+ +	Add pre Rel-10 procedures to processing delay requirement for RRC	10.2.0
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		RP-110839	0656	-	Clarification of inter-frequency RSTD measurement indication procedure	10.2.0
	RP-52	RP-110830	0658	-	Clarification of optionality of UE features without capability	10.2.0
		RP-110839	0660	-	Clarification on the definition of maxCellBlack	10.2.0
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	RP-52	RP-110850	0662	3	Clarification regarding eICIC measurements	10.2.0
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		RP-110851	0664	1	CR on clarification of RLF Report in Carrier Aggregation	10.2.0
		RP-110830	0669	-	FGI bit for handover between LTE FDD/TDD	10.2.0
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	RP-52	RP-110839	0671	2	General error handling for extension fields	10.2.0
	RP-52	RP-110851	0672	2	Additional information for RLF report	10.2.0
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		RP-110670	0674	4	Miscellaneous corrections (related to review in preparation for ASN.1	10.2.0
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		RP-110843	0675	-	PLMN check for MDT logging	10.2.0
		RP-110839	0677	-	UE actions upon leaving RRC_CONNECTED	10.2.0
		RP-110847	0678	-	Clarification on bandEUTRA-r10 and supportedBandListEUTRA	10.2.0
	RP-52	RP-110837	0679	-	Updated value range for the Extended Wait Timer	10.2.0
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		RP-110828	0693	1	Correction for SR-VCC and QCI usage	10.2.0
		RP-110847	0694	1_	Restructuring of CQI-ReportConfig-r10	10.2.0
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		RP-110850	0700	-	Reference SFN for MeasSubframePattern	10.2.0
		RP-110846	0701	-	Clarifications to CA related field descriptions	10.2.0
		RP-110847	0702	-	Corrections to codebookSubsetRestriction and SRS parameters	10.2.0
	RP-52	RP-110834	0704	-	Corrections to the handling of ri-ConfigIndex for TM9	10.2.0
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	RP-52	RP-110839	0713	1_	CR to 36.331 on redirected utra-TDD carrier frequency	10.2.0
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		RP-110839	0719		CR for Reconfiguration of discardTimer in PDCP-Config	10.2.0
		RP-110847	0723	-	On the missing multiplicity of UE capability parameters	10.2.0
		RP-110830	0735	<u> </u>	Radio frame alignment of CSA and MSP	10.2.0
	RP-52	RP-110847	0740	-	Reconfiguration involving critically extended IEs (using fullFieldConfig i.e.	10.2.0
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	RP-52	RP-110839	0744	1-	Counter proposal to R2-112753 on CR to remove CSG Identity validity	10.2.0
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	RP-52	RP-110839	0746	1	Increase of prioritisedBitRate	10.2.0
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00/00::		RP-110847	0747	-	CA and MIMO Capabilities in LTE Rel-10	10.2.0
09/2011		RP-111297	0752	-	TS36.331 Correction	10.3.0
		RP-111297	0754	-	maxNumberROHC-ContextSessions when no ROHC profile is supported	10.3.0
		RP-111280	0757	<u> - </u>	Correction to Subframe Allocation End in PMCH-Info	10.3.0
	RP-53	RP-111288	0761	-	Correction on PUCCH configuration for Un interface	10.3.0
		RP-111297	0762	-	Miscellaneous corrections to 36.331	10.3.0
		RP-111278	0764	2	36.331 correction on CSG identity validity to allow introduction of CSG	10.3.0
				-	RAN sharing	
		RP-111283	0770	2	AdditionalSpectrumEmissions in CA	10.3.0
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			0770		CR to 36.331 on Small correction of PHR parameter	10.3.0
	RP-53	RP-111297	0773	-		400
	RP-53 RP-53	RP-111297 RP-111283	0775	2	Clarifications to P-max on CA	10.3.0
	RP-53 RP-53 RP-53	RP-111297 RP-111283 RP-111280		2		10.3.0 10.3.0
	RP-53 RP-53 RP-53	RP-111297 RP-111283	0775	2	Clarifications to P-max on CA	
	RP-53 RP-53 RP-53	RP-111297 RP-111283 RP-111280 RP-111283	0775 0784 0792	- 2 - -	Clarifications to P-max on CA Clarification on for which subframes signalling MCS applies Corrections in RRC	10.3.0 10.3.0
	RP-53 RP-53 RP-53 RP-53 RP-53	RP-111297 RP-111283 RP-111280 RP-111283 RP-111297	0775 0784 0792 0793	- 2 - - -	Clarifications to P-max on CA Clarification on for which subframes signalling MCS applies Corrections in RRC Replace the tables with exception list in 10.5 AS-Config	10.3.0 10.3.0 10.3.0
	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111297 RP-111283 RP-111280 RP-111283 RP-111297 RP-111297	0775 0784 0792 0793 0796	- 2 - - -	Clarifications to P-max on CA Clarification on for which subframes signalling MCS applies Corrections in RRC Replace the tables with exception list in 10.5 AS-Config Corrections to the field descriptions	10.3.0 10.3.0 10.3.0 10.3.0
	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111297 RP-111283 RP-111280 RP-111283 RP-111297	0775 0784 0792 0793	- 2 - - - -	Clarifications to P-max on CA Clarification on for which subframes signalling MCS applies Corrections in RRC Replace the tables with exception list in 10.5 AS-Config	10.3.0 10.3.0 10.3.0

	DD 52	DD 111070	0010		CEDAN SI format for call change order? DS handover? enhanced	1020
	KP-53	RP-111272	0810	-	GERAN SI format for cell change order&PS handover& enhanced redirection to GERAN	10.3.0
	RP-53	RP-111283	0811	-	Corrections to PUCCH-Config field descriptions	10.3.0
12/2011	RP-54	RP-111711	0812	1	Clarification of PCI range for CSG cells	10.4.0
		RP-111716	0813	-	Clarifications to Default Radio Configurations	10.4.0
		RP-111716	0814	1	Corrections to enhancedDualLayerTDD	10.4.0
		RP-111716	0815	-	Miscellaneous small corrections	10.4.0
		RP-111716	0816	1	Correction on notation of SRS transmission comb	10.4.0
		RP-111706 RP-111716	0823 0827	2	36.331 CR SPS reconfiguration Clarification of list sizes in measurement configuration stored by UE	10.4.0
		RP-111710	0835	-	Clarification of the event B1 and ANR related FGI bits	10.4.0
		RP-111714	0840	1	Clarification on MBSFN and measurement resource restrictions	10.4.0
		RP-111706	0845	-	Clarification on parallel message transmission upon connection re-	10.4.0
					establishment	
03/2012		RP-120326	0855	1	Limiting MBMS counting responses to within the PLMN	10.5.0
		RP-120321	0857	-	CR to 36.331 on cdma2000 band classes and references	10.5.0
		RP-120326 RP-120325	0862 0871	1	Clarification on MBSFN and measurement resource restrictions On SIB10/11 Reception Timing	10.5.0
		RP-120326	0875	1	Clarification on MBMS counting for uncipherable services	10.5.0
		RP-120325	0876	-	Minor correction regarding limited service access on non-CSG-member	10.5.0
	1 00	111 120020	00.0		cell	10.0.0
	RP-55	RP-120326	0894	-	Time to keep RLF Reporting logs	10.5.0
	RP-55	RP-120356	0895	1	Introducing means to signal different FDD/TDD Capabilities/FGIs for Dual-	10.5.0
	DD 55	DD 400004	0000		XDD UE	40.5.0
	KP-55	RP-120321	0899	-	Clarification on SRB2 resumption upon connection re-establishment	10.5.0
-	RP-55	RP-120321	0900	1	(parallel message transmission) Duplicated ASN.1 naming correction	10.5.0
06/2012		RP-120805	0909	-	SPS Reconfiguration	10.6.0
00/2012		RP-120805	0912	1	Change in Scheduling Information for ETWS	10.6.0
		RP-120807	0914	-	Clarification of mch-SchedulingPeriod configuration	10.6.0
	RP-56	RP-120808	0916	1	Change in Scheduling Information for CMAS	10.6.0
	RP-56	RP-120814	0919	1	Introducing means to signal different REL-10 FDD/TDD Capabilities/FGIs	10.6.0
	DD 50	DD 400040	0000	4	for Dual-xDD UE	40.00
		RP-120812 RP-120808	0920 0931	1	Clarification on setting of dedicated NS value for CA by E-UTRAN T321 value for UTRA SI acquisition	10.6.0 10.6.0
		RP-120808	0957	1	Korean Public Alert System (KPAS) in relation to CMAS	10.6.0
		RP-120812	0969	1	Introduction of supported bandwidth combinations for CA	10.6.0
		RP-120734	0970	1	Introduction of multiple frequency band indicator	10.6.0
		RP-120825	0934	-	Introduction of a new security algorithm ZUC	11.0.0
		RP-120813	0973	1	EU-Alert in relation to CMAS	11.0.0
09/2012		RP-121371	0982	1	Introduction of EAB	11.1.0
		RP-121381	0990	-	Additional special subframe configuration related correction	11.1.0
		RP-121423 RP-121359	1000	4	36.331 CR introducing In-Device Coexistence (IDC)	11.1.0
		RP-121361	1013		Voice support Capabilities Differentiating UTRAN modes in FGIs	11.1.0
			1022	1	Introduction of absolute priority based measurements and reselection in	11.1.0
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		RP-121349	1025	2	Introducing Carrier aggregation enhancements for REL-11	11.1.0
		RP-121375	1026	-	Introducing MBMS enhancements for REL-11	11.1.0
<u> </u>		RP-121376	1052	2	Signaling support for CRS interference management in elCIC	11.1.0
-	KY-5/	RP-121395 RP-121395	1055 1056	+	CR on scell measurement cycle CR on measurement report	11.1.0
		RP-121393	1056	3	Introduction of 'Power preference indication'	11.1.0
		RP-121280	1060	-	Correction for PUCCH/SRS Release	11.1.0
12/2012		RP-121933	1063	<u> -</u>	Correction related to differentiating UTRAN modes in FGIs	11.2.0
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		RP-121953	1066	2	Addition of the stage-3 agreements on IDC	11.2.0
		RP-121951	1067	3	Carrier Aggregation Enhancement RAN1 parameters	11.2.0
		RP-121957	1068	1	Clarification of SR period	11.2.0
-		RP-121957 RP-121957	1069 1070	1	Clarification on HandoverCommand message Clarification on mobility related issues	11.2.0
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		RP-121940	1073	-	CR to 36.331 on SIB15 acquisition	11.2.0
		RP-121957	1074	1	Handling of 1xCSFB failure	11.2.0
	RP-58	RP-121957	1075	-	Miscellaneous corrections	11.2.0
		RP-121958	1076	1	RAN overload control using RRC connection Rejection	11.2.0
		RP-121954	1077	-	RRC support for CoMP in UL	11.2.0
		RP-121951	1078	-	Some clarification to Carrier aggregation enhancements	11.2.0
		RP-121939	1079	1	Validity of EAB SIB and acquisition of SIB1	11.2.0
		RP-121922 RP-121924	1085 1089	1	Clarification for Multiple Frequency Band Indicators feature Moving the TM5 capability	11.2.0 11.2.0
	111 -00	11 121324	1008	<u>' </u>	Interning the Thire capability	11.4.0

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		RP-121946	1100	-	Correction on MDT multi-PLMN support	11.2.0
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		RP-121958	1131	-	Introducion of wideband RSRQ measurements	11.2.0
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	RP-59	RP-130231	1193	1	Mandatory supporting of B1 measurement to UMTS FDD (FGI bit 15)	11.3.0
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<u> </u>		RP-130809	1308	-	CR on ROHC parameter configuration in Rel-11 RRC	11.4.0
-		RP-130804 RP-130809	1315	2	Clarification on UE CA capability	11.4.0
<u> </u>		RP-130809 RP-130805	1321 1323	-	Updating 3GPP2 specification references Clarification on the configuration of the extended PHR	11.4.0 11.4.0
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-		RP-131311 RP-131318	1348 1353	-	Corrections to the 3GPP2 specification references in 36.331 Clarifications regarding the usage of "rlf-Cause" in case of handover failure	11.5.0 11.5.0
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RP-76 RP-171226 Z771 1 F Leap second change for DFN timing 14.3 RP-76 RP-17123 Z775 2 C C C Emode configuration without handover 14.3 RP-76 RP-17123 Z775 2 C C C Emode configuration without handover 14.3 RP-76 RP-17123 Z775 2 C C C Emode configuration without handover 14.3 RP-76 RP-17124 Z795 Z797 F C Correction on VZX Ry pool for inter-frequency configuration in 36.331 4.3 RP-76 RP-17124 Z795 Z797 F FDD TDD GA Z797					2	F	Clarification regarding requesting fallback combinations with different	14.3.0
RP-76 RP-171244 2773 1 A Correction to RACH CE level into list 14.3 RP-76 RP-171247 2791 3 F Correction on V2X Rx pool for inter-frequency configuration in 36.331 14.3 RP-76 RP-171242 2795 1 F EDD TDD difference for Vol.TE capability 14.3 RP-76 RP-171242 2804 1 A Setting of FG1 107 and 109 in case of TDD-FDD CA 14.3 RP-76 RP-171242 2804 1 A Setting of FG1 107 and 109 in case of TDD-FDD CA 14.3 RP-76 RP-171242 2820 F Correction of RRCConnectionReconfiguration reception for V2X 14.3 RP-76 RP-171227 2820 F Correction of RRCConnectionReconfiguration reception for V2X 14.3 RP-76 RP-171242 2823 Z B Introduction of RRC connection RRC corrections 14.3 RP-76 RP-171242 2823 Z B Introduction of RRC connection re-establishment for NB-IoT control plane 14.3 RP-76 RP-171243 2828 Z A Clarification of RRC connection re-establishment for NB-IoT control plane 14.3 RP-76 RP-171245 2834 Z A Clarification to MIS repetitions 14.3 RP-76 RP-171245 2834 A Clarification or contention based random access for NB-IoT 14.3 RP-76 RP-171223 2844 F Correction to FG1 25 RP-76 RP-171223 2845 F Correction or bead random access for NB-IoT 14.3 RP-76 RP-171223 2845 F Correction on the UE AS context handling 14.3 RP-76 RP-171223 2845 F Correction on the UE AS context handling 14.3 RP-76 RP-171223 2845 F Correction on the UE AS context handling 14.3 RP-76 RP-171223 2845 F Correction on the UE AS context handling 14.3 RP-76 RP-171223 2847 F Correction on the UE AS context handling 14.3 RP-76 RP-171223 2847 F Correction on the UE AS context handling 14.3 RP-76 RP-171223 2847 F Correction on the UE AS context handling 14.3 RP-76 RP-171223 2849 F Correction on the UE AS conte	RE	P-76	RP-171226	2771	1	F		14.3.0
RP-76 RP-171222 2775 2 C C E mode configuration/deconfiguration without handover 14.3 RP-76 RP-171224 2791 3 F Correction on V2X Rp tool for inter-frequency configuration in 36.331 14.3 RP-76 RP-171242 2894 1 A Entry-Level UE Support UL 64QAM 14.3 RP-76 RP-171242 2894 1 A Setting of FG1 107 and 108 in case of TD0-FDD CA 14.3 RP-76 RP-171227 2820 - F CA OVEX miscellaneous RRC corrections reception for V2X 14.3 RP-76 RP-171227 2820 - F CA OVEX miscellaneous RRC corrections reception for V2X 14.3 RP-76 RP-171227 2820 - F CA OVEX miscellaneous RRC corrections reception for V2X 14.3 RP-76 RP-171224 2828 2 B Introduction of RRC connection re-establishment for NB-IoT control plane 14.3 RP-76 RP-171243 2826 - A Miscellaneous corrections to CA enhancements 14.3 RP-76 RP-171243 2826 A Clarification to MIB repetitions 14.3 RP-76 RP-171243 2826 A Clarification to MIB repetitions 14.3 RP-76 RP-171243 2830 A LAAW/Pii sharing indiction 14.3 RP-76 RP-171245 2831 B Enable Uplink-Only RoHC operations 14.3 RP-76 RP-171245 2833 A LAAW/Pii sharing indiction 14.3 RP-76 RP-171245 2833 A Clarification on contention based random access for NB-IoT 14.3 RP-76 RP-171245 2834 A Clarification on contention based random access for NB-IoT 14.3 RP-76 RP-171245 2846 A Editorial correction on ab-Barring parameter 14.3 RP-76 RP-171245 2846 A Editorial correction on ab-Barring parameter 14.3 RP-76 RP-171245 2846 A Editorial correction on bedering parameter 14.3 RP-76 RP-171245 2846 A Correction to Fice 25 B Introduction of enhanced RLM reportion 14.3 RP-76 RP-171245 2846 A Correction on the UE AS context handling 14.3 RP-76 RP-171245 2846 A Correction on RCARD RLM reportion 14.3 RP-76 RP-171245 2846 A Correction on the WEACO RLM report 14.3 RP-76 RP-171245 2846 A Correction on RCARD								14.3.0
RP-76 RP-1712Z						_		14.3.0
RP-76 RP-171248 2795 1	RF	P-76	RP-171227	2791	3	F		14.3.0
RP-76 RP-171242 2804 1					1	Α		14.3.0
RP-76 RP-171226	RP	P-76	RP-171235	2797	1	F	FDD TDD difference for VoLTE capability	14.3.0
RP-76 RP-171227 2820 F CR on V2X miscellaneous RRC corrections 14.3	RP	P-76	RP-171242					14.3.0
RP-76 RP-171244 2823 2 B Introduction of RRC connection re-establishment for NB-IoT control plane 14.3					1			14.3.0
RP-76 RP-171243 2826 A Miscellaneous corrections to CA enhancements 14.3					-	-		14.3.0
RP-76 RP-171244 2828 2					2	_		14.3.0
RP-76 RP-171243 2830 3					-			14.3.0
RP-76 RP-171245 2831 - B								14.3.0
RP-76 RP-171245 2833					3			14.3.0
RP-76 RP-17123 2842					-			14.3.0
RP-76 RP-171223 2844 F Correction to FGI 25 RP-76 RP-171223 2844 1 F Correction to InterFreqRSTDMeasurementIndication message 14.3 RP-76 RP-171223 2845 2 B Introduction of enhanced RLM reporting 14.3 RP-76 RP-171245 2849 1 A Correction on a tratch without PDN connectivity 14.3 RP-76 RP-171245 2849 1 A Correction on a tratch without PDN connectivity 14.3 RP-76 RP-171245 2849 1 A Correction on a tratch without PDN connectivity 14.3 RP-76 RP-171245 2853 1 F Miscellaneous RRC corrections on mobility enhancement 14.3 RP-76 RP-171243 2853 1 A Clarification on logicalChannelSR-ProhibitTimer for NB-IOT 14.3 RP-76 RP-171223 2854 2 F Correction to SC-MCCH and SC-MTCH configuration without delta configuration Correction of SRS switching 14.3 RP-76 RP-171223 2870 2 F Miscellaneous feMTC corrections and clarifications resulting from ASN.1 review RP-76 RP-171227 2871 - F Miscellaneous eDECOR corrections and clarifications resulting from ASN.1 review RP-76 RP-171221 2873 1 F Miscellaneous eDECOR corrections and clarifications resulting from ASN.1 RP-76 RP-171221 2874 1 B UE capabilities for feMBMS 4.3 RP-76 RP-171224 2876 1 F Long DRX values with regular wake-up cycle – Option 1 4.3 RP-76 RP-171223 2883 1 F Correction on the description of ce-srschnancement for FeMTC 4.3 RP-76 RP-171223 2883 1 F Correction on the description of ce-srschnancement for FeMTC 4.3 RP-76 RP-171223 2884 1 F Correction on the description of ce-srschnancement for FeMTC 4.3 RP-76 RP-171223 2883 1 F Correction on the description of ce-srschnancement for FeMTC 4.3 RP-76 RP-171223 2884 1 F Correction on the description of ce-srschnancement for FeMTC 4.3 RP-76 RP-171223 2885 1 F Correction on the description of ce-srschnancement for FeMTC 4.3 RP-76 RP-171223 2885 1 F Correction on the description of ce-srschnan					1			14.3.0
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RP-76 RP-171230 2869 1 F Correction of SRS switching RP-76 RP-171231 2870 2 F Miscellaneous feMTC corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171237 2871 - F Miscellaneous eDECOR corrections and clarifications resulting from ASN.1 review RP-76 RP-171221 2873 1 F Miscellaneous eDECOR corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171221 2874 1 B UE capabilities for feMBMS 14.3 RP-76 RP-171224 2876 1 F Long DRX values with regular wake-up cycle - Option 1 14.3 RP-76 RP-171242 2876 1 F Long DRX values with regular wake-up cycle - Option 1 14.3 RP-76 RP-171223 2882 1 F Correction on terminology of SI for eMTC 14.3 RP-76 RP-171223 2883 2 B Measurement gap sharing for FeMTC intra- and inter-frequency 14.3 RP-76 RP-171223 2884 1 F Minor correction in TS 36.331 for feMTC 14.3 RP-76 RP-171223 2885 2 F Corrections on reconfiguration between CE mode and normal mode in eMTC RP-76 RP-171230 2889 1 F Corrections on reconfiguration between CE mode and normal mode in eMTC RP-76 RP-171230 2889 1 F Correction of issues related to ASN.1 review for eVoLTE 14.3 RP-76 RP-171230 2890 1 F Merging of retuningTimeBandPairList with regular supported BC capabilities (ASN.1 review issue S.059) RP-76 RP-171247 2905 1 F Correction on V2X behavior in 36.331 14.3 RP-76 RP-171247 2905 1 F Correction on v2X behavior in 36.331 14.3 RP-76 RP-171244 2912 2 B EUTRAN sharing enhancement 14.3 RP-76 RP-171244 2919 - A Clarification on additionalSpectrumEmission for eMTC 14.3 RP-76 RP-171244 2919 - A Clarification on additionalSpectrumEmission for MB-IoT 14.3 RP-76 RP-171244 2927 - F Correction to CarrierConfigDedicated-NB 14.3 RP-76 RP-171244 2927 - F Correction to CarrierConfigDedicated-NB 14.3 RP-76 RP-171244 2927 - F Correctio							Correction to SC-MCCH and SC-MTCH configuration without delta	14.3.0
RP-76 RP-171223 2870 2 F Miscellaneous feMTC corrections and clarifications resulting from ASN.1 14.3	RF	P-76	RP-171230	2869	1	F		14.3.0
RP-76 RP-171237 2871 -							Miscellaneous feMTC corrections and clarifications resulting from ASN.1	14.3.0
RP-76 RP-171221 2873 1 F Miscellaneous feMBMS corrections and clarifications resulting from ASN.1 14.3	RF	P-76	RP-171237	2871	-	F	Miscellaneous eDECOR corrections and clarifications resulting from	14.3.0
RP-76 RP-171221 2874 1 B UE capabilities for feMBMS 14.3	RF	P-76	RP-171221	2873	1	F		14.3.0
RP-76 RP-171224 2876 1 F Long DRX values with regular wake-up cycle - Option 1 14.3 RP-76 RP-171244 2879 - A Correction on terminology of SI for eMTC 14.3 RP-76 RP-171223 2882 1 F Correction on the description of ce-srsEnhancement for FeMTC 14.3 RP-76 RP-171223 2883 2 B Measurement gap sharing for FeMTC intra- and inter-frequency measurement 14.3 RP-76 RP-171223 2884 1 F Minor correction in TS 36.331 for feMTC 14.3 RP-76 RP-171223 2885 2 F Corrections on reconfiguration between CE mode and normal mode in eMTC eMTC RP-76 RP-171235 2889 1 F Correction of issues related to ASN.1 review for eVoLTE 14.3 RP-76 RP-171230 2890 1 F Merging of retuningTimeBandPairList with regular supported BC capabilites (ASN.1 review issue S.059) RP-76 RP-171222 2891 - F Consistent gap pattern configuration for serving cells 14.3 RP-76 RP-171240 2903 2 B Introduction of UE capability for V2X in 36.331 14.3 RP-76 RP-171244 2919 - A Clarification on additionalSpectrumEmission for eMTC 14.3 RP-76 RP-171244 2919 - A Clarification on additionalSpectrumEmission for NB-IoT 14.3 RP-76 RP-171224 2927 - F Correction to CarrierConfigDedicated-NB 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.								
RP-76 RP-171244 2879 - A Correction on terminology of SI for eMTC 14.3					1			14.3.0
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RP-76 RP-171223 2885 2 F Corrections on reconfiguration between CE mode and normal mode in eMTC		D 70	DD 474000	2004	1	_		1400
RP-76 R2-1705852 2887 1 F Clarification regarding eFD-MIMO configuration (REL-14) 14.3 RP-76 RP-171235 2889 1 F Correction of issues related to ASN.1 review for eVoLTE 14.3 RP-76 RP-171230 2890 1 F Merging of retuningTimeBandPairList with regular supported BC capabilites (ASN.1 review issue S.059) RP-76 RP-171222 2891 - F Consistent gap pattern configuration for serving cells 14.3 RP-76 RP-171407 2903 2 B Introduction of UE capability for V2X in 36.331 14.3 RP-76 RP-171227 2905 1 F Correction on V2X behavior in 36.331 14.3 RP-76 RP-171246 2912 2 B EUTRAN sharing enhancement 14.3 RP-76 RP-171244 2919 - A Clarification on additionalSpectrumEmission for eMTC 14.3 RP-76 RP-171245 2920 - A Clarification on additionalSpectrumEmission for NB-IoT 14.3 RP-76 RP-171224 2927 - F Correction to CarrierConfigDedicated-NB 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 14.3 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 RP-76 RP-171224 2929 2 F Miscellaneous NB-IoT corrections and clarifications resulting from ASN.1 RP-76 RP-171224 2929 2 F					2		Corrections on reconfiguration between CE mode and normal mode in	14.3.0 14.3.0
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review					2			14.3.0
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RP-76 RP-171245 2931 2 A Extension of SIntraSearchP value range 14.3				2931	2	А	Extension of SIntraSearchP value range	14.3.0
handover					-		handover	14.3.0
RP-76 RP-171225 2938 3 F Revert PDCP state variable HFN and SN back to the values used in the source cell	RP	P-76	KP-171225	2938	3	F		14.3.0

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		RP-171236	2942	1	F	ASN.1 corrections for eLWA	14.3.0
		RP-171241	2943	-	Α	Clarification on UE capability and early feature support	14.3.0
		RP-171243	2944	-	Α	Clarification regarding EBF-FDMIMO configuration (REL-13)	14.3.0
		RP-171245	2945	1	Α	Generic clarification of "first bit" as leftmost bit	14.3.0
	RP-76	RP-171229	2948	ļ-	В	Introduction of UE capabilities for high speed	14.3.0
		RP-171229	2949	-	F	Correction of high speed	14.3.0
	RP-76	RP-171227	2950	-	F	CR on reduction of SIB21 size	14.3.0
	RP-76	RP-171244	2952	1	Α	Configuration of preamble groups for CE levels and preamble groups A/B	14.3.0
	RP-76	RP-171244	2954	1	Α	Extension of RSRP range for eMTC	14.3.0
		RP-171169	2958	-	С	FeMBMS/unicast-mixed carrier flag in measurement object	14.3.0
09/2017	RP-77	RP-171919	2807	4	Α	Correction to PUCCH-ConfigDedication	14.4.0
		RP-171914	2961	2	F	Correction on SPS assistance information in TS 36.331	14.4.0
	RP-77	RP-171914	2977	1	F	Miscellaneous correction to V2X in TS 36.331	14.4.0
	RP-77	RP-171914	2978	2	В	Introduction of new NS values for V2X sidelink communication	14.4.0
	RP-77	RP-171918	2980	3	Α	Adding abstract syntax notation one chapter of sidelink pre-configuration.	14.4.0
		RP-171914	2983	1	F	Correction on TTI bundling for TDD configurations 2 and 3	14.4.0
	RP-77	RP-171911	2984	2	F	Corrections on the use of plmn-IdentityList in field descriptions	14.4.0
		RP-171915	2985	2	F	RRC Connection Re-establishment for Control Plane CloT EPS	14.4.0
						Optimization	
	RP-77	RP-171919	2989	-	Α	Clarification that DL only bands are not supported in NB-IoT	14.4.0
		RP-171915	2990	1	F	Cleanup for NB-IoT Enhancements	14.4.0
		RP-171920	2992	2	Α	Clarification on SI repetition pattern	14.4.0
		RP-171914	2993	2	F	CR on condition for RRC connection establishment and condition for	14.4.0
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History

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