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Contents

Foreword

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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

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*.

[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 ".

[4] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); UE Procedures in Idle Mode".

[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".

[9] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRAN); Overall description; Stage 2".

[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-A v6.0: "Physical Layer Standard for cdma2000 Spread Spectrum Systems – Release A".

[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 8824-1).

[14] ITU-T Recommendation X.681 (07/2002) "Information Technology - Abstract Syntax Notation One (ASN.1): Information object specification" (Same as the ISO/IEC International Standard 8824-2).

[15] ITU-T Recommendation X.691 (07/2002) "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)" (Same as the ISO/IEC International Standard 8825-2).

[16] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

[17] 3GPP TS 25.101: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (FDD)".

[18] 3GPP TS 25.102: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (TDD)".

[19] 3GPP TS 25.331:"Universal Terrestrial Radio Access (UTRA); Radio Resource Control (RRC); Protocol specification".

[20] 3GPP TS 45.005: "Radio transmission and reception".

[21] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".

[22] 3GPP TS 36.212: "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding".

[23] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".

[24] 3GPP2 C.S0057-E v1.0: "Band Class Specification for cdma2000 Spread Spectrum Systems".

[25] 3GPP2 C.S0005-A v6.0: "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems – Release A, Addendum 2".

[26] 3GPP2 C.S0024-A v3.0: "cdma2000 High Rate Packet Data Air Interface Specification".

[27] 3GPP TS 23.003: "Numbering, addressing and identification".

[28] 3GPP TS 45.008: "Radio subsystem link control".

[29] 3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".

[30] 3GPP TS 25.123: "Requirements for Support of Radio Resource Management (TDD)".

[31] 3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access (E-UTRA); Architecture description".

[32] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".

[33] 3GPP2 A.S0008-C v4.0: "Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network"

[34] 3GPP2 C.S0004-A v6.0: "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems – Addendum 2"

[35] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[36] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".

[37] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[38] 3GPP TS 23.038: "Alphabets and Language".

[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 44.005: "Data Link (DL) Layer General Aspects".

[44] 3GPP2 C.S0087-A v1.0: "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.S0097-0 v2.0: "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 TS 25.307: "Requirement 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].

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

CSG member cell: for a UE in RRC_CONNECTED, a cell broadcasting the identity of the Registered PLMN or Equivalent PLMN and for which CSG whitelist of the UE includes an entry comprising of cell"s CSG ID and the respective PLMN identity.

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 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.

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

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.

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.

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

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] 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].

1xRTT	CDMA2000 1x Radio Transmission Technology
AM	Acknowledged Mode
ASN.1	Abstract Syntax Notation One
ARQ	Automatic Repeat Request
AS	Access Stratum
BCCH	Broadcast Control Channel
BCD	Binary Coded Decimal
BCH	Broadcast Channel
CA	Carrier Aggregation
CCCH	Common Control Channel
CCO	Cell Change Order
CMAS	Commercial Mobile Alert Service
CP	Control Plane
C-RNTI	Cell RNTI
CSFB	CS fallback

CSG	Closed Subscriber Group
DCCH	Dedicated Control Channel
DRB	(user) Data Radio Bearer
DRX	Discontinuous Reception
DTCH	Dedicated Traffic Channel
DL	Downlink
DL-SCH	Downlink Shared Channel
ETWS	Earthquake and Tsunami Warning System
E-UTRA	Evolved Universal Terrestrial Radio Access
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
ENB	Evolved Node B
EPC	Enhanced Packet Core
EHPLMN	Equivalent Home Public Land Mobile Network
EPS	Enhanced Packet System
FDD	Frequency Division Duplex
FFS	For Further Study
GERAN	GSM/EDGE Radio Access Network
GSM	Global System for Mobile Communications
HARQ	Hybrid Automatic Repeat Request
HPLMN	Home Public Land Mobile Network
HRPD	CDMA2000 High Rate Packet Data
IE	Information element
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
kB	Kilobyte (1000 bytes)
L1	Layer 1
L2	Layer 2
L3	Layer 3
MAC	Medium Access Control
MBMS	Multimedia Broadcast Multicast Service
MBSFN	Multimedia Broadcast multicast service Single Frequency Network
MDT	Minimization of Drive Tests
MIB	Master Information Block
MO	Mobile Originating
MT	Mobile Terminating
MRB	MBMS Point to Multipoint Radio Bearer
MSI	MCH Scheduling Information
N/A	Not Applicable
NACC	Network Assisted Cell Change
NAS	Non Access Stratum
PCCH	Paging Control Channel
PCell	Primary Cell
PDU	Protocol Data Unit
PDCP	Packet Data Convergence Protocol
PLMN	Public Land Mobile Network
QoS	Quality of Service
RACH	Random Access CHannel
RAT	Radio Access Technology
RB	Radio Bearer
RLC	Radio Link Control
RN	Relay Node
RNTI	Radio Network Temporary Identifier
RPLMN	Registered Public Land Mobile Network
RRC	Radio Resource Control
RSCP	Received Signal Code Power
RSRP	Reference Signal Received Power
RSSI	Received Signal Strength Indicator
SAE	System Architecture Evolution
SAP	Service Access Point
SCell	Secondary Cell
SFN	System Frame Number
SI	System Information

SIB	System Information Block
SI-RNTI	System Information RNTI
SPS	Semi-Persistent Scheduling
SRB	Signalling Radio Bearer
SSAC	Service Specific Access Control
S-TMSI	SAE Temporary Mobile Station Identifier
TA	Tracking Area
TDD	Time Division Duplex
TM	Transparent Mode
TPC-RNTI	Transmit Power Control RNTI
UE	User Equipment
UICC	Universal Integrated Circuit Card
UL	Uplink
UM	Unacknowledged Mode
UL-SCH	Uplink Shared Channel
UP	User Plane
UTRAN	Universal Terrestrial Radio Access Network
VoLTE	Voice over Long Term Evolution

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.

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.
  - 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;
  - Network controlled mobility, i.e. handover and cell change order with optional network assistance (NACC) to GERAN;
  - 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;
    - Monitors control channels associated with the shared data channel to determine if data is scheduled for it;
    - Provides channel quality and feedback information;
    - Performs neighbouring cell measurements and measurement reporting;
    - Acquires system information.

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.

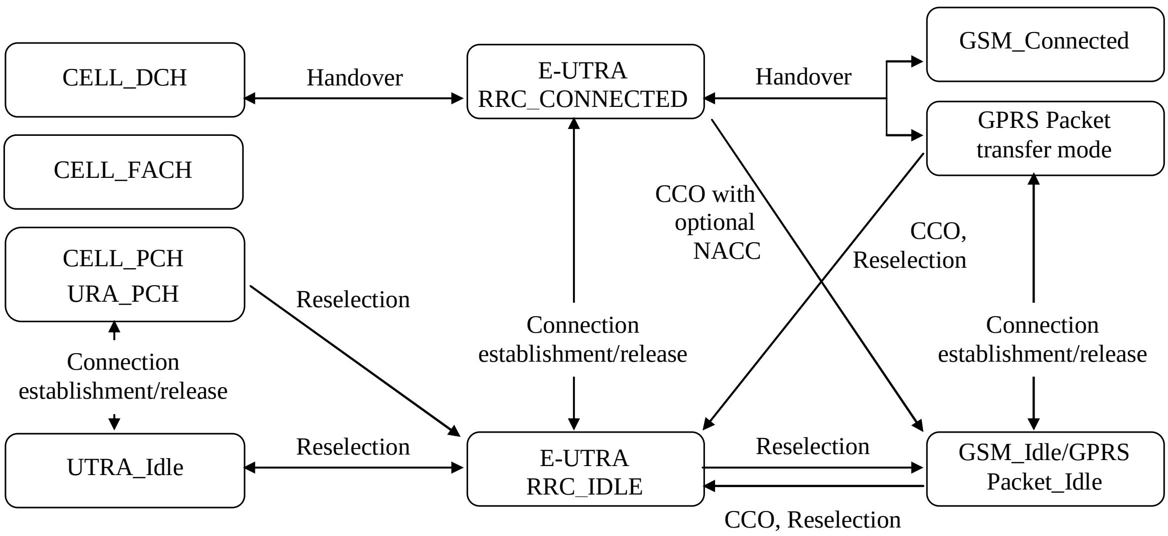

Figure 4.2.1-1: E-UTRA states and inter RAT mobility procedures, 3GPP

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.

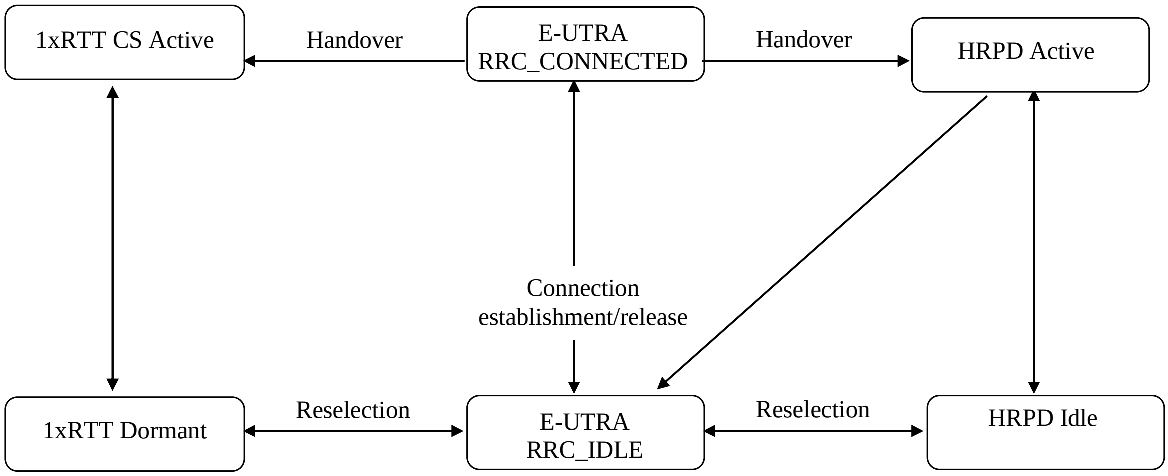

Figure 4.2.1-2: Mobility procedures between E-UTRA and CDMA2000

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).

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 three 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;
- 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.

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.

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;
- RRC connection control:
  - Paging;
  - Establishment/ modification/ release of RRC connection, including e.g. assignment/ modification of UE identity (C-RNTI), establishment/ modification/ release of SRB1 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;
  - 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 and addition/ modification/ release of SCell(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;
    - Recovery from radio link failure;
- Inter-RAT mobility including e.g. security activation, transfer of RRC context information;
- Measurement configuration and reporting:
    - 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;
- Support of measurement logging and reporting for network performance optimisation [60];

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

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 and sub-clause 5.9 covers RN-specific procedures.

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 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;

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.

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, only SIBs having the same scheduling requirement (periodicity) can be mapped to the same SI message, and *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.

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].

The UE applies the system information acquisition and change monitoring procedures for the PCell only. For an SCell, E-UTRAN provides, via dedicated signalling, all system information relevant for operation in RRC_CONNECTED when adding the SCell. 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.

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

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 acquisition procedure. The dedicated system information remains valid 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.

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.

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]).

A single SI-RNTI is used to address *SystemInformationBlockType1* as well as all SI messages.

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

5.2.1.3 System information validity and notification of changes

Change of system information (other than for ETWS and CMAS) 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.

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 acquires the new system information immediately from the start of the next modification period. The UE applies the previously acquired system information until the UE acquires the new system information.

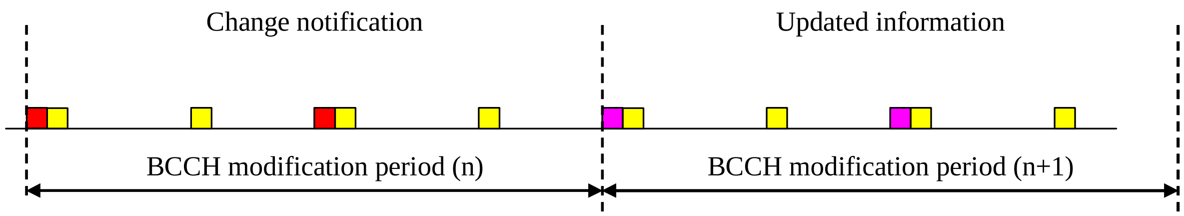

Figure 5.2.1.3-1: Change of system Information

The *Paging* message is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about a system information change. If the UE receives a *Paging* message including the *systemInfoModification*, it knows that the system information will change at the next modification 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.

SystemInformationBlockType1 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, the UE considers stored system information to be invalid after 3 hours from the moment it was successfully confirmed as valid, unless specified otherwise.

E-UTRAN may not update *systemInfoValueTag* upon change of some system information e.g. ETWS information, CMAS information, regularly changing parameters like CDMA2000 system time (see 6.3). Similarly, E-UTRAN may not include the *systemInfoModification* within the *Paging* message upon change of some system information.

The UE verifies that stored system information remains valid by either checking *systemInfoValueTag* in *SystemInformationBlockType1* after the modification period boundary, or attempting to find the *systemInfoModification* indication at least *modificationPeriodCoeff* 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 *systemInfoModification* whether a change of system information other than ETWS and CMAS information will occur in the next modification period or not.

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 re-acquire *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 re-acquire *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].

5.2.2 System information acquisition

5.2.2.1 General

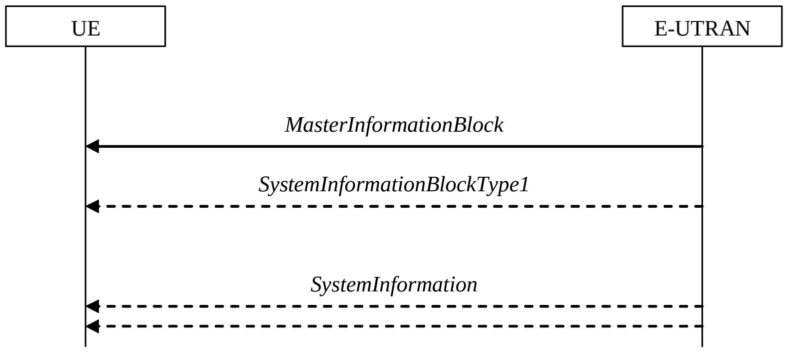

Figure 5.2.2.1-1: System information acquisition, normal

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.

5.2.2.2 Initiation

The UE shall apply the system information acquisition procedure upon selecting (e.g. upon power on) and upon re-selecting 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 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.

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> the *MasterInformationBlock* and *SystemInformationBlockType1* as well as *SystemInformationBlockType2* through *SystemInformationBlockType8*, depending on support of the concerned RATs;

2> if in RRC_CONNECTED:

3> the *MasterInformationBlock*, *SystemInformationBlockType1* and *SystemInformationBlockType2* as well as *SystemInformationBlockType8*, depending on support of CDMA2000;

1> delete any stored system information after 3 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* and *systemInformationBlockType12* to be invalid if *systemInfoValueTag* included in the *SystemInformationBlockType1* is different from the one of the stored system information;

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;

1> if the procedure is triggered by a system information change notification:

2> 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 procedure nor initiate transmission of the *RRCConnectionReestablishmentRequest* message until the UE has a valid version of the *MasterInformationBlock* and *SystemInformationBlockType1* messages as well as *SystemInformationBlockType2* ;

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> 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; and

1> if *schedulingInfoList* indicates that *SystemInformationBlockType13* is present and the UE does not have stored a valid version of this system information block:

2> aquire *SystemInformationBlockType13*;

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 4: 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* or the *SystemInformationBlockType1*:

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*:

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;

5.2.2.7 Actions upon reception of the *SystemInformationBlockType1* message

Upon receiving the *SystemInformationBlockType1* message the UE shall:

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; 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:

3> forward the *cellIdentity* to upper layers;

3> forward the *trackingAreaCode* to upper layers;

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 *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 *additionalSpectrumEmission* in *SystemInformationBlockType2* 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*;

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 timer 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 *multiNS-Pmax*:

2> disregard the *additionalSpectrumEmission* and *ul-CarrierFreq*, if received, while in RRC_CONNECTED;

5.2.2.10 Actions upon reception of *SystemInformationBlockType3*

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.

5.2.2.11 Actions upon reception of *SystemInformationBlockType4*

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.

5.2.2.12 Actions upon reception of *SystemInformationBlockType5*

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.

5.2.2.13 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 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> forward the *ac-BarringConfig1XRTT* to CDMA2000 upper layers, if included;

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 *warningType*, *messageIdentifier* and *serialNumber* 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 s*erialNumber* 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.

5.2.3 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;

5.3 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.

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.

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.

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 and/ or connection re-establishment.

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 and connection re-establishment. The *keyChangeIndicator* is used upon handover and indicates whether the UE should use the keys associated with the latest available K_{ASME} key. The *nextHopChainingCount* parameter is used upon handover and connection re-establishment 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. 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.

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*. 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.

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. 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. 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, 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. cell global 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).

5.3.2 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 in RRC_CONNECTED about a system information change and/ or;
- to inform about an ETWS primary notification and/ or ETWS secondary notification and/ or;
- to inform about a CMAS notification.

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 the *cn-Domain* to the upper layers;

1> if the *systemInfoModification* 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*;

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*;

5.3.3 RRC connection establishment

5.3.3.1 General

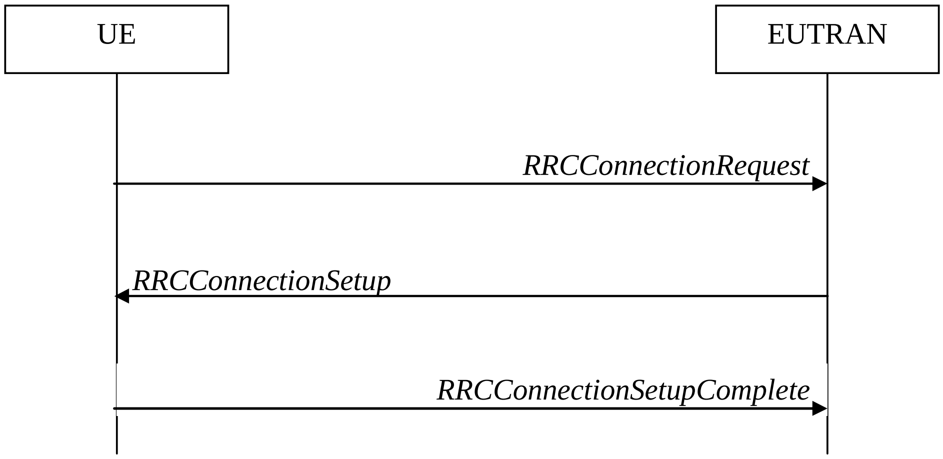

Figure 5.3.3.1-1: RRC connection establishment, successful

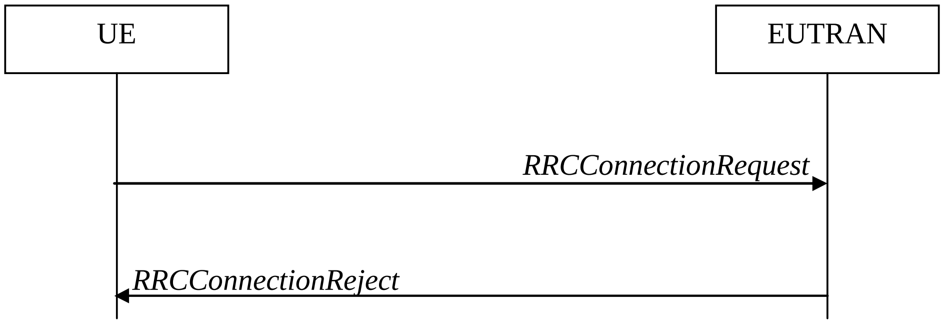

Figure 5.3.3.1-2: RRC connection establishment, network reject

The purpose of this procedure is to establish an RRC connection. RRC connection establishment involves SRB1 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:

- to establish SRB1 only.

5.3.3.2 Initiation

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

Upon initiation of the procedure, the UE shall:

1> 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 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, 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 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 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 and that access barring for mobile originating signalling is applicable, upon which the procedure ends;

1> else (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 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 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> 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> 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.

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> set the *establishmentCause* in accordance with the information received from upper layers;

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.

5.3.3.4 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];

The UE shall:

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> 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> perform the actions as specified in 5.3.3.7;

1> stop timer T320, 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> 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> 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 connecting as an RN:

3> include the *rn-SubframeConfigReq*;

2> set the *dedicatedInfoNAS* to include the information received from upper layers;

2> if the UE has radio link failure or handover failure information available in VarRLF-Report and *plmn-Identity* stored in *VarRLF-Report* is equal to the RPLMN:

3> include *rlf-InfoAvailable*;

2> if the UE has logged measurements available for E-UTRA and *plmn-Identity* stored in *VarLogMeasReport* is equal to the RPLMN:

3> include *logMeasAvailable*;

2> submit the *RRCConnectionSetupComplete* message to lower layers for transmission, upon which the procedure ends;

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

The UE shall:

1> if cell reselection occurs while T300, T302, T303, T305 or T306 is running:

2> if timer T302, T303, T305 and/ or T306 is running:

3> stop timer T302, T303, T305 and T306, 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;

5.3.3.6 T300 expiry

The UE shall:

1> if timer T300 expires:

2> reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;

2> inform upper layers about the failure to establish the RRC connection, upon which the procedure ends;

5.3.3.7 T302, T303, T305 or T306 expiry or stop

The UE shall:

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;

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;

5.3.3.8 Reception of the *RRCConnectionReject* by the UE

The UE shall:

1> stop timer T300;

1> reset MAC and release the MAC configuration;

1> start timer T302, with the timer value set to the *waitTime*;

1> if the *extendedWaitTime* is present and the UE supports delay tolerant access:

2> forward the *extendedWaitTime* to upper layers;

1> 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 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> set the local variables *BarringFactorForMMTEL-Voice* and *BarringTimeForMMTEL-Voice* as follows:

2> if the UE is in RRC_IDLE and *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 the UE is in RRC_IDLE and *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: $0 \leq rand < 1$;

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 $0 \leq rand < 1$;

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*.

5.3.4 Initial security activation

5.3.4.1 General

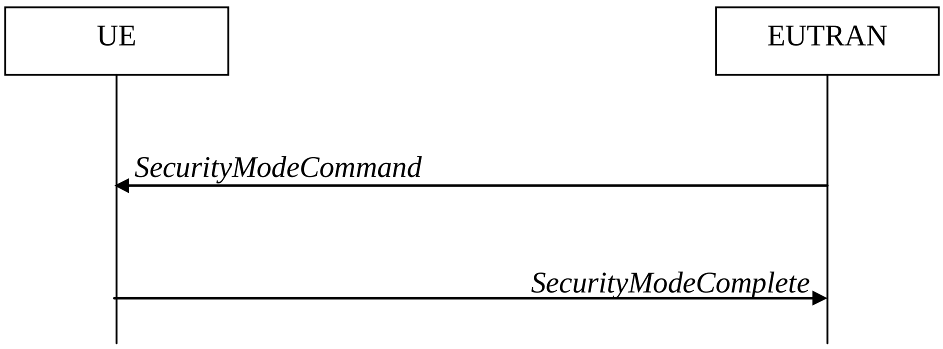

Figure 5.3.4.1-1: Security mode command, successful

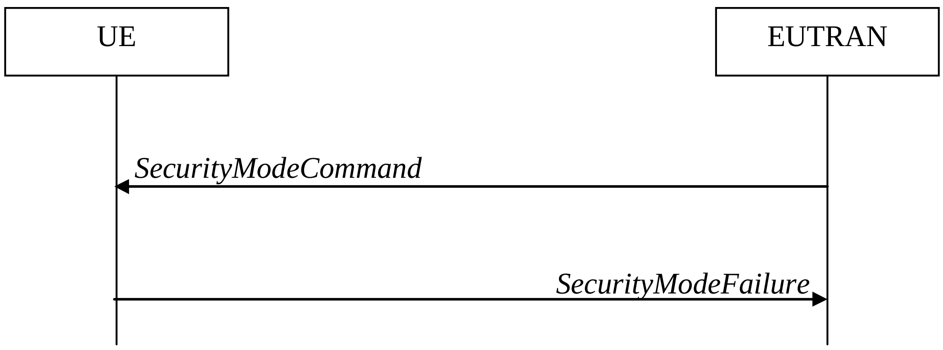

Figure 5.3.4.1-2: Security mode command, failure

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 is established, i.e. prior to establishment of SRB2 and/ or DRBs.

5.3.4.3 Reception of the *SecurityModeCommand* by the UE

The UE shall:

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> 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

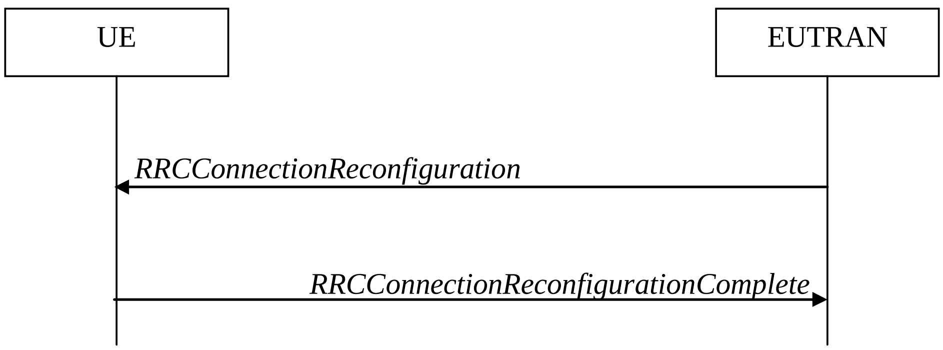

Figure 5.3.5.1-1: RRC connection reconfiguration, successful

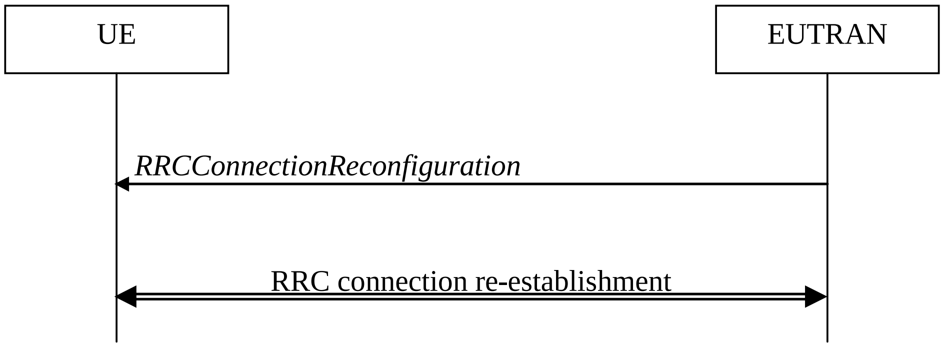

Figure 5.3.5.1-2: RRC connection reconfiguration, failure

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 section 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 *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 *RRCConnectionReconfiguratio*n message includes the *reportProximityConfig*:

2> perform the proximity indication in accordance with the received *reportProximityConfig*;

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> start timer T304 with the timer value set to *t304*, as included in the *mobilityControlInfo*;

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> reset MAC;

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 RLC for all RBs that are established;

1> configure lower layers to consider the SCell(s), 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 section 5.3.5.8;

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> 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 fresh K_{ASME} key taken into use with the previous 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 *sCellToReleaseList*:

2> perform SCell release as specified in 5.3.10.3a;

1> if the received *RRCConnectionReconfiguration* includes the s*CellToAddModList*:

2> perform SCell addition or modification as specified in 5.3.10.3b;

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 *reportProximityConfig*:

2> perform the proximity indication in accordance with the received *reportProximityConfig*;

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 *plmn-Identity* stored in *VarRLF-Report* is equal to the RPLMN:

3> include *rlf-InfoAvailable*;

2> if the UE has logged measurements available for E-UTRA and *plmn-Identity* stored in *VarLogMeasReport* is equal to the RPLMN:

3> include the *logMeasAvailable*;

1> submit the *RRCConnectionReconfigurationComplete* message to lower layers for transmission;

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 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> 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.

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)

The UE shall:

1> if T304 expires (handover failure):

NOTE: 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*;

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-Identity* to 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;

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 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*;

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 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*';

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 2: 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

5.3.5.8 Radio Configuration involving full configuration option

The UE shall:

1> release/ clear all current dedicated radio configurations except the C-RNTI, the 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*;

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> 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.

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

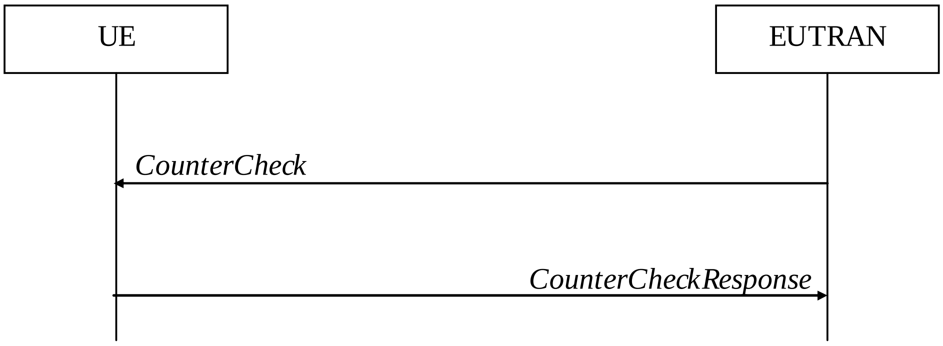

Figure 5.3.6.1-1: Counter check procedure

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

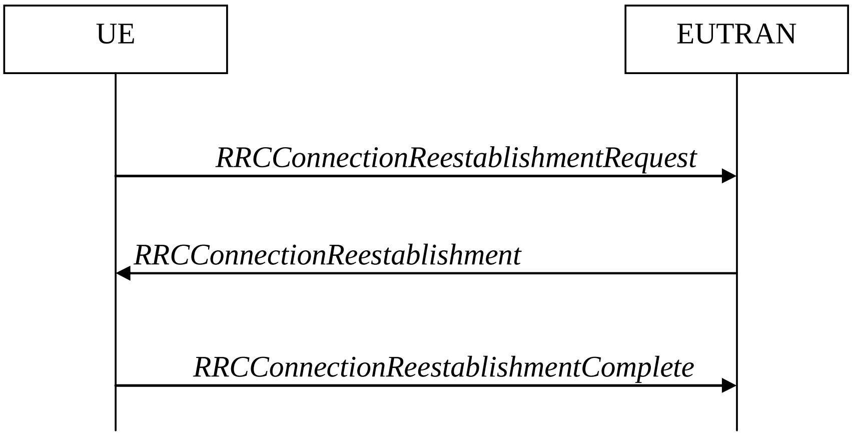

Figure 5.3.7.1-1: RRC connection re-establishment, successful

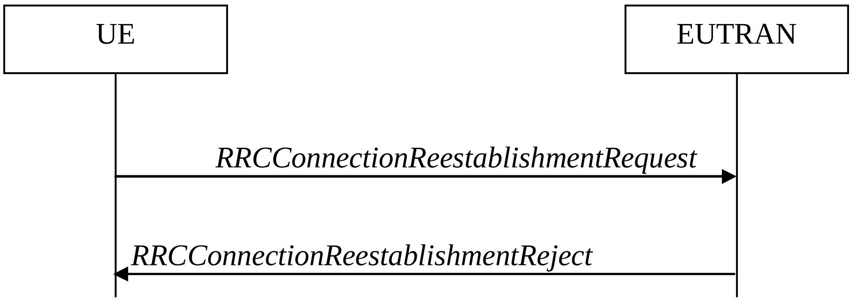

Figure 5.3.7.1-2: RRC connection re-establishment, failure

The purpose of this procedure is to re-establish the RRC connection, which involves the resumption of SRB1 operation, the re-activation of security and the configuration of only the PCell.

A UE in RRC_CONNECTED, for which security has been activated, may initiate the procedure in order to continue the RRC connection. The connection re-establishment 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.

E-UTRAN applies the procedure as follows:

- to reconfigure SRB1 and to resume data transfer only for this RB;

- to re-activate AS security without changing algorithms.

5.3.7.2 Initiation

The UE shall only initiate the procedure when AS security has been activated. 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> start timer T311;

1> suspend all RBs except SRB0;

1> reset MAC;

1> release the 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> 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> release *reportProximityConfig* and clear any associated proximity status reporting timer;

1> release *measSubframePatternPCell*, if configured;

1> if connected as an RN and configured with an RN subframe configuration:

2> release the RN subframe configuration;

1> perform cell selection in accordance with the cell selection process as specified in TS 36.304 [4];

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> 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> 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

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> 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*;

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

The UE shall:

1> stop timer T301;

1> consider the current cell to be the PCell;

1> re-establish PDCP for SRB1;

1> re-establish RLC for SRB1;

1> perform the radio resource configuration procedure in accordance with the received *radioResourceConfigDedicated* and as specified in 5.3.10;

1> resume SRB1;

NOTE: E-UTRAN should not transmit any message on SRB1 prior to receiving the *RRCConnectionReestablishmentComplete* message.

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 *RRCConnectionReestablishment* 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> 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> if connected as an RN:

2> derive the K_{UPint} key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

1> 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;

1> if connected as an RN:

2> 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;

1> 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;

1> set the content of *RRCConnectionReestablishmentComplete* message as follows:

2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and *plmn-Identity* stored in *VarRLF-Report* is equal to the RPLMN:

3> include the *rlf-InfoAvailable*;

2> if the UE has logged measurements available for E-UTRA and *plmn-Identity* stored in *VarLogMeasReport* is equal to the RPLMN:

3> include the *logMeasAvailable*;

1> perform the measurement related actions as specified in 5.5.6.1;

1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;

1> submit the *RRCConnectionReestablishmentComplete* message to lower layers for transmission, upon which 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

The UE shall:

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

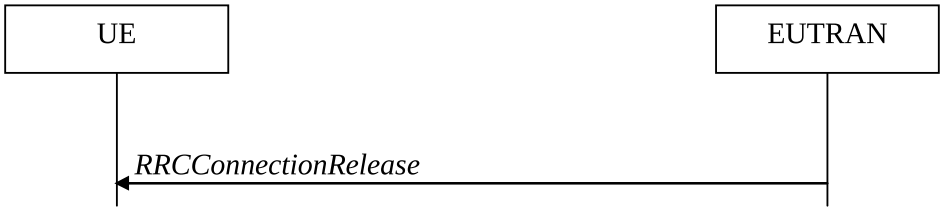

Figure 5.3.8.1-1: RRC connection release, successful

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.

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> 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> 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> if the *releaseCause* 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 *releaseCause* 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 the UE supports delay tolerant access:

3> forward the *extendedWaitTime* to upper layers;

2> 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;

5.3.9 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

The UE shall:

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;

5.3.10.1 SRB addition/ modification

The UE shall:

1> for each *srb-Identity* value included in the *srb-ToAddModList* that is not part of the current UE configuration (SRB establishment):

2> apply the specified configuration defined in 9.1.2 for the corresponding SRB;

2> establish a PDCP entity and configure it with the current security configuration, if applicable;

2> establish an RLC entity in accordance with the received *rlc-Config*;

2> establish a DCCH logical channel in accordance with the received *logicalChannelConfig* and with the logical channel identity set in accordance with 9.1.2;

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

The UE shall:

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

The UE shall:

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> establish a PDCP entity and configure it with the current security configuration and in accordance with the received *pdcp-Config*;

2> establish an RLC entity or entities in accordance with the received *rlc-Config*;

2> establish a DTCH logical channel in accordance with the received *logicalChannelIdentity* and the received *logicalChannelConfig*;

1> if the *RRCConnectionReconfiguration* message includes the *fullConfig* IE:

2> associate the established DRB with corresponding included *eps-BearerIdentity*;

1> else:

2> 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 *pdcp-Config* is included:

3> reconfigure the PDCP entity in accordance with the received *pdcp-Config*;

2> if the *rlc-Config* is included:

3> reconfigure the RLC entity or entities in accordance with the received *rlc-Config*;

2> if the *logicalChannelConfig* is included:

3> reconfigure the DTCH logical channel in accordance with the received *logicalChannelConfig*;

NOTE: Removal and addition of the same *drb-Identity* in single *radioResourceConfiguration* is not supported.

5.3.10.3a SCell release

The UE shall:

1> if the release is triggered by reception of the *sCellToReleaseList*:

2> for each *sCellIndex* value included in the *sCellToReleaseList*:

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

The UE shall:

1> for each *sCellIndex* value included in the *sCellToAddModList* that is not part of the current UE configuration (SCell addition):

2> add the SCell, corresponding to the *cellIdentification*, in accordance with the received *radioResourceConfigCommonSCell* and *radioResourceConfigDedicatedSCell*;

2> configure lower layers to consider the SCell to be in deactivated state;

1> for each *sCellIndex* value included in the *sCellToAddModList* that is part of the current UE configuration (SCell modification):

2> modify the SCell configuration in accordance with the received *radioResourceConfigDedicatedSCell*;

5.3.10.4 MAC main reconfiguration

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

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 section 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 *antennaInfo* is included and set to *explicitValue*:

2> if the configured *transmissionMode* is not *tm3* or *tm4* or *tm8* or *tm9*; 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;

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*;

1> else:

2> reconfigure the value of timers and constants in accordance with received *rlf-TimersAndConstants*;

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;*

5.3.11 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;

NOTE: Physical layer monitoring and related autonomous actions do not apply to SCells.

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;

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.

5.3.11.3 Detection of radio link failure

The UE shall:

1> upon T310 expiry; or

1> upon random access problem indication from MAC while neither T300, T301, T304 nor T311 is running; or

1> upon indication from RLC that the maximum number of retransmissions has been reached:

2> consider radio link failure to be detected;

2> 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-Identity* to 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*;

NOTE: 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> if an *RRCConnectionReconfiguration* message including the *mobilityControlInfo* concerning an intra E-UTRA handover was received before the connection failure:

4> include *previousPCellId* and set it to the global cell identity of the PCell where the last *RRCConnectionReconfiguration* including the *mobilityControlInfo* message was received;

4> set the *timeConnFailure* to the elapsed time since reception of the last *RRCConnectionReconfiguration* message including the *mobilityControlInfo*;

3> set the *connectionFailureType* to *rlf*;

2> if AS 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;

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.

5.3.12 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 and T330;

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

1> 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> enter RRC_IDLE and perform procedures as specified in TS 36.304 [4, 5.2.7];

5.3.13 UE actions upon PUCCH/ SRS release request

Upon receiving a PUCCH/ SRS release request from lower layers, the UE shall:

1> apply the default physical channel configuration for *cqi-ReportConfig* as specified in 9.2.4 and release *cqi-ReportConfigSCell*, for each SCell that is configured, if any;

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

1> apply the default physical channel configuration for *schedulingRequestConfig* 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

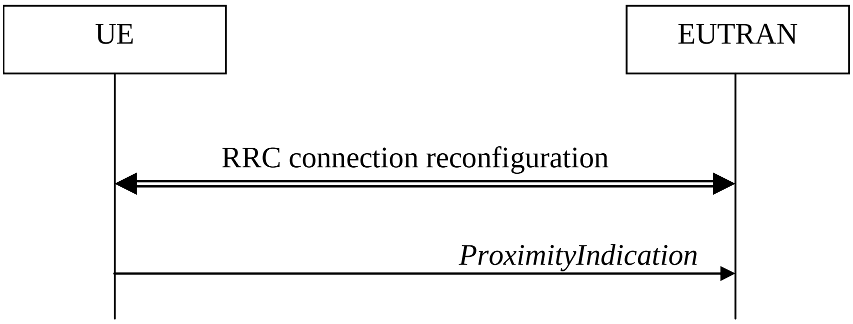

Figure 5.3.14.1-1: Proximity indication

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.

5.4 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

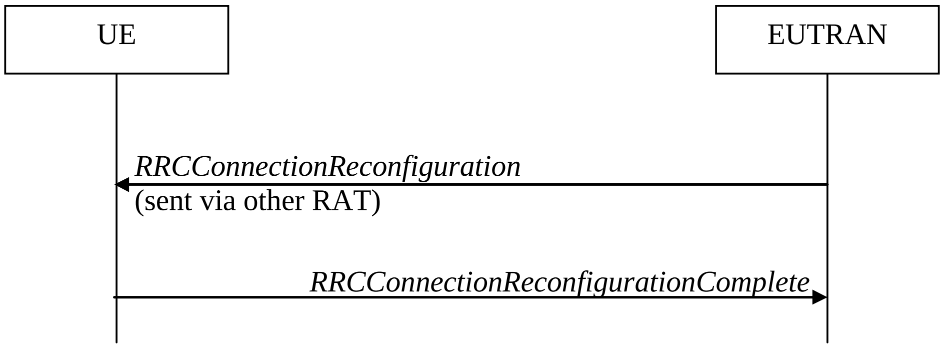

Figure 5.4.2.1-1: Handover to E-UTRA, successful

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 s*CellToAddModList*:

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 *reportProximityConfig*:

2> perform the proximity indication configuration in accordance with the received *reportProximityConfig*;

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 *plmn-Identity* stored in *VarRLF-Report* is equal to the RPLMN:

3> include *rlf-InfoAvailable*;

2> if the UE has logged measurements available for E-UTRA and *plmn-Identity* stored in *VarLogMeasReport* is equal to the RPLMN:

3> include the *logMeasAvailable*;

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

The UE shall:

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

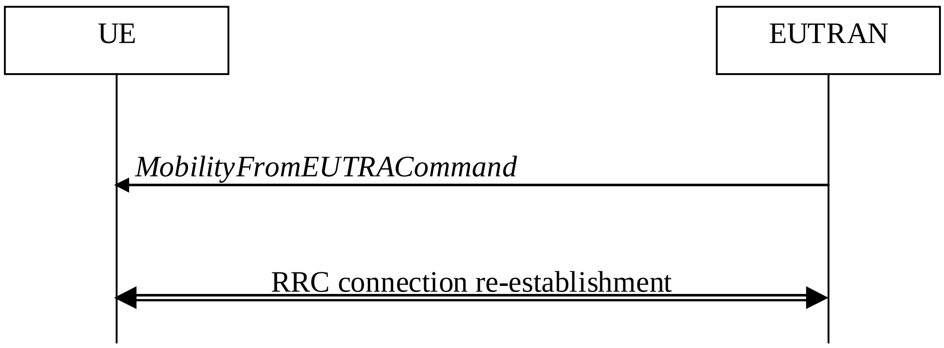

Figure 5.4.3.1-2: Mobility from E-UTRA, failure

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.

The UE shall:

1> stop timer T310, 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 *redirectedCarrierInfoCDMA2000-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.

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

The UE shall:

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*:

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

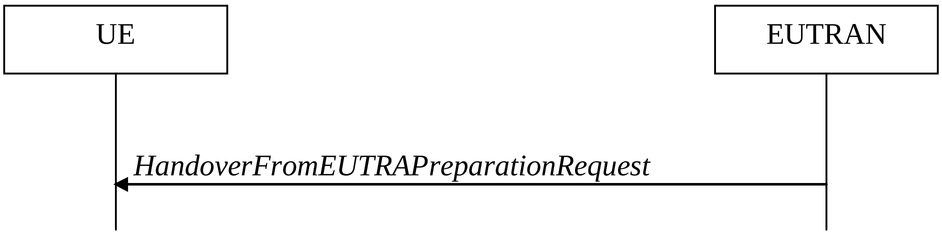

Figure 5.4.4.1-1: Handover from E-UTRA preparation request

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

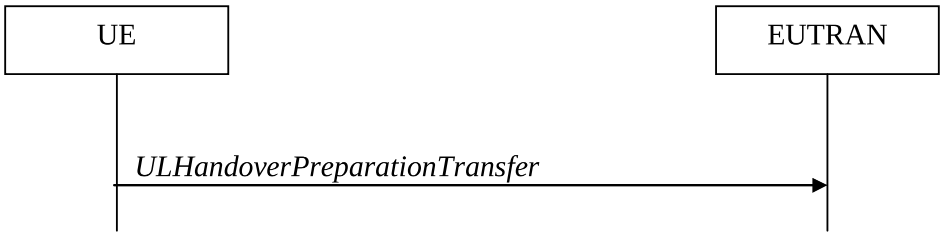

Figure 5.4.5.1-1: UL handover preparation transfer

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* 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 frequencies.

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 and a list of 'blacklisted' 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.

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.

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, 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).

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).

For E-UTRA, the UE measures and reports on the serving cell(s), listed cells and detected cells. 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.

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;

The UE shall:

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 *measConfig* includes the *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*:

2> perform the measurement gap configuration procedure as specified in 5.5.2.9;

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*;

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

The UE shall:

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:

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 and A6.

NOTE 2: When performed during re-establishment, the UE is only configured with a primary frequency (i.e. the SCell(s) 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> 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

The UE shall:

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

The UE shall:

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> replace the entry with the value received for this *measObject*, except for the fields *cellsToAddModList*, *blackCellsToAddModList*, *cellsToRemoveList*, *blackCellsToRemoveList* and *measSubframePatternConfigNeigh*;

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*;

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 *measSubframePatternConfigNeigh*:

4> set *measSubframePatternConfigNeigh* within the *VarMeasConfig* to the value of the received field

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*;

2> else:

3> add a new entry for the received *measObject* to the *measObjectList* within *VarMeasConfig*;

5.5.2.6 Reporting configuration removal

The UE shall:

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> replace 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 is already setup, release the measurement gap configuration;

2> 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 mod T = FLOOR(*gapOffset*/10);

subframe = *gapOffset* mod 10;

with T = MGRP/10 as defined in TS 36.133 [16];

1> else:

2> release the measurement gap configuration;

5.5.3 Performing measurements

5.5.3.1 General

For all measurements 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, applying for the PCell the time domain measurement resource restriction in accordance with *measSubframePatternPCell*, if configured;

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 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;

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> 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:

5> perform the corresponding measurements of neighbouring cells on the frequencies and RATs indicated in the concerned *measObject*, applying for neighbouring cells on the primary frequency the time domain measurement resource restriction in accordance with *measSubframePatternConfigNeigh*, 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;

2> perform the evaluation of reporting criteria as specified in 5.5.4;

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].

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 measurements i.e. for those type 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 *filterCoefficent* 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 *filterCoefficent* 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:

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 *eventA1* or *eventA2* is configured in the corresponding *reportConfig*:

5> consider only the serving cell to be applicable;

4> else:

5> 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;

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*;

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 an 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> 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> 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 *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 *purpose* is included and set to *reportStrongestCells* or to *reportStrongestCellsForSON* 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;

NOTE 1: If the *purpose* is set to *reportStrongestCells* and *reportAmount* > 1, the UE initiates a first measurement report immediately after the quantity to be reported becomes available for the PCell. If the *purpose* is set to *reportStrongestCells* and *reportAmount* = 1, the UE initiates a first measurement report immediately after the quantity to be reported becomes available for the PCell and for the strongest cell among the applicable cells. If the purpose is set to *reportStrongestCellsForSON*, the UE initiates a first measurement report 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.

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.

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)

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;

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

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, not taking into account any offsets.

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

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

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.

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.

Ofn, Ocn, Hys are expressed in dB.

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

5.5.4.6 Event A5 (PCell 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;

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

Inequality A5-1 (Entering condition 1)

$$Mp + Hys < Thresh1$$

Inequality A5-2 (Entering condition 2)

$$Mn + Ofn + Ocn - Hys > Thresh2$$

Inequality A5-3 (Leaving condition 1)

$$Mp - Hys > Thresh1$$

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, 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.

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.

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)

$$Mp + Hys < Thresh1$$

Inequality B2-2 (Entering condition 2)

$$Mn + Ofn - Hys > Thresh2$$

Inequality B2-3 (Leaving condition 1)

$$Mp - Hys > Thresh1$$

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***.

5.5.5 Measurement reporting

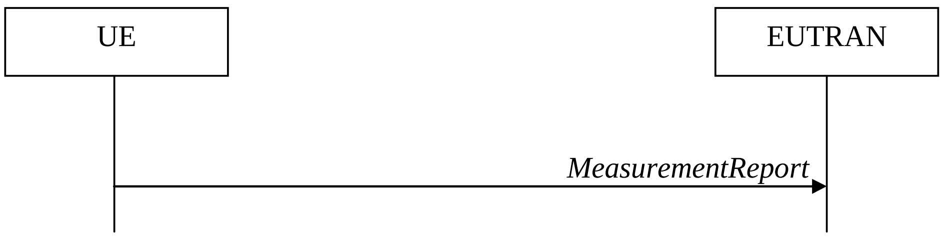

Figure 5.5.5-1: Measurement reporting

The purpose of this procedure is to transfer measurement results from the UE to E-UTRAN. 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];

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: 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 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 that have been successfully acquired, except for the *plmn-IdentityList*;

5> else:

6> include the *cgi-Info* containing all the fields that have been successfully acquired;

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 *includeLocationInfo* is configured in the corresponding *reportConfig* for this *measId* 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*;

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> 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 sub-clause 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

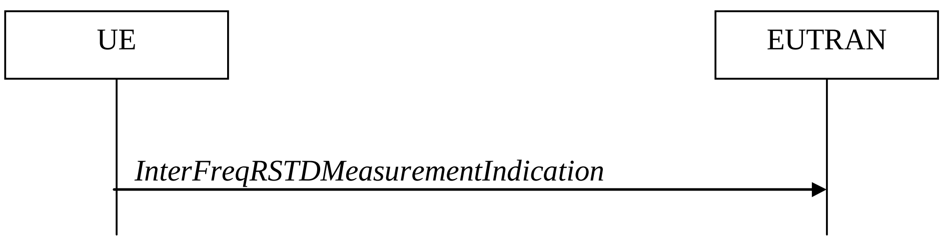

Figure 5.5.7.1-1: Inter-frequency RSTD measurement indication

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].

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> set the *rstd-InterFreqIndication* as follows:

2> if the procedure is initiated to indicate start of inter-frequency RSTD measurements:

3> set the *rstd-InterFreqInfoList* according to the information received from upper layers;

2> else if the procedure is initiated to indicate stop of inter-frequency RSTD measurements:

3> 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

5.6.1 DL information transfer

5.6.1.1 General

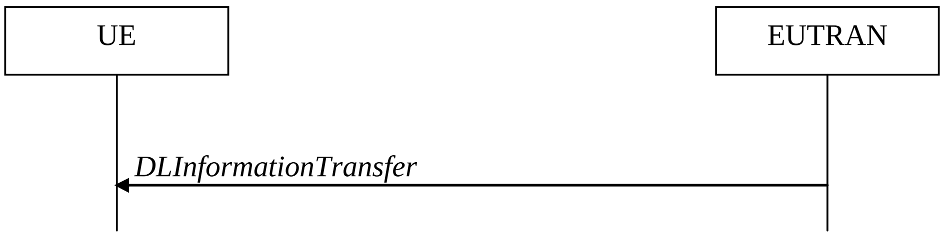

Figure 5.6.1.1-1: DL information transfer

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 *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

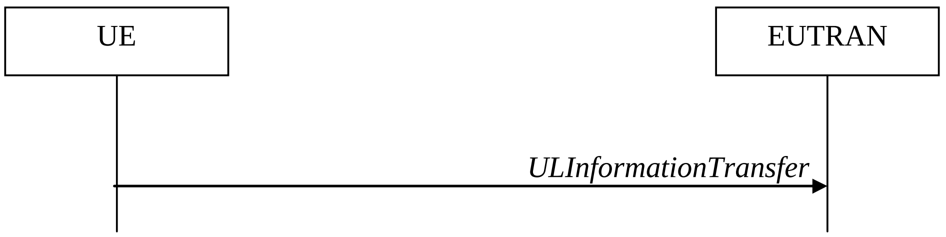

Figure 5.6.2.1-1: UL information transfer

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 in which case the NAS information is piggybacked to the *RRCConnectionSetupComplete* message. 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> 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> 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 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

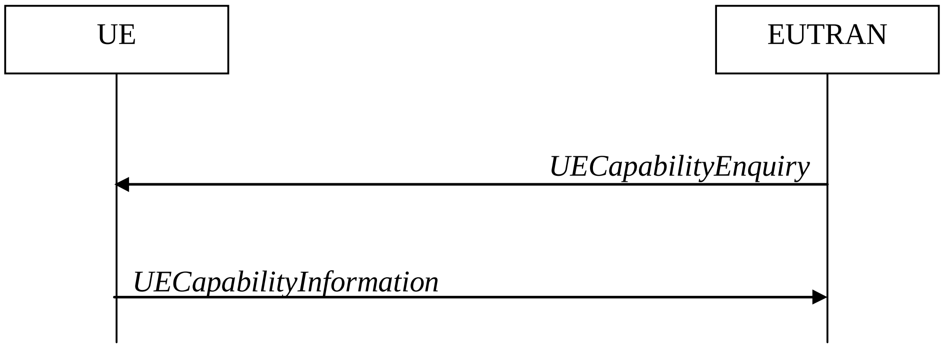

Figure 5.6.3.1-1: UE capability transfer

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> 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: 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 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 that are not allowed to be different the same as the *Common value*;

- the sub-fields 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;

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

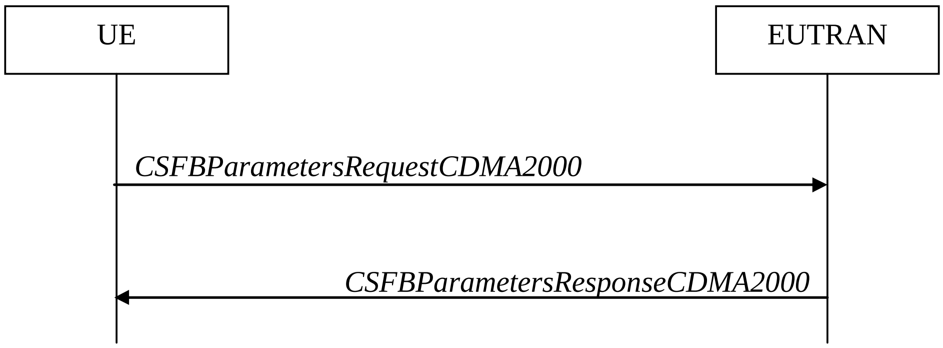

Figure 5.6.4.1-1: CSFB to 1x Parameter transfer

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

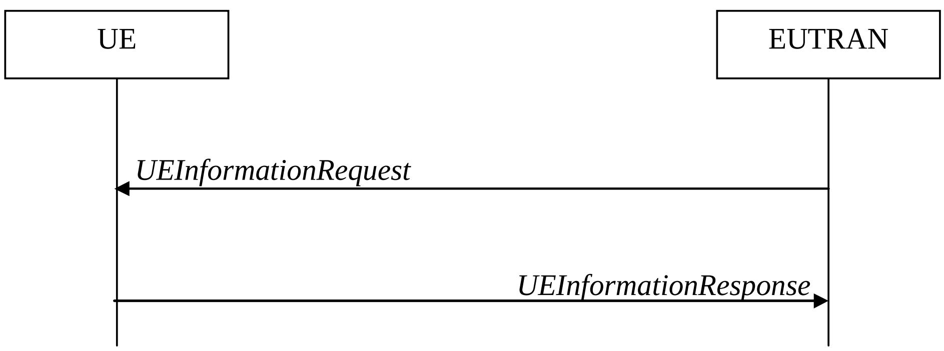

Figure 5.6.5.1-1: UE information procedure

The UE information procedure is used by E-UTRAN to request the UE to report information. E-UTRAN should initiate this procedure only after successful security activation.

5.6.5.2 Initiation

E-UTRAN initiates the procedure by sending the *UEInformationRequest* message.

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 *plmn-Identity* stored in *VarRLF-Report* is equal to the RPLMN, set the *rlf-Report* in the *UEInformationResponse* message to the value of *rlf-Report* in *VarRLF-Report*;

1> if the *rlf-Report* is included in *UEInformationResponse*:

2> discard the *rlf-Report* from *VarRLF-Report* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers.

1> if the *logMeasReportReq* is present and the *plmn-Identity* stored in *VarLogMeasReport* is equal to the RPLMN:

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 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

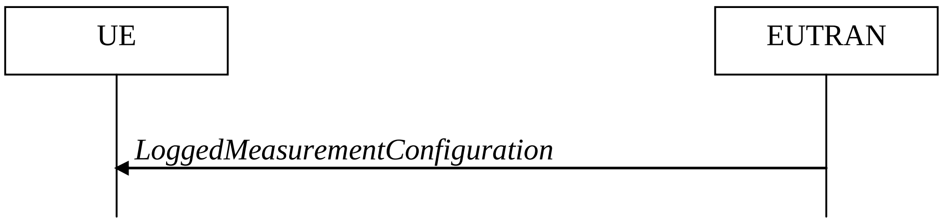

Figure 5.6.6.1-1: Logged measurement configuration

The purpose of this procedure is to configure the UE to perform logging of measurement results while in RRC_IDLE. 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 *loggingDuration*, *loggingInterval* and *areaConfiguration*, if included, in *VarLogMeasConfig*;

1> store the RPLMN as *plmn-Identity* in *VarLogMeasReport*;

1> store the received *absoluteTimeInfo, traceReference, traceRecordingSessionRef* and *tce-Id* in *VarLogMeasReport*;

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.

5.6.8.2 Initiation

While T330 is running, the UE shall:

1> perform the logging in accordance with the following:

2> if the UE is camping normally on an E-UTRA cell and the RPLMN of the UE is the same as the *plmn-Identity* 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 following:

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> set the *servCellIdentity* to indicate global cell identity of the cell the UE is camping on;

3> set the *measResultServCell* to include the quantities of the cell the UE is camping on;

3> 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 as well as 3 inter-RAT neighbours, per frequency/ set of frequencies (GERAN) per RAT;

NOTE: 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].

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;

5.7 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, PCCH, CCCH, or MCCH 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 ::=            SEQUENCE (SIZE (1..max)) OF ItemInfo


ItemInfo ::=                SEQUENCE {
    itemIdentity                INTEGER (1..max),
    field1                      Field1,
    field2                      Field2          OPTIONAL,       -- Need ON
    ...
    [[  field3-r9               Field3-r9       OPTIONAL,       -- Cond Cond1
        field4-r9               Field4-r9       OPTIONAL        -- Need ON
    ]]
}


-- Example with traditional non-critical extension (empty sequence)
```

```
BroadcastInfoBlock1 ::=              SEQUENCE {
    itemIdentity                     INTEGER (1..max),
    field1                           Field1,
    field2                           Field2              OPTIONAL,        -- Need ON
    nonCriticalExtension             BroadcastInfoBlock1-v940-IEs OPTIONAL
}

BroadcastInfoBlock1-v940-IEs::=      SEQUENCE {
    field3-r9                        Field3-r9           OPTIONAL,        -- Cond Cond1
    field4-r9                        Field4-r9           OPTIONAL,        -- Need ON
    nonCriticalExtension             SEQUENCE {}             OPTIONAL         -- Need OP
}


-- ASN1STOP
```

The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension additon 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.

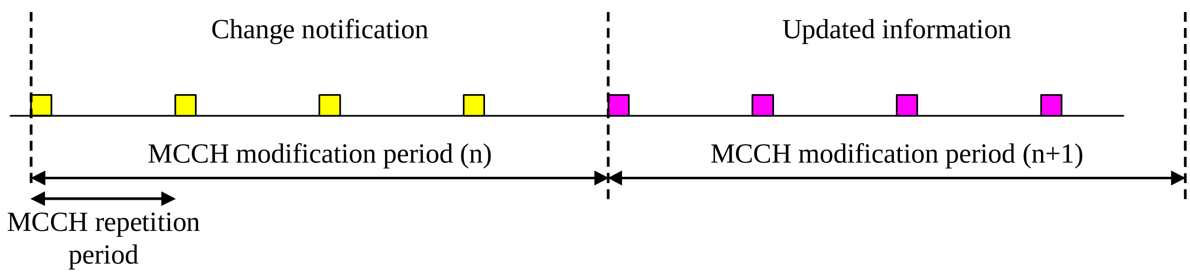

Figure 5.8.1.3-1: Change of MCCH Information

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. 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 shall acquire the MCCH information from the start of each modification period. A UE that is not receiving an MBMS service, as well as UEs that are receiving an MBMS service but potentially interested to receive other services not started yet in another MBSFN area, 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

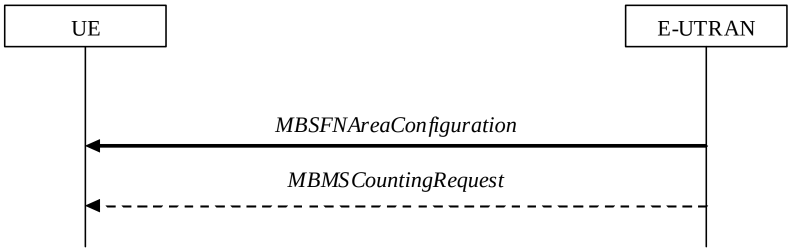

Figure 5.8.2.1-1: MCCH information acquisition

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 section 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

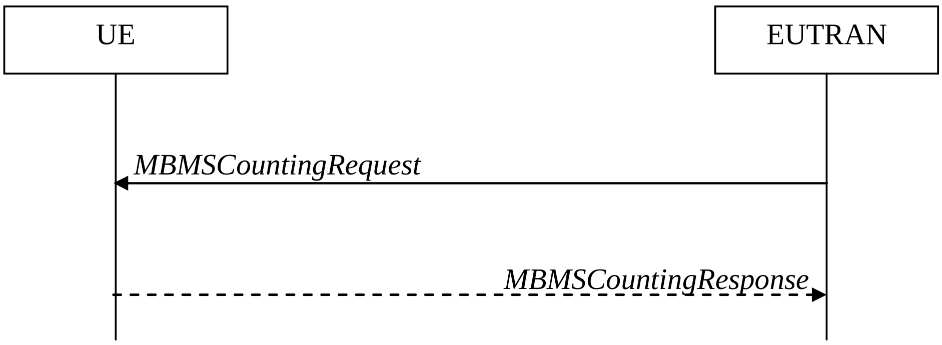

Figure 5.8.4.1-1: MBMS Counting procedure

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.

5.9 RN procedures

5.9.1 RN reconfiguration

5.9.1.1 General

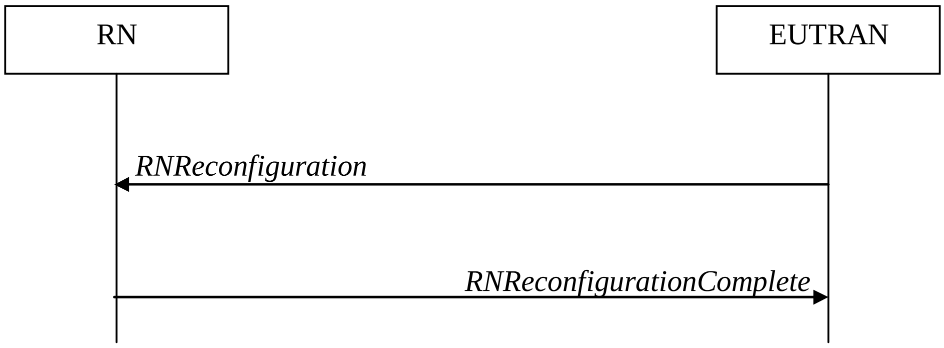

Figure 5.9.1.1-1: RN reconfiguration

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;

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 information elements 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 information elements 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 information elements to be present

Abbreviation	Meaning
Cond *conditionTag* (Used in downlink only)	*Conditionally present* An information element for which the need is specified by means of conditions. For each *conditionTag*, 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 in the description of the field itself.
Need OP (Used in downlink only)	*Optionally present* An information element that is optional to signal. For downlink messages, the UE is not required to take any special action on absence of the IE 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 (Used in downlink only)	*Optionally present, No action* An information element that is optional to signal. If the message is received by the UE, and in case the information element is absent, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality).
Need OR (Used in downlink only)	*Optionally present, Release* An information element that is optional to signal. If the message is received by the UE, and in case the information element is absent, the UE shall discontinue/ stop using/ delete any existing value (and/ or the associated functionality).

Any IE with Need ON in system information shall be interpreted as Need OR.

Need codes may not be specified for a group, used in downlink, which includes one or more extensions. Upon absence of such a field, the UE shall:

- For each individual extension, 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 extensions included directly within the optional field, but also for extensions defined at further nesting levels;

NOTE: The above applies for groups of non critical extensions using double brackets, 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.

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
```

– BCCH-BCH-Message

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.

```
-- ASN1START

BCCH-BCH-Message ::= SEQUENCE {
    message                 BCCH-BCH-MessageType
}

BCCH-BCH-MessageType ::=            MasterInformationBlock

-- ASN1STOP
```

– 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.

```
-- ASN1START

BCCH-DL-SCH-Message ::= SEQUENCE {
    message                 BCCH-DL-SCH-MessageType
}

BCCH-DL-SCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        systemInformation               SystemInformation,
        systemInformationBlockType1         SystemInformationBlockType1
    },
    messageClassExtension   SEQUENCE {}
}

-- ASN1STOP
```

– 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 {
    message                 MCCH-MessageType
}

MCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        mbsfnAreaConfiguration-r9       MBSFNAreaConfiguration-r9
    },
    later                   CHOICE {
        c2                          CHOICE{
            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.

```
-- ASN1START

PCCH-Message ::= SEQUENCE {
    message                 PCCH-MessageType
}

PCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        paging                      Paging
    },
    messageClassExtension  SEQUENCE {}
}

-- ASN1STOP
```

– 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 {
    message                 DL-CCCH-MessageType
}

DL-CCCH-MessageType ::= CHOICE {
```

```
    c1                          CHOICE {
        rrcConnectionReestablishment            RRCConnectionReestablishment,
        rrcConnectionReestablishmentReject          RRCConnectionReestablishmentReject,
        rrcConnectionReject                     RRCConnectionReject,
        rrcConnectionSetup                      RRCConnectionSetup
    },
    messageClassExtension   SEQUENCE {}
}

-- ASN1STOP
```

– 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

DL-DCCH-Message ::= SEQUENCE {
    message                     DL-DCCH-MessageType
}

DL-DCCH-MessageType ::= CHOICE {
    c1                          CHOICE {
        csfbParametersResponseCDMA2000              CSFBParametersResponseCDMA2000,
        dlInformationTransfer                   DLInformationTransfer,
        handoverFromEUTRAPreparationRequest         HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand                    MobilityFromEUTRACommand,
        rrcConnectionReconfiguration            RRCConnectionReconfiguration,
        rrcConnectionRelease                    RRCConnectionRelease,
        securityModeCommand                         SecurityModeCommand,
        ueCapabilityEnquiry                     UECapabilityEnquiry,
        counterCheck                        CounterCheck,
        ueInformationRequest-r9                     UEInformationRequest-r9,
        loggedMeasurementConfiguration-r10      LoggedMeasurementConfiguration-r10,
        rnReconfiguration-r10                   RNReconfiguration-r10,
        spare4 NULL,
```

```
        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.

```
-- ASN1START

UL-CCCH-Message ::= SEQUENCE {
    message                     UL-CCCH-MessageType
}

UL-CCCH-MessageType ::= CHOICE {
    c1                          CHOICE {
        rrcConnectionReestablishmentRequest     RRCConnectionReestablishmentRequest,
        rrcConnectionRequest                    RRCConnectionRequest
    },
    messageClassExtension  SEQUENCE {}
}

-- 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 {
    message                     UL-DCCH-MessageType
}
```

```
UL-DCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        csfbParametersRequestCDMA2000           CSFBParametersRequestCDMA2000,
        measurementReport                       MeasurementReport,
        rrcConnectionReconfigurationComplete    RRCConnectionReconfigurationComplete,
        rrcConnectionReestablishmentComplete    RRCConnectionReestablishmentComplete,
        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  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 {
        c1                                  CHOICE {
            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,  -- Need OP
    nonCriticalExtension                SEQUENCE {}                 OPTIONAL   -- Need OP
}

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

CounterCheckResponse ::=            SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        counterCheckResponse-r8             CounterCheckResponse-r8-IEs,
        criticalExtensionsFuture        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,
                              count-Uplink              INTEGER(0..4294967295),
                              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

```
-- ASN1START

CSFBParametersRequestCDMA2000 ::= SEQUENCE {
    criticalExtensions              CHOICE {
        csfbParametersRequestCDMA2000-r8 CSFBParametersRequestCDMA2000-r8-IEs,
        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,
    criticalExtensions                      CHOICE {
        csfbParametersResponseCDMA2000-r8        CSFBParametersResponseCDMA2000-r8-IEs,
        criticalExtensionsFuture                SEQUENCE {}
    }
}


CSFBParametersResponseCDMA2000-r8-IEs ::= SEQUENCE {
    rand                                    RAND-CDMA2000,
    mobilityParameters                          MobilityParametersCDMA2000,
    nonCriticalExtension                    CSFBParametersResponseCDMA2000-v8a0-IEs                 OPTIONAL
}


CSFBParametersResponseCDMA2000-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,  -- Need OP
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL   -- Need OP
}
```

```
-- 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

DLInformationTransfer ::=           SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        c1                              CHOICE {
            dlInformationTransfer-r8            DLInformationTransfer-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

DLInformationTransfer-r8-IEs ::=  SEQUENCE {
    dedicatedInfoType                   CHOICE {
        dedicatedInfoNAS                    DedicatedInfoNAS,
        dedicatedInfoCDMA2000-1XRTT         DedicatedInfoCDMA2000,
        dedicatedInfoCDMA2000-HRPD          DedicatedInfoCDMA2000
    },
    nonCriticalExtension            DLInformationTransfer-v8a0-IEs                  OPTIONAL
}

DLInformationTransfer-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,  -- Need OP
```

```
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL    -- Need OP
}


-- 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 {
        c1                                  CHOICE {
            handoverFromEUTRAPreparationRequest-r8
                                                HandoverFromEUTRAPreparationRequest-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}


HandoverFromEUTRAPreparationRequest-r8-IEs ::= SEQUENCE {
    cdma2000-Type                   CDMA2000-Type,
    rand                            RAND-CDMA2000               OPTIONAL,  -- Cond cdma2000-Type
    mobilityParameters              MobilityParametersCDMA2000      OPTIONAL,  -- Cond cdma2000-Type
    nonCriticalExtension            HandoverFromEUTRAPreparationRequest-v890-IEsOPTIONAL
}
```

```
HandoverFromEUTRAPreparationRequest-v890-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING            OPTIONAL,  -- Need OP
    nonCriticalExtension            HandoverFromEUTRAPreparationRequest-v920-IEsOPTIONAL
}

HandoverFromEUTRAPreparationRequest-v920-IEs ::= SEQUENCE {
    concurrPrepCDMA2000-HRPD-r9         BOOLEAN                 OPTIONAL,  -- Cond cdma2000-Type
    nonCriticalExtension            HandoverFromEUTRAPreparationRequest-v1020-IEs    OPTIONAL
}

HandoverFromEUTRAPreparationRequest-v1020-IEs ::= SEQUENCE {
    dualRxTxRedirectIndicator-r10       ENUMERATED {true}       OPTIONAL,  -- Cond cdma2000-1XRTT
    redirectCarrierCDMA2000-1XRTT-r10   CarrierFreqCDMA2000     OPTIONAL,  -- Cond dualRxTxRedirect
    nonCriticalExtension            SEQUENCE {}             OPTIONAL   -- Need OP
}

-- 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 *cdma2000-Type = type1XRTT*; otherwise it is not present.
cdma2000-Type	The field is mandatory present if the *cdma2000-Type = type1XRTT*; otherwise it is not present.
dualRxTxRedirect	The field is optionally present, need ON, if *dualRxTxRedirectIndicator* is present; otherwise it is not present.

– 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].

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 ::=      SEQUENCE {
    rstd-InterFreqIndication-r10        CHOICE {
        start                               SEQUENCE {
            rstd-InterFreqInfoList-r10              RSTD-InterFreqInfoList-r10
        },
        stop                                NULL
    },
    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
carrierFreq 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*.
measPRS-Offset Indicates the requested gap offset for performing inter-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 inter-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 RSTD measurement action, i.e. the UE is going to start or stop inter-frequency RSTD measurement.

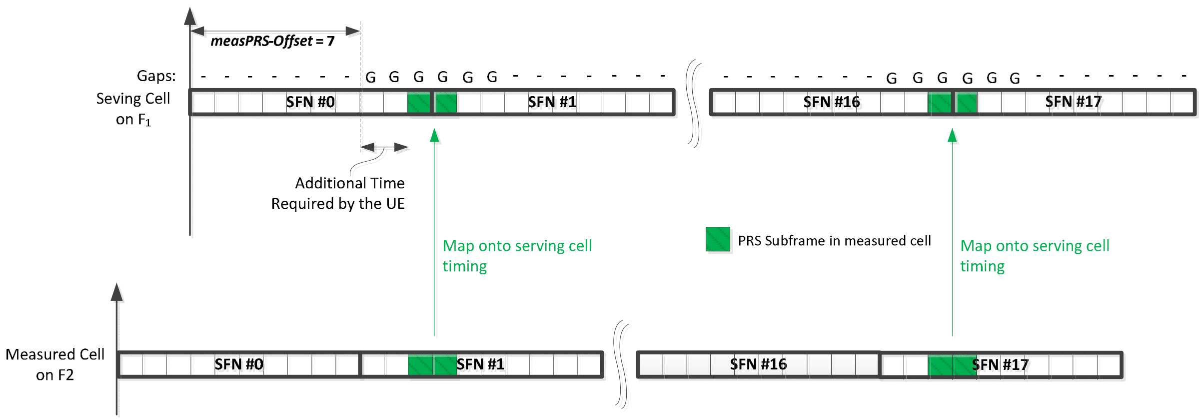

Figure 6.2.2-1 (informative): Exemplary calculation of measPRS-Offset field.

– LoggedMeasurementConfiguration

The *LoggedMeasurementConfiguration* message is used by E-UTRAN to configure the UE to perform logging of measurement results while in RRC_IDLE. 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

LoggedMeasurementConfiguration-r10 ::=     SEQUENCE {
    criticalExtensions                      CHOICE {
        c1                                  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               AreaConfiguration-r10       OPTIONAL,  -- Need OR
    loggingDuration-r10                 LoggingDuration-r10,
    loggingInterval-r10                 LoggingInterval-r10,
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL   -- Need OP

}

-- ASN1STOP
```

***LoggedMeasurementConfiguration* field descriptions**
absoluteTimeInfo Indicates the absolute time in the current cell.
tce-Id 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

```
-- ASN1START


MasterInformationBlock ::=          SEQUENCE {
    dl-Bandwidth                    ENUMERATED {
                                        n6, n15, n25, n50, n75, n100},
    phich-Config                    PHICH-Config,
    systemFrameNumber                       BIT STRING (SIZE (8)),
    spare                           BIT STRING (SIZE (10))
}



-- ASN1STOP
```

***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.
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 (the associated functionality is common i.e. not performed independently for each cell).

– 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,  -- Need OP
    nonCriticalExtension        SEQUENCE {}                         OPTIONAL   -- Need OP
}


CountingRequestList-r10 ::=     SEQUENCE (SIZE (1..maxServiceCount)) OF CountingRequestInfo-r10


CountingRequestInfo-r10 ::=         SEQUENCE {
    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


MBMSCountingResponse-r10 ::=            SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                              CHOICE {
            countingResponse-r10                MBMSCountingResponse-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}
```

```
MBMSCountingResponse-r10-IEs ::= SEQUENCE {
    mbsfn-AreaIndex-r10                 INTEGER (0..maxMBSFN-Area-1)                OPTIONAL,
    countingResponseList-r10        CountingResponseList-r10            OPTIONAL,
    lateNonCriticalExtension        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**
countingResponseList 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-AreaIndex 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.

– MBSFNAreaConfiguration

The *MBSFNAreaConfiguration* message contains the MBMS control information applicable for an MBSFN area. E-UTRAN configures an MCCH for each MBSFN area i.e. the MCCH identifies the MBSFN area.

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,  -- Need OP
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL   -- Need OP
}

CommonSF-AllocPatternList-r9 ::=    SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig

-- ASN1STOP
```

MBSFNAreaConfiguration **field descriptions**
commonSF-Alloc Indicates the subframes allocated to the MBSFN area
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.

– 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

```
-- ASN1START

MeasurementReport ::=               SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                              CHOICE{
            measurementReport-r8                MeasurementReport-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
```

```
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

MeasurementReport-r8-IEs ::=        SEQUENCE {
    measResults                         MeasResults,
    nonCriticalExtension                MeasurementReport-v8a0-IEs                  OPTIONAL
}

MeasurementReport-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

– 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 ::=        SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            mobilityFromEUTRACommand-r8         MobilityFromEUTRACommand-r8-IEs,
            mobilityFromEUTRACommand-r9         MobilityFromEUTRACommand-r9-IEs,
            spare2 NULL, spare1 NULL
```

```
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

MobilityFromEUTRACommand-r8-IEs ::=    SEQUENCE {
    cs-FallbackIndicator                BOOLEAN,
    purpose                                 CHOICE{
        handover                            Handover,
        cellChangeOrder                         CellChangeOrder
    },
    nonCriticalExtension                MobilityFromEUTRACommand-v8a0-IEs                               OPTIONAL
}

MobilityFromEUTRACommand-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension                OCTET STRING                        OPTIONAL,  -- Need OP
    nonCriticalExtension                MobilityFromEUTRACommand-v8d0-IEs     OPTIONAL
}

MobilityFromEUTRACommand-v8d0-IEs ::= SEQUENCE {
    bandIndicator                       BandIndicatorGERAN              OPTIONAL,  -- Cond GERAN
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL   -- Need OP
}

MobilityFromEUTRACommand-r9-IEs ::=    SEQUENCE {
    cs-FallbackIndicator                BOOLEAN,
    purpose                                 CHOICE{
        handover                            Handover,
        cellChangeOrder                         CellChangeOrder,
        e-CSFB-r9                               E-CSFB-r9,
        ...
    },
    nonCriticalExtension                MobilityFromEUTRACommand-v930-IEs                               OPTIONAL
}
```

```
MobilityFromEUTRACommand-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,  -- Need OP
    nonCriticalExtension            MobilityFromEUTRACommand-v960-IEs    OPTIONAL
}

MobilityFromEUTRACommand-v960-IEs ::= SEQUENCE {
    bandIndicator                   BandIndicatorGERAN          OPTIONAL,  -- Cond GERAN
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL   -- Need OP
}

Handover ::=                    SEQUENCE {
    targetRAT-Type                      ENUMERATED {
                                        utra, geran, cdma2000-1XRTT, cdma2000-HRPD,
                                        spare4,    spare3, spare2, spare1, ...},
    targetRAT-MessageContainer              OCTET STRING,
    nas-SecurityParamFromEUTRA                  OCTET STRING (SIZE (1))    OPTIONAL,  -- Cond UTRAGERAN
    systemInformation                   SI-OrPSI-GERAN                  OPTIONAL   -- Cond PSHO
}

CellChangeOrder ::=             SEQUENCE {
    t304                            ENUMERATED {
                                        ms100, ms200, ms500, ms1000,
                                        ms2000, ms4000, ms8000, spare1},
    targetRAT-Type                      CHOICE {
            geran                       SEQUENCE {
                physCellId                      PhysCellIdGERAN,
                carrierFreq                     CarrierFreqGERAN,
                networkControlOrder                 BIT STRING (SIZE (2))         OPTIONAL,  -- Need OP
                systemInformation               SI-OrPSI-GERAN                  OPTIONAL   -- Need OP
            },
            ...
    }
}

SI-OrPSI-GERAN ::=                  CHOICE {
```

```
    si                                  SystemInfoListGERAN,
    psi                                 SystemInfoListGERAN
}


E-CSFB-r9 ::=                           SEQUENCE {
    messageContCDMA2000-1XRTT-r9        OCTET STRING        OPTIONAL,   -- Need ON
    mobilityCDMA2000-HRPD-r9            ENUMERATED {
                                            handover, redirection
                                        }                   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.
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 *mobilityCDMA2000-HRPD* is set to '*handover*'; otherwise the field is optional present, need ON.
concRedir	The field is mandatory present if the m*obilityCDMA2000-HRPD* is set to '*redirection*'; otherwise the field is not present.
GERAN	The field should be present if the *purpose* is set to '*handover*' and the *targetRAT-Type* is set to '*geran*'; otherwise the field is not present
PSHO	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) 3GPP TS 44.060, version 6.13.0 or later (clause 11.2.43) 3GPP TS 44.060, version 7.6.0 or later (clause 11.2.46)	HANDOVER COMMAND PS HANDOVER COMMAND 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


Paging ::=                    SEQUENCE {
    pagingRecordList                PagingRecordList                OPTIONAL,  -- Need ON
    systemInfoModification          ENUMERATED {true}                   OPTIONAL,  -- Need ON
    etws-Indication                 ENUMERATED {true}                   OPTIONAL,  -- Need ON
    nonCriticalExtension            Paging-v890-IEs                 OPTIONAL
}


Paging-v890-IEs ::=           SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                        OPTIONAL,  -- Need OP
    nonCriticalExtension        Paging-v920-IEs                     OPTIONAL
}


Paging-v920-IEs ::=           SEQUENCE {
    cmas-Indication-r9              ENUMERATED {true}                   OPTIONAL,  -- Need ON
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL   -- Need OP
}


PagingRecordList ::=                SEQUENCE (SIZE (1..maxPageRec)) OF PagingRecord
```

```
PagingRecord ::=                SEQUENCE {
    ue-Identity                     PagingUE-Identity,
    cn-Domain                       ENUMERATED {ps, cs},
    ...
}

PagingUE-Identity ::=             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.
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.
systemInfoModification If present: indication of a BCCH modification other than SIB10, SIB11 and SIB12.
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 {
        c1                          CHOICE {
            proximityIndication-r9          ProximityIndication-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
            },
        criticalExtensionsFuture    SEQUENCE {}
    }
}

ProximityIndication-r9-IEs ::= SEQUENCE {
    type-r9                         ENUMERATED {entering, leaving},
    carrierFreq-r9              CHOICE {
        eutra-r9                    ARFCN-ValueEUTRA,
        utra-r9                     ARFCN-ValueUTRA,
        ...,
        eutra2-v9e0                     ARFCN-ValueEUTRA-v9e0
    },
    nonCriticalExtension        ProximityIndication-v930-IEs                OPTIONAL
}

ProximityIndication-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                OPTIONAL,
    nonCriticalExtension        SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

***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.
type 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 {
    rrc-TransactionIdentifier     RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        c1                              CHOICE {
            rnReconfiguration-r10        RNReconfiguration-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture      SEQUENCE {}
    }
}

RNReconfiguration-r10-IEs ::=     SEQUENCE {
    rn-SystemInfo-r10                   RN-SystemInfo-r10           OPTIONAL,  -- Need ON
    rn-SubframeConfig-r10               RN-SubframeConfig-r10           OPTIONAL,  -- Need ON
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,  -- Need OP
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL   -- Need OP
}

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 {
        c1                                  CHOICE{
            rnReconfigurationComplete-r10               RNReconfigurationComplete-r10-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RNReconfigurationComplete-r10-IEs ::=  SEQUENCE {
    lateNonCriticalExtension                OCTET STRING                OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                 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{
            rrcConnectionReconfiguration-r8     RRCConnectionReconfiguration-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
    measConfig                          MeasConfig                  OPTIONAL,  -- Need ON
    mobilityControlInfo                 MobilityControlInfo         OPTIONAL,  -- Cond HO
    dedicatedInfoNASList                SEQUENCE (SIZE(1..maxDRB)) OF
                                        DedicatedInfoNAS            OPTIONAL,  -- Cond nonHO
    radioResourceConfigDedicated        RadioResourceConfigDedicated    OPTIONAL, -- Cond HO-toEUTRA
    securityConfigHO                    SecurityConfigHO            OPTIONAL,  -- Cond HO
    nonCriticalExtension            RRCConnectionReconfiguration-v890-IEs     OPTIONAL
}

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                    OPTIONAL,
    nonCriticalExtension                RRCConnectionReconfiguration-v10i0-IEs          OPTIONAL
}

RRCConnectionReconfiguration-v10i0-IEs ::= SEQUENCE {
    antennaInfoDedicatedPCell-v10i0     AntennaInfoDedicated-v10i0          OPTIONAL,  -- Need ON
    -- Following field is only for late non-critical extensions from REL-10
    nonCriticalExtension                SEQUENCE {}                 OPTIONAL
}

-- Regular non-critical extensions:
RRCConnectionReconfiguration-v920-IEs ::= SEQUENCE {
    otherConfig-r9                      OtherConfig-r9                  OPTIONAL,  -- Need ON
    fullConfig-r9                       ENUMERATED {true}               OPTIONAL,  -- Cond HO-Reestab
    nonCriticalExtension                RRCConnectionReconfiguration-v1020-IEs          OPTIONAL
}

RRCConnectionReconfiguration-v1020-IEs ::= SEQUENCE {
    sCellToReleaseList-r10              SCellToReleaseList-r10          OPTIONAL,  -- Need ON
    sCellToAddModList-r10                   SCellToAddModList-r10           OPTIONAL,  -- Need ON
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL   -- Need OP
}

SCellToAddModList-r10 ::=           SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-r10

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   -- Need ON
    ]]
}


SCellToReleaseList-r10 ::=          SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellIndex-r10


SecurityConfigHO ::=                SEQUENCE {
    handoverType                        CHOICE {
        intraLTE                        SEQUENCE {
            securityAlgorithmConfig             SecurityAlgorithmConfig         OPTIONAL,  -- Cond fullConfig
            keyChangeIndicator              BOOLEAN,
            nextHopChainingCount            NextHopChainingCount
        },
        interRAT                        SEQUENCE {
            securityAlgorithmConfig             SecurityAlgorithmConfig,
            nas-SecurityParamToEUTRA            OCTET STRING (SIZE(6))
        }
    },
    ...
}


-- ASN1STOP
```

***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 native K_{ASME} key taken into use through the successful NAS SMC, 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].
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.
nextHopChainingCount Parameter NCC: See TS 33.401 [32]

Conditional presence	Explanation
EARFCN-max	The field is mandatory present if *dl-CarrierFreq-r10* is included and set to *maxEARFCN*. 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.
HO	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 *fullConfig* is included; otherwise the field is optionally 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

```
-- ASN1START

RRCConnectionReconfigurationComplete ::= SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        rrcConnectionReconfigurationComplete-r8
                                            RRCConnectionReconfigurationComplete-r8-IEs,
```

```
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
    nonCriticalExtension                RRCConnectionReconfigurationComplete-v8a0-IEs  OPTIONAL
}

RRCConnectionReconfigurationComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    nonCriticalExtension                RRCConnectionReconfigurationComplete-v1020-IEs     OPTIONAL
}

RRCConnectionReconfigurationComplete-v1020-IEs ::= SEQUENCE {
    rlf-InfoAvailable-r10               ENUMERATED {true}               OPTIONAL,
    logMeasAvailable-r10                ENUMERATED {true}               OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

– 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,
    criticalExtensions                  CHOICE {
        c1                              CHOICE{
```

```
            rrcConnectionReestablishment-r8       RRCConnectionReestablishment-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4   NULL,
            spare3 NULL, spare2 NULL, spare1   NULL
        },
        criticalExtensionsFuture          SEQUENCE {}
    }
}

RRCConnectionReestablishment-r8-IEs ::= SEQUENCE {
    radioResourceConfigDedicated      RadioResourceConfigDedicated,
    nextHopChainingCount              NextHopChainingCount,
    nonCriticalExtension          RRCConnectionReestablishment-v8a0-IEs     OPTIONAL
}

RRCConnectionReestablishment-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension          OCTET STRING                 OPTIONAL,  -- Need OP
    nonCriticalExtension          SEQUENCE {}                      OPTIONAL   -- Need OP
}

-- ASN1STOP
```

– RRCConnectionReestablishmentComplete

The *RRCConnectionReestablishmentComplete* message is used to confirm the successful completion of an RRC connection reestablishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionReestablishmentComplete message

```
-- ASN1START

RRCConnectionReestablishmentComplete ::= SEQUENCE {
    rrc-TransactionIdentifier         RRC-TransactionIdentifier,
    criticalExtensions                    CHOICE {
```

```
        rrcConnectionReestablishmentComplete-r8
                                            RRCConnectionReestablishmentComplete-r8-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCConnectionReestablishmentComplete-r8-IEs ::= SEQUENCE {
    nonCriticalExtension                RRCConnectionReestablishmentComplete-v920-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v920-IEs ::= SEQUENCE {
    rlf-InfoAvailable-r9                ENUMERATED {true}               OPTIONAL,
    nonCriticalExtension                RRCConnectionReestablishmentComplete-v8a0-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension                OCTET STRING                        OPTIONAL,
    nonCriticalExtension                RRCConnectionReestablishmentComplete-v1020-IEs    OPTIONAL
}

RRCConnectionReestablishmentComplete-v1020-IEs ::= SEQUENCE {
    logMeasAvailable-r10                    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 {
    nonCriticalExtension            RRCConnectionReestablishmentReject-v8a0-IEs                 OPTIONAL
}

RRCConnectionReestablishmentReject-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,  -- Need OP
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL   -- Need OP
}

-- 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 {
    criticalExtensions                  CHOICE {
        rrcConnectionReestablishmentRequest-r8
                                        RRCConnectionReestablishmentRequest-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

RRCConnectionReestablishmentRequest-r8-IEs ::= SEQUENCE {
    ue-Identity                         ReestabUE-Identity,
    reestablishmentCause                ReestablishmentCause,
    spare                               BIT STRING (SIZE (2))
}

ReestabUE-Identity ::=              SEQUENCE {
    c-RNTI                              C-RNTI,
    physCellId                          PhysCellId,
    shortMAC-I                          ShortMAC-I
}

ReestablishmentCause ::=            ENUMERATED {
                                    reconfigurationFailure, handoverFailure,
                                    otherFailure, spare1}


-- ASN1STOP
```

***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.
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 {
    criticalExtensions                  CHOICE {
        c1                              CHOICE {
            rrcConnectionReject-r8              RRCConnectionReject-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

RRCConnectionReject-r8-IEs ::=          SEQUENCE {
    waitTime                        INTEGER (1..16),
    nonCriticalExtension            RRCConnectionReject-v8a0-IEs        OPTIONAL
}

RRCConnectionReject-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,  -- Need OP
    nonCriticalExtension            RRCConnectionReject-v1020-IEs       OPTIONAL
}

RRCConnectionReject-v1020-IEs ::=   SEQUENCE {
    extendedWaitTime-r10                INTEGER (1..1800)       OPTIONAL,  -- Need ON
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL   -- Need OP
}

-- ASN1STOP
```

***RRCConnectionReject* field descriptions**
extendedWaitTime Value in seconds for the wait time for Delay Tolerant access requests.
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


RRCConnectionRelease ::=            SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        c1                                      CHOICE {
            rrcConnectionRelease-r8                 RRCConnectionRelease-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}


RRCConnectionRelease-r8-IEs ::=     SEQUENCE {
    releaseCause                        ReleaseCause,
    redirectedCarrierInfo               RedirectedCarrierInfo                   OPTIONAL,  -- Need ON
    idleModeMobilityControlInfo             IdleModeMobilityControlInfo             OPTIONAL,  -- Need OP
    nonCriticalExtension                RRCConnectionRelease-v890-IEs       OPTIONAL
}


RRCConnectionRelease-v890-IEs ::=  SEQUENCE {
    lateNonCriticalExtension                OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs)
    OPTIONAL,  -- Need OP
    nonCriticalExtension                RRCConnectionRelease-v920-IEs       OPTIONAL
```

```
}

RRCConnectionRelease-v9e0-IEs ::= SEQUENCE {
    redirectedCarrierInfo-v9e0          RedirectedCarrierInfo-v9e0          OPTIONAL,  -- Cond NoRedirect-r8
    idleModeMobilityControlInfo-v9e0    IdleModeMobilityControlInfo-v9e0    OPTIONAL,  -- Cond 
IdleInfoEUTRA
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL   -- Need OP
}

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
    nonCriticalExtension            RRCConnectionRelease-v1020-IEs          OPTIONAL
}

RRCConnectionRelease-v1020-IEs ::=SEQUENCE {
    extendedWaitTime-r10                INTEGER (1..1800)       OPTIONAL,  -- Need ON
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL   -- Need OP
}

ReleaseCause ::=                ENUMERATED {loadBalancingTAUrequired,
                                            other, cs-FallbackHighPriority-v1020, spare1}

RedirectedCarrierInfo ::=           CHOICE {
    eutra                               ARFCN-ValueEUTRA,
    geran                               CarrierFreqsGERAN,
    utra-FDD                            ARFCN-ValueUTRA,
    utra-TDD                            ARFCN-ValueUTRA,
    cdma2000-HRPD                           CarrierFreqCDMA2000,
    cdma2000-1xRTT                          CarrierFreqCDMA2000,
```

```
    ...,
    utra-TDD-r10                CarrierFreqListUTRA-TDD-r10
}

RedirectedCarrierInfo-v9e0 ::=      SEQUENCE {
    eutra-v9e0                      ARFCN-ValueEUTRA-v9e0
}

CarrierFreqListUTRA-TDD-r10 ::=     SEQUENCE (SIZE (1..maxFreqUTRA-TDD-r10)) OF ARFCN-
ValueUTRA

IdleModeMobilityControlInfo ::=     SEQUENCE {
    freqPriorityListEUTRA           FreqPriorityListEUTRA       OPTIONAL,   -- Need ON
    freqPriorityListGERAN           FreqsPriorityListGERAN      OPTIONAL,   -- Need ON
    freqPriorityListUTRA-FDD        FreqPriorityListUTRA-FDD    OPTIONAL,   -- Need ON
    freqPriorityListUTRA-TDD        FreqPriorityListUTRA-TDD    OPTIONAL,   -- Need ON
    bandClassPriorityListHRPD       BandClassPriorityListHRPD   OPTIONAL,   -- Need ON
    bandClassPriorityList1XRTT      BandClassPriorityList1XRTT  OPTIONAL,   -- Need ON
    t320                        ENUMERATED {
                                    min5, min10, min20, min30, min60, min120, min180,
                                    spare1}                 OPTIONAL,   -- Need OR
    ...
}

IdleModeMobilityControlInfo-v9e0 ::=    SEQUENCE {
    freqPriorityListEUTRA-v9e0      SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v9e0
}

FreqPriorityListEUTRA ::=       SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA

FreqPriorityEUTRA ::=           SEQUENCE {
    carrierFreq                     ARFCN-ValueEUTRA,
    cellReselectionPriority         CellReselectionPriority
}
```

```
FreqPriorityEUTRA-v9e0 ::=          SEQUENCE {
    carrierFreq-v9e0                ARFCN-ValueEUTRA-v9e0       OPTIONAL   -- Cond EARFCN-max
}

FreqsPriorityListGERAN ::=          SEQUENCE (SIZE (1..maxGNFG)) OF FreqsPriorityGERAN

FreqsPriorityGERAN ::=              SEQUENCE {
    carrierFreqs                    CarrierFreqsGERAN,
    cellReselectionPriority             CellReselectionPriority
}

FreqPriorityListUTRA-FDD ::=        SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF FreqPriorityUTRA-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 {
    bandClass                       BandclassCDMA2000,
    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 ::=             SEQUENCE {
    physCellId-r9                       PhysCellIdUTRA-FDD,
    utra-BCCH-Container-r9              OCTET STRING
}

CellInfoListUTRA-TDD-r9 ::=         SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r9

CellInfoUTRA-TDD-r9 ::=             SEQUENCE {
    physCellId-r9                       PhysCellIdUTRA-TDD,
    utra-BCCH-Container-r9              OCTET STRING
}

CellInfoListUTRA-TDD-r10 ::=        SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r10

CellInfoUTRA-TDD-r10 ::=            SEQUENCE {
    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.
carrierFreqs 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). If E-UTRAN includes *freqPriorityListEUTRA-v9e0* it includes the same number of entries, and listed in the same order, as in *freqPriorityListEUTRA* (i.e. without suffix).
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 r*edirectedCarrierInfo* 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 *carrierFreq* (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 {
    criticalExtensions                  CHOICE {
        rrcConnectionRequest-r8             RRCConnectionRequest-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

RRCConnectionRequest-r8-IEs ::=     SEQUENCE {
    ue-Identity                         InitialUE-Identity,
    establishmentCause                  EstablishmentCause,
    spare                           BIT STRING (SIZE (1))
}

InitialUE-Identity ::=              CHOICE {
    s-TMSI                              S-TMSI,
    randomValue                         BIT STRING (SIZE (40))
}

EstablishmentCause ::=              ENUMERATED {
                                    emergency, highPriorityAccess, mt-Access, mo-Signalling,
                                    mo-Data, delayTolerantAccess-v1020, spare2, 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.
randomValue Integer value in the range 0 to $2^{40} - 1$.
ue-Identity UE identity included to facilitate contention resolution by lower layers.

– 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 {
        c1                          CHOICE {
            rrcConnectionSetup-r8           RRCConnectionSetup-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture    SEQUENCE {}
    }
}


RRCConnectionSetup-r8-IEs ::=       SEQUENCE {
    radioResourceConfigDedicated    RadioResourceConfigDedicated,
    nonCriticalExtension            RRCConnectionSetup-v8a0-IEs                 OPTIONAL
}


RRCConnectionSetup-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension        OCTET STRING                OPTIONAL,  -- Need OP
```

```
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL   -- Need OP
}


-- 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
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}


RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
    selectedPLMN-Identity                   INTEGER (1..6),
    registeredMME                           RegisteredMME                       OPTIONAL,
    dedicatedInfoNAS                        DedicatedInfoNAS,
    nonCriticalExtension                RRCConnectionSetupComplete-v8a0-IEs OPTIONAL
}


RRCConnectionSetupComplete-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension                OCTET STRING                        OPTIONAL,
```

```
    nonCriticalExtension                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                SEQUENCE {}                             OPTIONAL
}

RegisteredMME ::=                       SEQUENCE {
    plmn-Identity                       PLMN-Identity                       OPTIONAL,
    mmegi                               BIT STRING (SIZE (16)),
    mmec                                MMEC
}

-- ASN1STOP
```

***RRCConnectionSetupComplete* field descriptions**
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].
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* included in SIB1. 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.

– 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 {
        c1                           CHOICE{
            securityModeCommand-r8           SecurityModeCommand-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture     SEQUENCE {}
    }
}

SecurityModeCommand-r8-IEs ::=       SEQUENCE {
    securityConfigSMC                SecurityConfigSMC,
    nonCriticalExtension             SecurityModeCommand-v8a0-IEs                OPTIONAL
}

SecurityModeCommand-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension         OCTET STRING                 OPTIONAL,  -- Need OP
    nonCriticalExtension             SEQUENCE {}                  OPTIONAL   -- Need OP
}

SecurityConfigSMC ::=                SEQUENCE {
    securityAlgorithmConfig                  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

SecurityModeComplete ::=            SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        securityModeComplete-r8                 SecurityModeComplete-r8-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

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 {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        securityModeFailure-r8              SecurityModeFailure-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

SecurityModeFailure-r8-IEs ::=      SEQUENCE {
    nonCriticalExtension            SecurityModeFailure-v8a0-IEs                OPTIONAL
}

SecurityModeFailure-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL
}

-- ASN1STOP
```

– SystemInformation

The *SystemInformation* 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 message

```
-- ASN1START
```

```
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
    },
    nonCriticalExtension            SystemInformation-v8a0-IEs                  OPTIONAL
}

SystemInformation-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,  -- Need OP
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL   -- Need OP
}

-- 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.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

SystemInformationBlockType1 message

```
-- ASN1START


SystemInformationBlockType1 ::=     SEQUENCE {
    cellAccessRelatedInfo               SEQUENCE {
        plmn-IdentityList               PLMN-IdentityList,
        trackingAreaCode                    TrackingAreaCode,
        cellIdentity                    CellIdentity,
        cellBarred                      ENUMERATED {barred, notBarred},
        intraFreqReselection            ENUMERATED {allowed, notAllowed},
        csg-Indication                      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                    OPTIONAL,          -- Need OP
    freqBandIndicator                   FreqBandIndicator,
    schedulingInfoList                  SchedulingInfoList,
    tdd-Config                          TDD-Config                   OPTIONAL,  -- Cond TDD
    si-WindowLength                         ENUMERATED {
                                        ms1, ms2, ms5, ms10, ms15, ms20,
                                        ms40},
    systemInfoValueTag                  INTEGER (0..31),
    nonCriticalExtension            SystemInformationBlockType1-v890-IEs                    OPTIONAL
}
```

```
SystemInformationBlockType1-v890-IEs::=   SEQUENCE {
    lateNonCriticalExtension            OCTET STRING (CONTAINING SystemInformationBlockType1-v8h0-IEs)
        OPTIONAL,  -- Need OP
    nonCriticalExtension                SystemInformationBlockType1-v920-IEs OPTIONAL
}


-- Late non critical extensions
SystemInformationBlockType1-v8h0-IEs ::=  SEQUENCE {
    multiBandInfoList                   MultiBandInfoList       OPTIONAL,  -- Need OR
    nonCriticalExtension                SystemInformationBlockType1-v9e0-IEs  OPTIONAL   -- Need OP
}


SystemInformationBlockType1-v9e0-IEs ::= SEQUENCE {
    freqBandIndicator-v9e0              FreqBandIndicator-v9e0      OPTIONAL,  -- Cond FBI-max
    multiBandInfoList-v9e0              MultiBandInfoList-v9e0      OPTIONAL,  -- Cond mFBI-max
    nonCriticalExtension                SystemInformationBlockType1-v10j0-IEs                   OPTIONAL   -- Need OP
}


SystemInformationBlockType1-v10j0-IEs ::= SEQUENCE {
    freqBandInfo-r10                    NS-PmaxList-r10                   OPTIONAL,  -- Need OR
    multiBandInfoList-v10j0                  MultiBandInfoList-v10j0         OPTIONAL,  -- Need OR
    nonCriticalExtension                SEQUENCE {}                       OPTIONAL
}


-- Regular non critical extensions
SystemInformationBlockType1-v920-IEs ::=  SEQUENCE {
    ims-EmergencySupport-r9                  ENUMERATED {true}           OPTIONAL,  -- Need OR
    cellSelectionInfo-v920              CellSelectionInfo-v920       OPTIONAL,  -- Cond RSRQ
    nonCriticalExtension                SEQUENCE {}                       OPTIONAL   -- Need OP
}


PLMN-IdentityList ::=                   SEQUENCE (SIZE (1..6)) OF PLMN-IdentityInfo


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
}

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, spare5,
                                    spare4, spare3, spare2, spare1, ...}

CellSelectionInfo-v920 ::=          SEQUENCE {
    q-QualMin-r9                    Q-QualMin-r9,
    q-QualMinOffset-r9                  INTEGER (1..8)                  OPTIONAL   -- Need OP
}

-- ASN1STOP
```

***SystemInformationBlockType1* field descriptions**
cellBarred barred means the cell is barred, as defined in TS 36.304 [4].
cellReservedForOperatorUse As defined in TS 36.304 [4].
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].
freqBandInfo A list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band in *freqBandIndicator*.
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.
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 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* IE it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the *multiBandInfoList* IE. If E-UTRAN includes *multiBandInfoList-v9e0* 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.
multiBandInfoList-v10j0 A list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 36.101 [42, table 6.2.4-1] 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).
plmn-IdentityList List of PLMN identities. The first listed *PLMN-Identity* is the primary PLMN.
p-Max 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]. If *cellSelectionInfo-v920* is not present, the UE applies the (default) value of negative infinity for $Q_{qualmin}$.
q-QualMinOffset Parameter '$Q_{qualminoffset}$' in TS 36.304 [4]. Actual value $Q_{qualminoffset}$ = IE 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-RxLevMinOffset Parameter $Q_{rxlevminoffset}$ in TS 36.304 [4]. Actual value $Q_{rxlevminoffset}$ = IE 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-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-WindowLength Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on.
systemInfoValueTag Common for all SIBs other than MIB, SIB1, SIB10, SIB11 and SIB12. Change of MIB and SIB1 is detected by acquisition of the corresponding message.
trackingAreaCode A *trackingAreaCode* that is common for all the PLMNs listed.

Conditional presence	Explanation
FBI-max	The field is mandatory present if *freqBandIndicator* (i.e. without suffix) is set to *maxFBI*. Otherwise the field is not present.
mFBI-max	The field is mandatory present if one or more entries in *multiBandInfoList* (i.e. without suffix, introduced in -v8h0) is set to *maxFBI*. Otherwise the field is not present.
RSRQ	The field is mandatory present if SIB3 is being broadcast and *threshServingLowQ* is present in SIB3; otherwise optionally present, Need OP.
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.

– 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           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        c1                              CHOICE {
            ueCapabilityEnquiry-r8              UECapabilityEnquiry-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

UECapabilityEnquiry-r8-IEs ::=          SEQUENCE {
    ue-CapabilityRequest                UE-CapabilityRequest,
    nonCriticalExtension            UECapabilityEnquiry-v8a0-IEs                OPTIONAL
}

UECapabilityEnquiry-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,  -- Need OP
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL   -- Need OP
```

```
}

UE-CapabilityRequest ::=        SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF RAT-Type

-- ASN1STOP
```

UECapabilityEnquiry **field descriptions**
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.

– 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,
    criticalExtensions                      CHOICE {
        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 {
    ue-CapabilityRAT-ContainerList        UE-CapabilityRAT-ContainerList,
    nonCriticalExtension                UECapabilityInformation-v8a0-IEs                        OPTIONAL
```

```
}

UECapabilityInformation-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

– 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        ::=                SEQUENCE {
    rrc-TransactionIdentifier     RRC-TransactionIdentifier,
    criticalExtensions                    CHOICE {
        c1                                CHOICE {
            ueInformationRequest-r9                    UEInformationRequest-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture          SEQUENCE {}
    }
}

UEInformationRequest-r9-IEs ::=       SEQUENCE {
    rach-ReportReq-r9                              BOOLEAN,
    rlf-ReportReq-r9                           BOOLEAN,
    nonCriticalExtension                    UEInformationRequest-v930-IEs                    OPTIONAL
}
```

```
UEInformationRequest-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,  -- Need OP
    nonCriticalExtension            UEInformationRequest-v1020-IEs      OPTIONAL
}

UEInformationRequest-v1020-IEs ::=      SEQUENCE {
    logMeasReportReq-r10                        ENUMERATED {true}           OPTIONAL,  -- Need ON
    nonCriticalExtension                    SEQUENCE {}                 OPTIONAL   -- Need OP
}

-- 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 {
    rach-Report-r9                        SEQUENCE {
        numberOfPreamblesSent-r9              INTEGER (1..200),
        contentionDetected-r9                 BOOLEAN
    }                                                             OPTIONAL,
    rlf-Report-r9                     RLF-Report-r9          OPTIONAL,
    nonCriticalExtension              UEInformationResponse-v930-IEs            OPTIONAL
}

UEInformationResponse-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension          OCTET STRING (CONTAINING UEInformationResponse-v9e0-IEs)
    OPTIONAL,
    nonCriticalExtension          UEInformationResponse-v1020-IEs        OPTIONAL
}

UEInformationResponse-v9e0-IEs ::= SEQUENCE {
    rlf-Report-v9e0                   RLF-Report-v9e0                  OPTIONAL,
    nonCriticalExtension          SEQUENCE {}                     OPTIONAL
}

UEInformationResponse-v1020-IEs ::= SEQUENCE {
    logMeasReport-r10                 LogMeasReport-r10              OPTIONAL,
    nonCriticalExtension          SEQUENCE {}                     OPTIONAL
}

RLF-Report-r9 ::=                 SEQUENCE {
    measResultLastServCell-r9             SEQUENCE {
        rsrpResult-r9                     RSRP-Range,
        rsrqResult-r9                     RSRQ-Range          OPTIONAL
    },
    measResultNeighCells-r9               SEQUENCE {
        measResultListEUTRA-r9                MeasResultList2EUTRA-r9         OPTIONAL,
        measResultListUTRA-r9                 MeasResultList2UTRA-r9          OPTIONAL,
        measResultListGERAN-r9                MeasResultListGERAN             OPTIONAL,
```

```
        measResultsCDMA2000-r9              MeasResultList2CDMA2000-r9         OPTIONAL
    }   OPTIONAL,
    ...,
    [[  locationInfo-r10                LocationInfo-r10       OPTIONAL,
        failedPCellId-r10                       CHOICE {
            cellGlobalId-r10                        CellGlobalIdEUTRA,
            pci-arfcn-r10                           SEQUENCE {
                physCellId-r10                              PhysCellId,
                carrierFreq-r10                             ARFCN-ValueEUTRA
            }
        }                                                       OPTIONAL,
        reestablishmentCellId-r10       CellGlobalIdEUTRA                   OPTIONAL,
        timeConnFailure-r10             INTEGER (0..1023)               OPTIONAL,
        connectionFailureType-r10       ENUMERATED {rlf, hof}           OPTIONAL,
        previousPCellId-r10             CellGlobalIdEUTRA                   OPTIONAL
    ]],
    [[  failedPCellId-v1090             SEQUENCE {
            carrierFreq-v1090                   ARFCN-ValueEUTRA-v9e0
        }                                                       OPTIONAL
    ]]
}

RLF-Report-v9e0 ::=                     SEQUENCE {
    measResultListEUTRA-v9e0            MeasResultList2EUTRA-v9e0
}

MeasResultList2EUTRA-r9 ::=             SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r9

MeasResultList2EUTRA-v9e0 ::=           SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v9e0

MeasResult2EUTRA-r9 ::=                 SEQUENCE {
    carrierFreq-r9                      ARFCN-ValueEUTRA,
    measResultList-r9                       MeasResultListEUTRA
}
```

```
MeasResult2EUTRA-v9e0 ::=           SEQUENCE {
    carrierFreq-v9e0                ARFCN-ValueEUTRA-v9e0       OPTIONAL
}

MeasResultList2UTRA-r9 ::=          SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2UTRA-r9

MeasResult2UTRA-r9 ::=              SEQUENCE {
    carrierFreq-r9                  ARFCN-ValueUTRA,
    measResultList-r9               MeasResultListUTRA
}

MeasResultList2CDMA2000-r9 ::=      SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2CDMA2000-r9

MeasResult2CDMA2000-r9 ::=          SEQUENCE {
    carrierFreq-r9                  CarrierFreqCDMA2000,
    measResultList-r9               MeasResultsCDMA2000
}

LogMeasReport-r10 ::=               SEQUENCE {
    absoluteTimeStamp-r10           AbsoluteTimeInfo-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

LogMeasInfo-r10 ::=         SEQUENCE {
    locationInfo-r10                LocationInfo-r10        OPTIONAL,
    relativeTimeStamp-r10           INTEGER (0..7200),
    servCellIdentity-r10            CellGlobalIdEUTRA,
    measResultServCell-r10          SEQUENCE {
```

```
        rsrpResult-r10                  RSRP-Range,
        rsrqResult-r10                  RSRQ-Range
    },
    measResultNeighCells-r10        SEQUENCE {
        measResultListEUTRA-r10             MeasResultList2EUTRA-r9     OPTIONAL,
        measResultListUTRA-r10              MeasResultList2UTRA-r9      OPTIONAL,
        measResultListGERAN-r10             MeasResultList2GERAN-r10    OPTIONAL,
        measResultListCDMA2000-r10              MeasResultList2CDMA2000-r9      OPTIONAL
    }   OPTIONAL,
    ...
}

MeasResultList2GERAN-r10 ::=            SEQUENCE (SIZE (1..maxCellListGERAN)) OF MeasResultListGERAN

-- ASN1STOP
```

***UEInformationResponse* field descriptions**
absoluteTimeStamp Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within *absoluteTimeInfo*.
carrierFreq 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].
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.
measResultLastServCell This field refers to the last measurement results taken in the PCell, where radio link failure or handover failure happened.
measResultListEUTRA If *measResultListEUTRA-v9e0*, *measResultListEUTRA-v1090* or *measResultListEUTRA-v11x0* 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.
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].
previousPCellId This field is used to indicate the source PCell of the last handover (source PCell when the last *RRC-Connection-Reconfiguration* message including *mobilityControlInfo*was received).
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.
tce-Id 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 = IE value * 100ms. The maximum value 1023 means 102.3s 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 ::=   SEQUENCE {
    criticalExtensions              CHOICE {
        c1                          CHOICE {
```

```
            ulHandoverPreparationTransfer-r8        ULHandoverPreparationTransfer-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture                SEQUENCE {}
    }
}

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 {
    lateNonCriticalExtension                OCTET STRING                    OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

***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
```

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
```

```
SystemInformationBlockType2 ::=     SEQUENCE {
    ac-BarringInfo                      SEQUENCE {
        ac-BarringForEmergency              BOOLEAN,
        ac-BarringForMO-Signalling          AC-BarringConfig            OPTIONAL,   -- Need OP
        ac-BarringForMO-Data            AC-BarringConfig            OPTIONAL    -- Need OP
    }                                                           OPTIONAL,   -- Need OP
    radioResourceConfigCommon           RadioResourceConfigCommonSIB,
    ue-TimersAndConstants               UE-TimersAndConstants,
    freqInfo                        SEQUENCE {
        ul-CarrierFreq                      ARFCN-ValueEUTRA            OPTIONAL,   -- Need OP
        ul-Bandwidth                    ENUMERATED {n6, n15, n25, n50, n75, n100}
                                                                OPTIONAL,   -- Need OP
        additionalSpectrumEmission          AdditionalSpectrumEmission
    },
    mbsfn-SubframeConfigList            MBSFN-SubframeConfigList            OPTIONAL,   -- Need OR
    timeAlignmentTimerCommon            TimeAlignmentTimer,
    ...,
    lateNonCriticalExtension        OCTET STRING (CONTAINING SystemInformationBlockType2-v8h0-IEs)
                OPTIONAL,   -- Need OP
    [[  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
    ]]
}

SystemInformationBlockType2-v8h0-IEs ::=  SEQUENCE {
    multiBandInfoList               SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission
    OPTIONAL,   -- Need OR
    nonCriticalExtension        SystemInformationBlockType2-v9e0-IEs  OPTIONAL    -- Need OP
}

SystemInformationBlockType2-v9e0-IEs ::= SEQUENCE {
    ul-CarrierFreq-v9e0                 ARFCN-ValueEUTRA-v9e0       OPTIONAL,   -- Cond ul-FreqMax
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL    -- Need OP
```

```
}

AC-BarringConfig ::=                SEQUENCE {
    ac-BarringFactor                ENUMERATED {
                                        p00, p05, p10, p15, p20, p25, p30, p40,
                                        p50, p60, p70, p75, p80, p85, p90, p95},
    ac-BarringTime                      ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512},
    ac-BarringForSpecialAC                  BIT STRING (SIZE(5))
}

MBSFN-SubframeConfigList ::=        SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig

-- 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.
additionalSpectrumEmission The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, table 6.2.4.1]**.**
mbsfn-SubframeConfigList Defines the subframes that are reserved for MBSFN in downlink.
multiBandInfoList A list of *additionalSpectrumEmission* i.e. one for each additional frequency band included in *multiBandInfoList* in *SystemInformationBlockType1,* listed in the same order*.*
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.
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.

Conditional presence	Explanation
ul-FreqMax	The field is mandatory present if *ul-CarrierFreq* (i.e. without suffix) is present and set to *maxEARFCN*. Otherwise the field is not present.

– 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 ::=     SEQUENCE {
    cellReselectionInfoCommon           SEQUENCE {
        q-Hyst                          ENUMERATED {
                                            dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                            dB12, dB14, dB16, dB18, dB20, dB22, dB24},
        speedStateReselectionPars           SEQUENCE {
            mobilityStateParameters             MobilityStateParameters,
            q-HystSF                    SEQUENCE {
                sf-Medium                       ENUMERATED {
                                                    dB-6, dB-4, dB-2, dB0},
                sf-High                         ENUMERATED {
                                                    dB-6, dB-4, dB-2, dB0}
            }
        }                                                       OPTIONAL        -- Need OP
    },
    cellReselectionServingFreqInfo  SEQUENCE {
        s-NonIntraSearch            ReselectionThreshold        OPTIONAL,       -- Need OP
        threshServingLow                ReselectionThreshold,
        cellReselectionPriority         CellReselectionPriority
    },
    intraFreqCellReselectionInfo    SEQUENCE {
        q-RxLevMin                      Q-RxLevMin,
        p-Max                       P-Max                       OPTIONAL,       -- Need OP
        s-IntraSearch               ReselectionThreshold        OPTIONAL,       -- Need OP
        allowedMeasBandwidth            AllowedMeasBandwidth        OPTIONAL,       -- Need OP
        presenceAntennaPort1            PresenceAntennaPort1,
```

```
        neighCellConfig                         NeighCellConfig,
        t-ReselectionEUTRA                          T-Reselection,
        t-ReselectionEUTRA-SF                       SpeedStateScaleFactors      OPTIONAL        -- Need OP
    },
    ...,
    lateNonCriticalExtension                OCTET STRING (CONTAINING SystemInformationBlockType3-v10j0-IEs)             OPTIONAL,  -- Need OP
    [[  s-IntraSearch-v920                  SEQUENCE {
            s-IntraSearchP-r9                   ReselectionThreshold,
            s-IntraSearchQ-r9                       ReselectionThresholdQ-r9
        }                                                       OPTIONAL,       -- Need OP
        s-NonIntraSearch-v920               SEQUENCE {
            s-NonIntraSearchP-r9                    ReselectionThreshold,
            s-NonIntraSearchQ-r9                    ReselectionThresholdQ-r9
        }                                                       OPTIONAL,       -- Need OP
        q-QualMin-r9                        Q-QualMin-r9                OPTIONAL,       -- Need OP
        threshServingLowQ-r9                ReselectionThresholdQ-r9   OPTIONAL        -- Need OP
    ]]
}

-- Late non critical extensions
SystemInformationBlockType3-v10j0-IEs ::= SEQUENCE {
    freqBandInfo-r10                    NS-PmaxList-r10                 OPTIONAL,  -- Need OR
    multiBandInfoList-v10j0                 MultiBandInfoList-v10j0         OPTIONAL,  -- Need OR
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

***SystemInformationBlockType3* field descriptions**
allowedMeasBandwidth If absent, the value corresponding to the downlink bandwidth indicated by the *dl-Bandwidth* included in *MasterInformationBlock* applies.
cellReselectionInfoCommon Cell re-selection information common for cells.
cellReselectionServingFreqInfo Information common for Cell re-selection to inter-frequency and inter-RAT cells.
freqBandInfo A list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 36.101 [42, table 6.2.4-1] applicable for the intra-frequency neighbouring E-UTRA cells if the UE selects the frequenby band from *freqBandIndicator* in *SystemInformationBlockType1*.
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] applicable for the intra-frequency neighbouring E-UTRA cells if the UE selects the frequenby 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* (i.e. without suffix).
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 Q_{hyst} in 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 '$\mathrm{Q_{qualmin}}$' in TS 36.304 [4], applicable for intra-frequency neighrbour cells. If the field is not present, the UE applies the (default) value of negative infinity for $\mathrm{Q_{qualmin}}$.
q-RxLevMin Parameter '$\mathrm{Q_{rxlevmin}}$' in TS 36.304 [4], applicable for intra-frequency neighbour cells.
s-IntraSearch Parameter '$\mathrm{S_{IntraSearchP}}$' 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 $\mathrm{S_{IntraSearchP}}$.
s-IntraSearchP Parameter '$\mathrm{S_{IntraSearchP}}$' in TS 36.304 [4]. See descriptions under *s-IntraSearch*.
s-IntraSearchQ Parameter '$\mathrm{S_{IntraSearchQ}}$' in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for $\mathrm{S_{IntraSearchQ}}$.
s-NonIntraSearch Parameter '$\mathrm{S_{nonIntraSearchP}}$' 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 $\mathrm{S_{nonIntraSearchP}}$.
s-NonIntraSearchP Parameter '$\mathrm{S_{nonIntraSearchP}}$' in TS 36.304 [4]. See descriptions under *s-NonIntraSearch*.
s-NonIntraSearchQ Parameter '$\mathrm{S_{nonIntraSearchQ}}$' in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for $\mathrm{S_{nonIntraSearchQ}}$.
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].
threshServingLow Parameter '$\mathrm{Thresh_{Serving,\ LowP}}$' in TS 36.304 [4].
threshServingLowQ Parameter '$\mathrm{Thresh_{Serving,\ LowQ}}$' in TS 36.304 [4].
t-ReselectionEUTRA Parameter '$\mathrm{Treselection_{EUTRA}}$' in TS 36.304 [4].
t-ReselectionEUTRA-SF Parameter 'Speed dependent ScalingFactor for $\mathrm{Treselection_{EUTRA}}$' in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

– 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**

```
-- ASN1START

SystemInformationBlockType4 ::=     SEQUENCE {
    intraFreqNeighCellList              IntraFreqNeighCellList      OPTIONAL,  -- Need OR
    intraFreqBlackCellList              IntraFreqBlackCellList          OPTIONAL,  -- Need OR
    csg-PhysCellIdRange                     PhysCellIdRange             OPTIONAL,  -- Cond CSG
    ...,
    lateNonCriticalExtension                OCTET STRING                OPTIONAL        -- Need OP
}

IntraFreqNeighCellList ::=      SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo

IntraFreqNeighCellInfo ::=      SEQUENCE {
    physCellId                              PhysCellId,
    q-OffsetCell                        Q-OffsetRange,
    ...
}

IntraFreqBlackCellList ::=      SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange

-- ASN1STOP
```

***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.
q-OffsetCell Parameter 'Qoffset$_{s,n}$' 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            OCTET STRING(CONTAINING SystemInformationBlockType5-v8h0-IEs)
                OPTIONAL   -- Need OP
}

SystemInformationBlockType5-v8h0-IEs ::=  SEQUENCE {
    interFreqCarrierFreqList-v8h0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v8h0
    OPTIONAL,  -- Need OP
    nonCriticalExtension            SystemInformationBlockType5-v9e0-IEs  OPTIONAL   -- Need OP
}

SystemInformationBlockType5-v9e0-IEs ::=  SEQUENCE {
    interFreqCarrierFreqList-v9e0   SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v9e0
    OPTIONAL,  -- Need OR
    nonCriticalExtension            SystemInformationBlockType5-v10j0-IEs                OPTIONAL   -- Need
OP
}

SystemInformationBlockType5-v10j0-IEs ::= SEQUENCE {
    interFreqCarrierFreqList-v10j0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v10j0
    OPTIONAL,  -- Need OR
    nonCriticalExtension            SEQUENCE {}                     OPTIONAL
}

InterFreqCarrierFreqList ::=      SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo
```

```
InterFreqCarrierFreqInfo ::=     SEQUENCE {
    dl-CarrierFreq                          ARFCN-ValueEUTRA,
    q-RxLevMin                              Q-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,
    q-OffsetFreq                        Q-OffsetRange                   DEFAULT dB0,
    interFreqNeighCellList                  InterFreqNeighCellList          OPTIONAL,       -- Need OR
    interFreqBlackCellList                  InterFreqBlackCellList          OPTIONAL,       -- Need OR
    ...,
    [[  q-QualMin-r9                    Q-QualMin-r9                    OPTIONAL,       -- Need OP
        threshX-Q-r9                    SEQUENCE {
            threshX-HighQ-r9                    ReselectionThresholdQ-r9,
            threshX-LowQ-r9                         ReselectionThresholdQ-r9
        }                                                           OPTIONAL        -- Cond RSRQ
    ]]
}

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 {
    freqBandInfo-r10                    NS-PmaxList-r10                 OPTIONAL,  -- Need OR
```

```
    multiBandInfoList-v10j0            MultiBandInfoList-v10j0        OPTIONAL   -- Need OR
}

InterFreqNeighCellList ::=          SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo

InterFreqNeighCellInfo ::=          SEQUENCE {
    physCellId                          PhysCellId,
    q-OffsetCell                    Q-OffsetRange
}

InterFreqBlackCellList ::=          SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange

-- ASN1STOP
```

***SystemInformationBlockType5* field descriptions**
freqBandInfo A list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band represented by *dl-CarrierFreq* for which cell reselection parameters are common.
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* and/ or *interFreqCarrierFreqList-v9e0* 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.
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 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).
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 '$\text{Qoffset}_{s,n}$' in TS 36.304 [4].
q-OffsetFreq Parameter '$\text{Qoffset}_{\text{frequency}}$' in TS 36.304 [4].
q-QualMin Parameter '$\text{Q}_{\text{qualmin}}$' in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for $\text{Q}_{\text{qualmin}}$.
threshX-High Parameter '$\text{Thresh}_{\text{X, HighP}}$' in TS 36.304 [4].
threshX-HighQ Parameter '$\text{Thresh}_{\text{X, HighQ}}$' in TS 36.304 [4].
threshX-Low Parameter '$\text{Thresh}_{\text{X, LowP}}$' in TS 36.304 [4].
threshX-LowQ Parameter '$\text{Thresh}_{\text{X, LowQ}}$' in TS 36.304 [4].
t-ReselectionEUTRA Parameter '$\text{Treselection}_{\text{EUTRA}}$' in TS 36.304 [4].
t-ReselectionEUTRA-SF Parameter 'Speed dependent ScalingFactor for $\text{Treselection}_{\text{EUTRA}}$' in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

Conditional presence	**Explanation**
dl-FreqMax	The field is mandatory present if, for the corresponding entry in *InterFreqCarrierFreqList* (i.e. without suffix), *dl-CarrierFreq* (i.e. without suffix) is set to *maxEARFCN*. Otherwise the field is not present.
RSRQ	The field is mandatory present if *threshServingLowQ* is present in *systemInformationBlockType3*; otherwise it is not present.

– SystemInformationBlockType6

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,       -- Need OR
    carrierFreqListUTRA-TDD             CarrierFreqListUTRA-TDD         OPTIONAL,       -- Need OR
    t-ReselectionUTRA                   T-Reselection,
    t-ReselectionUTRA-SF                SpeedStateScaleFactors          OPTIONAL,       -- Need OP
    ...,
    lateNonCriticalExtension            OCTET STRING(CONTAINING SystemInformationBlockType6-v8h0-IEs)
            OPTIONAL   -- Need OP
}

SystemInformationBlockType6-v8h0-IEs ::= SEQUENCE {
    carrierFreqListUTRA-FDD-v8h0 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqInfoUTRA-
FDD-v8h0 OPTIONAL, -- Need OR
    nonCriticalExtension        SEQUENCE {}                     OPTIONAL   -- Need OP
}

CarrierFreqListUTRA-FDD ::=     SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD

CarrierFreqUTRA-FDD ::=             SEQUENCE {
    carrierFreq                         ARFCN-ValueUTRA,
    cellReselectionPriority             CellReselectionPriority         OPTIONAL,       -- Need OP
    threshX-High                    ReselectionThreshold,
    threshX-Low                         ReselectionThreshold,
    q-RxLevMin                          INTEGER (-60..-13),
    p-MaxUTRA                           INTEGER (-50..33),
    q-QualMin                           INTEGER (-24..0),
    ...,
    [[  threshX-Q-r9                SEQUENCE {
            threshX-HighQ-r9                ReselectionThresholdQ-r9,
            threshX-LowQ-r9                     ReselectionThresholdQ-r9
        }                                                       OPTIONAL        -- Cond RSRQ
    ]]
}

CarrierFreqInfoUTRA-FDD-v8h0 ::=            SEQUENCE {
```

```
    multiBandInfoList               SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-UTRA-FDD
                OPTIONAL    -- Need OR
}

CarrierFreqListUTRA-TDD ::=     SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF CarrierFreqUTRA-TDD

CarrierFreqUTRA-TDD ::=             SEQUENCE {
    carrierFreq                     ARFCN-ValueUTRA,
    cellReselectionPriority         CellReselectionPriority         OPTIONAL,       -- Need OP
    threshX-High                ReselectionThreshold,
    threshX-Low                     ReselectionThreshold,
    q-RxLevMin                      INTEGER (-60..-13),
    p-MaxUTRA                       INTEGER (-50..33),
    ...
}

FreqBandIndicator-UTRA-FDD ::=              INTEGER (1..86)

-- ASN1STOP
```

***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* 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-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.
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
q-QualMin Parameter '$Q_{qualmin}$' in TS 25.304 [40]. Actual value = IE value [dB].
q-RxLevMin Parameter '$Q_{rxlevmin}$' in TS 25.304 [40]. Actual value = IE value * 2+1 [dBm].
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 '$Thresh_{X, HighP}$' in TS 36.304 [4].
threshX-HighQ Parameter '$Thresh_{X, HighQ}$' in TS 36.304 [4].
threshX-Low Parameter '$Thresh_{X, LowP}$' in TS 36.304 [4].
threshX-LowQ Parameter '$Thresh_{X, LowQ}$' 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.

– SystemInformationBlockType7

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
    carrierFreqsInfoList                CarrierFreqsInfoListGERAN       OPTIONAL,  -- Need OR
    ...,
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL        -- Need OP
}

CarrierFreqsInfoListGERAN ::=           SEQUENCE (SIZE (1..maxGNFG)) OF CarrierFreqsInfoGERAN
```

```
CarrierFreqsInfoGERAN ::=           SEQUENCE {
    carrierFreqs                    CarrierFreqsGERAN,
    commonInfo                      SEQUENCE {
        cellReselectionPriority         CellReselectionPriority         OPTIONAL,  -- Need OP
        ncc-Permitted               BIT STRING (SIZE (8)),
        q-RxLevMin                      INTEGER (0..45),
        p-MaxGERAN                          INTEGER (0..39)                     OPTIONAL,  -- Need OP
        threshX-High                ReselectionThreshold,
        threshX-Low                     ReselectionThreshold
    },
    ...
}


-- 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 [1], minimum required RX level in the GSM cell. The actual value of $Q_{rxlevmin}$ in dBm = (IE value * 2) – 115.
threshX-High Parameter '$Thresh_{X, HighP}$' in TS 36.304 [4].
threshX-Low Parameter '$Thresh_{X, LowP}$' 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].

– SystemInformationBlockType8

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 {
    systemTimeInfo                  SystemTimeInfoCDMA2000              OPTIONAL,  -- Need OR
    searchWindowSize                INTEGER (0..15)                     OPTIONAL,  -- Need OR
    parametersHRPD                  SEQUENCE {
        preRegistrationInfoHRPD             PreRegistrationInfoHRPD,
        cellReselectionParametersHRPD       CellReselectionParametersCDMA2000   OPTIONAL -- Need OR
    }                                                                   OPTIONAL,  -- Need OR
    parameters1XRTT                     SEQUENCE {
        csfb-RegistrationParam1XRTT         CSFB-RegistrationParam1XRTT         OPTIONAL,  -- Need OP
        longCodeState1XRTT                  BIT STRING (SIZE (42))              OPTIONAL,  -- Need OR
        cellReselectionParameters1XRTT      CellReselectionParametersCDMA2000   OPTIONAL -- Need OR
    }                                                                   OPTIONAL,  -- Need OR
    ...,
    lateNonCriticalExtension        OCTET STRING                        OPTIONAL,  -- Need OP
    [[  csfb-SupportForDualRxUEs-r9         BOOLEAN                             OPTIONAL,  -- Need OR
        cellReselectionParametersHRPD-v920CellReselectionParametersCDMA2000-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
    ]]
}

CellReselectionParametersCDMA2000 ::= SEQUENCE {
    bandClassList                   BandClassListCDMA2000,
    neighCellList                   NeighCellListCDMA2000,
```

```
                                            t-ReselectionCDMA2000           T-Reselection,
            t-ReselectionCDMA2000-SF        SpeedStateScaleFactors          OPTIONAL   -- Need OP
}

CellReselectionParametersCDMA2000-v920 ::= SEQUENCE {
    neighCellList-v920                  NeighCellListCDMA2000-v920
}

NeighCellListCDMA2000 ::=           SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000

NeighCellCDMA2000 ::=   SEQUENCE {
    bandClass                       BandclassCDMA2000,
    neighCellsPerFreqList               NeighCellsPerBandclassListCDMA2000
}

NeighCellsPerBandclassListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000

NeighCellsPerBandclassCDMA2000 ::=  SEQUENCE {
    arfcn                           ARFCN-ValueCDMA2000,
    physCellIdList                      PhysCellIdListCDMA2000
}

NeighCellListCDMA2000-v920 ::=      SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-v920

NeighCellCDMA2000-v920 ::=          SEQUENCE {
    neighCellsPerFreqList-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-Barring0to9-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),
    ac-Barring15-r9                     INTEGER (0..7),
    ac-BarringMsg-r9                    INTEGER (0..7),
    ac-BarringReg-r9                INTEGER (0..7),
    ac-BarringEmg-r9                    INTEGER (0..7)
}

-- 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-A [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-A [34].
ac-BarringMsg Parameter used for modifying the access class barring factor for message transmissions. It is the parameter 'MSG_PSIST' in C.S0004-A [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-A [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-A [34].
bandClass Identifies the Frequency Band in which the Carrier can be found. Details can be found in C.S0057-E [24, Table 1.5].
bandClassList List of CDMA2000 frequency bands.
cellReselectionParameters1XRTT Cell reselection parameters applicable only 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-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].
longCodeState1XRTT The state of long code generation registers in CDMA2000 1XRTT system as defined in C.S0002-A [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 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.
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-A [12] or C.S0024-A [26].
neighCellsPerFreqList-v920 Extended list of neighbour cell ids, in the same CDMA2000 Frequency Band as the corresponding instance in 'NeighCellListCDMA2000'.

***SystemInformationBlockType8* field descriptions**
parameters1XRTT Parameters applicable for interworking with CDMA2000 1XRTT system.
parametersHRPD Parameters applicable only for interworking with CDMA2000 HRPD systems.
physCellIdList Identifies the list of CDMA2000 cell ids, see C.S0002-A [12] or C.S0024-A [26].
physCellIdList-v920 Extended list of CDMA2000 cell ids, in the same CDMA2000 ARFCN as the corresponding instance in 'NeighCellsPerBandclassCDMA2000'.
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-A [25, Table 2.6.6.2.1-1] and C.S0024-A [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].
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.
threshX-High Parameter '$\text{Thresh}_{\text{X, HighP}}$' 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 $\log_{10} E_c/I_o$) in units of 0.5 dB, as defined in C.S0005-A [25].
threshX-Low Parameter '$\text{Thresh}_{\text{X, LowP}}$' 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-A [25].
t-ReselectionCDMA2000 Parameter '$\text{Treselection}_{\text{CDMA\_HRPD}}$' or '$\text{Treselection}_{\text{CDMA\_1xRTT}}$' in TS 36.304 [4].
t-ReselectionCDMA2000-SF Parameter 'Speed dependent ScalingFactor for $\text{Treselection}_{\text{CDMA-HRPD}}$' or $\text{Treselection}_{\text{CDMA-1xRTT}}$' 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.
REG-1XRTT	The field is optional present, need OR, if *csfb-RegistrationParam1XRTT* is present; 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        -- Need OP
}


-- 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)),
    dummy                               OCTET STRING (SIZE (50))        OPTIONAL,       -- Need OP
    ...,
    lateNonCriticalExtension            OCTET STRING            OPTIONAL        -- Need OP
}


-- ASN1STOP
```

***SystemInformationBlockType10* field descriptions**
messageIdentifier 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, 9.4.1.2.2], 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, 9.4.1.2.1], 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 should 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

SystemInformationBlockType11 ::=    SEQUENCE {
    messageIdentifier                   BIT STRING (SIZE (16)),
    serialNumber                    BIT STRING (SIZE (16)),
    warningMessageSegmentType           ENUMERATED {notLastSegment, lastSegment},
    warningMessageSegmentNumber         INTEGER (0..63),
    warningMessageSegment               OCTET STRING,
    dataCodingScheme                    OCTET STRING (SIZE (1))         OPTIONAL,  -- Cond Segment1
    ...,
    lateNonCriticalExtension            OCTET STRING            OPTIONAL        -- Need OP
}

-- 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, 9.4.2.2.4] and encoded according to TS 23.038 [38].

***SystemInformationBlockType11* field descriptions**
messageIdentifier 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, 9.4.1.2.2], 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, 9.4.1.2.1], 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.

– SystemInformationBlockType12

The IE *SystemInformationBlockType12* contains a CMAS notification.

SystemInformationBlockType12 information element

```
-- ASN1START

SystemInformationBlockType12-r9 ::=     SEQUENCE {
    messageIdentifier-r9                BIT STRING (SIZE (16)),
    serialNumber-r9                     BIT STRING (SIZE (16)),
    warningMessageSegmentType-r9        ENUMERATED {notLastSegment, lastSegment},
    warningMessageSegmentNumber-r9      INTEGER (0..63),
    warningMessageSegment-r9            OCTET STRING,
    dataCodingScheme-r9                 OCTET STRING (SIZE (1))         OPTIONAL,  -- Cond Segment1
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,  -- Need OP
    ...
}

-- ASN1STOP
```

***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, 9.4.2.2.4] and encoded according to TS 23.038 [38].
messageIdentifier 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, 9.4.1.2.2], 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, 9.4.1.2.1], 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

```
-- ASN1START

SystemInformationBlockType13-r9 ::=     SEQUENCE {
    mbsfn-AreaInfoList-r9               MBSFN-AreaInfoList-r9,
    notificationConfig-r9               MBMS-NotificationConfig-r9,
    lateNonCriticalExtension            OCTET STRING                OPTIONAL,  -- Need OP
    ...
}

-- ASN1STOP
```

6.3.2 Radio resource control information elements

– AntennaInfo

The IE *AntennaInfoCommon* and the *AntennaInfoDedicated* are used to specify the common and the UE specific antenna configuration respectively.

***AntennaInfo* information elements**

```
-- ASN1START

AntennaInfoCommon ::=               SEQUENCE {
    antennaPortsCount               ENUMERATED {an1, an2, an4, spare1}
}

AntennaInfoDedicated ::=            SEQUENCE {
    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,
        setup                       ENUMERATED {closedLoop, openLoop}
    }
}

AntennaInfoDedicated-v920 ::=       SEQUENCE {
    codebookSubsetRestriction-v920      CHOICE {
        n2TxAntenna-tm8-r9              BIT STRING (SIZE (6)),
        n4TxAntenna-tm8-r9              BIT STRING (SIZE (32))
    }       OPTIONAL                                            -- Cond TM8
}

AntennaInfoDedicated-r10 ::=        SEQUENCE {
```

```
    transmissionMode-r10                ENUMERATED {
                                            tm1, tm2, tm3, tm4, tm5, tm6, tm7, tm8-v920,
                                            tm9-v1020, spare7, spare6, spare5, spare4,
                                            spare3, spare2, spare1},
    codebookSubsetRestriction-r10       BIT STRING          OPTIONAL,           -- Cond TMX
    ue-TransmitAntennaSelection         CHOICE{
        release                         NULL,
        setup                           ENUMERATED {closedLoop, openLoop}
    }
}

AntennaInfoDedicated-v10i0::=       SEQUENCE {
    maxLayersMIMO-r10               ENUMERATED {twoLayers, fourLayers, eightLayers}     OPTIONAL    -- Need OR
}


-- ASN1STOP
```

***AntennaInfo* field descriptions**
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].
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.
maxLayersMIMO Indicates the maximum number of layers for spatial multiplexing. In this release of the specification EUTRAN only configures value *fourLayers* for this field, and only configures the field when *transmissionMode* is set to *tm3* or *tm4* for the corresponding serving cell.
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 *transmissionMode* 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 *AntennaInfoDedicated* 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 and the UE takes no action i.e. continues to use the existing value, if previously configured.
TMX	The field is mandatory present if the *transmissionMode-r10* is set to *tm3*, *tm4*, *tm5* or *tm6*. The field is optionally present, need OR, if the *transmissionMode-r10* is set to *tm8* or *tm9*. Otherwise the field is not present and the UE shall delete any existing value for this field.

– AntennaInfoUL

The IE *AntennaInfoUL* is used to specify the UL antenna configuration.

***AntennaInfoUL* information elements**

```
-- ASN1START

AntennaInfoUL-r10 ::=        SEQUENCE {
    transmissionModeUL-r10                  ENUMERATED {tm1, tm2, spare6, spare5,
                                                spare4, spare3, spare2, spare1}  OPTIONAL,  -- Need OR
    fourAntennaPortActivated-r10            ENUMERATED {setup}              OPTIONAL        -- Need OR
}

-- ASN1STOP
```

AntennaInfoUL 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

CQI-ReportConfig ::=                    SEQUENCE {
    cqi-ReportModeAperiodic             CQI-ReportModeAperiodic OPTIONAL,           -- Need OR
    nomPDSCH-RS-EPRE-Offset                     INTEGER (-1..6),
    cqi-ReportPeriodic                  CQI-ReportPeriodic  OPTIONAL                -- Need ON
```

```
}

CQI-ReportConfig-v920 ::=     SEQUENCE {
    cqi-Mask-r9                     ENUMERATED {setup}      OPTIONAL,     -- Cond cqi-Setup
    pmi-RI-Report-r9                ENUMERATED {setup}      OPTIONAL      -- Cond PMIRI
}

CQI-ReportConfig-r10 ::=   SEQUENCE {
    cqi-ReportAperiodic-r10             CQI-ReportAperiodic-r10         OPTIONAL,  -- Need ON
    nomPDSCH-RS-EPRE-Offset             INTEGER (-1..6),
    cqi-ReportPeriodic-r10          CQI-ReportPeriodic-r10          OPTIONAL,  -- Need ON
    pmi-RI-Report-r9                ENUMERATED {setup}                  OPTIONAL,  -- Cond PMIRIPCell
    csi-SubframePatternConfig-r10   CHOICE {
        release                     NULL,
        setup                       SEQUENCE {
            csi-MeasSubframeSet1-r10        MeasSubframePattern-r10,
            csi-MeasSubframeSet2-r10        MeasSubframePattern-r10
        }
    }                                                       OPTIONAL   -- Need ON
}

CQI-ReportConfigSCell-r10 ::=               SEQUENCE {
    cqi-ReportModeAperiodic-r10         CQI-ReportModeAperiodic OPTIONAL,         -- Need OR
    nomPDSCH-RS-EPRE-Offset-r10             INTEGER (-1..6),

    cqi-ReportPeriodicSCell-r10         CQI-ReportPeriodic-r10          OPTIONAL,  -- Need ON
    pmi-RI-Report-r10               ENUMERATED {setup}                  OPTIONAL   -- Cond PMIRISCell
}

CQI-ReportPeriodic ::=      CHOICE {
    release                     NULL,
    setup                       SEQUENCE {
        cqi-PUCCH-ResourceIndex             INTEGER (0..1185),
        cqi-pmi-ConfigIndex             INTEGER (0..1023),
        cqi-FormatIndicatorPeriodic             CHOICE {
```

```
            widebandCQI                         NULL,
            subbandCQI                          SEQUENCE {
                k                               INTEGER (1..4)
            }
        },
        ri-ConfigIndex                      INTEGER (0..1023) OPTIONAL,             -- Need OR
        simultaneousAckNackAndCQI           BOOLEAN
    }
}

CQI-ReportPeriodic-r10 ::=      CHOICE {
    release                             NULL,
    setup                               SEQUENCE {
        cqi-PUCCH-ResourceIndex-r10             INTEGER (0..1184),
        cqi-PUCCH-ResourceIndexP1-r10       INTEGER (0..1184)               OPTIONAL,  -- Need OR
        cqi-pmi-ConfigIndex             INTEGER (0..1023),
        cqi-FormatIndicatorPeriodic-r10         CHOICE {
            widebandCQI-r10                         SEQUENCE {
                csi-ReportMode-r10      ENUMERATED {submode1, submode2}      OPTIONAL   -- Need OR
            },
            subbandCQI-r10                      SEQUENCE {
                k                               INTEGER (1..4),
                periodicityFactor-r10                   ENUMERATED {n2, n4}
            }
        },
        ri-ConfigIndex                  INTEGER (0..1023)       OPTIONAL,               -- Need OR
        simultaneousAckNackAndCQI       BOOLEAN,
        cqi-Mask-r9                     ENUMERATED {setup}          OPTIONAL,               -- Need OR
        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
```

```
    }
}

CQI-ReportAperiodic-r10    ::=      CHOICE {
    release                         NULL,
    setup                           SEQUENCE {
        cqi-ReportModeAperiodic-r10         CQI-ReportModeAperiodic,
        aperiodicCSI-Trigger-r10            SEQUENCE {
            trigger1-r10                BIT STRING (SIZE (8)),
            trigger2-r10                BIT STRING (SIZE (8))
        }                                                   OPTIONAL  -- Need OR
    }
}

CQI-ReportModeAperiodic ::=             ENUMERATED {
                                    rm12, rm20, rm22, rm30, rm31,
                                    spare3, spare2, spare1
}

-- ASN1STOP
```

***CQI-ReportConfig* field descriptions**
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 and *trigger2* corresponds to the CSI request field 11, see TS 36.213 [23, table 7.2.1-1A]. 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. One value applies for all serving cells (the associated functionality is common i.e. not performed independently for each cell).
cqi-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 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.*
cqi-pmi-ConfigIndex2 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]. The parameter applies to the subframe pattern corresponding to *csi-MeasSubframeSet2.*
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.
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* configured for the PCell when the transmission bandwidth of the PCell in downlink is 6 resource blocks.
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-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].
csi-ReportMode Parameter: *PUCCH_format1-1_CSI_reporting_mode,* see TS 36.213 [23, 7.2.2].
K 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 = IE value * 2 [dB].
periodicityFactor Parameter: H', see TS 36.213 [23, 7.2.2].
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 or tm9*.
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) 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.* E-UTRAN configures *ri-ConfigIndex2* only if *ri-ConfigIndex* is configured.
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. For SCells this field is not applicable and the UE shall ignore the value.

Conditional presence	Explanation
cqi-Setup	The field is optional present, need OR, if the *cqi-ReportPeriodic* in the *cqi-ReportConfig* is set to *setup*. If the field *cqi-ReportPeriodic* is present 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 and the UE takes no action i.e. continues to use the existing value, if previously configured.
PMIRI	The field is optional present, need OR, if *cqi-ReportPeriodic* is included and set to *setup*, or *cqi-ReportModeAperiodic* is included. If the field *cqi-ReportPeriodic* is present and set to *release* and *cqi-ReportModeAperiodic* is absent, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present and the UE takes no action i.e. continues to use the existing value, if previously configured.
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 and the UE takes no action i.e. continues to use the existing value, if previously configured.
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 and the UE takes no action i.e. continues to use the existing value, if previously configured.

– 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)
        }
    }
}

-- ASN1STOP
```

***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 DCI formats, see TS 36.212 [22, 5.3.3.1].
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.

– 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 {
    csi-RS-r10                  CHOICE {
        release                 NULL,
        setup                   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       CHOICE {
        release                 NULL,
        setup                   SEQUENCE {
            zeroTxPowerResourceConfigList-r10   BIT STRING (SIZE (16)),
            zeroTxPowerSubframeConfig-r10       INTEGER (0..154)
        }
    }                                                   OPTIONAL        -- Need ON
}

-- ASN1STOP
```

***CSI-RS-Config* field descriptions**
antennaPortsCount Parameter represents the number of antenna ports used for transmission of CSI reference signals where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.5].
p-C Parameter: P_c , see TS 36.213 [23, 7.2.5].
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].
zeroTxPowerResourceConfigList Parameter: *ZeroPowerCSI-RS,* see TS 36.211 [21, 6.10.5.2].
zeroTxPowerSubframeConfig Parameter: $I_{\mathrm{CSI-RS}}$, see TS 36.211 [21, table 6.10.5.3-1].

– 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
```

– LogicalChannelConfig

The IE *LogicalChannelConfig* is used to configure the logical channel parameters.

LogicalChannelConfig information element

```
-- ASN1START

LogicalChannelConfig ::=            SEQUENCE {
    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},
        bucketSizeDuration                  ENUMERATED {
                                            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
    ]]
}

-- ASN1STOP
```

LogicalChannelConfig field descriptions
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.
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].
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 *ul-SpecificParameters* is present, need OR; otherwise it is not present.
UL	The field is mandatory present for UL logical channels; otherwise it is not present.

– MAC-MainConfig

The IE *MAC-MainConfig* is used to specify the MAC main configuration for signalling and data radio bearers.

MAC-MainConfig **information element**

```
-- ASN1START

MAC-MainConfig ::=                  SEQUENCE {
    ul-SCH-Config                   SEQUENCE {
        maxHARQ-Tx                      ENUMERATED {
                                    n1, n2, n3, n4, n5, n6, n7, n8,
                                    n10, n12, n16, n20, n24, n28,
                                    spare2, spare1}         OPTIONAL,  -- Need ON
        periodicBSR-Timer               ENUMERATED {
                                    sf5, sf10, sf16, sf20, sf32, sf40, sf64, sf80,
                                    sf128, sf160, sf320, sf640, sf1280, sf2560,
```

```
                                        infinity, spare1}   OPTIONAL,  -- Need ON
        retxBSR-Timer                   ENUMERATED {
                                        sf320, sf640, sf1280, sf2560, sf5120,
                                        sf10240, spare2, spare1},
        ttiBundling                     BOOLEAN
    }                                                       OPTIONAL,  -- Need ON
    drx-Config                      DRX-Config              OPTIONAL,  -- Need ON
    timeAlignmentTimerDedicated         TimeAlignmentTimer,
    phr-Config                      CHOICE {
        release                     NULL,
        setup                       SEQUENCE {
            periodicPHR-Timer               ENUMERATED {sf10, sf20, sf50, sf100, sf200,
                                                    sf500, sf1000, infinity},
            prohibitPHR-Timer               ENUMERATED {sf0, sf10, sf20, sf50, sf100,
                                                        sf200, sf500, sf1000},
            dl-PathlossChange               ENUMERATED {dB1, dB3, dB6, infinity}
        }
    }                                                       OPTIONAL,  -- Need ON
    ...,
    [[  sr-ProhibitTimer-r9             INTEGER (0..7)          OPTIONAL   -- Need ON
    ]],
    [[  mac-MainConfig-v1020            SEQUENCE {
            sCellDeactivationTimer-r10      ENUMERATED {
                                            rf2, rf4, rf8, rf16, rf32, rf64, rf128,
                                            spare}          OPTIONAL,  -- Need OP
            extendedBSR-Sizes-r10           ENUMERATED {setup}          OPTIONAL,  -- Need OR
            extendedPHR-r10                     ENUMERATED {setup}          OPTIONAL   -- Need OR
        }                                                   OPTIONAL   -- Need ON
    ]]
}


DRX-Config ::=                      CHOICE {
    release                         NULL,
    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},
    drx-RetransmissionTimer             ENUMERATED {
                                    psf1, psf2, psf4, psf6, psf8, psf16,
                                    psf24, psf33},
    longDRX-CycleStartOffset        CHOICE {
        sf10                        INTEGER(0..9),
        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),
        sf256                       INTEGER(0..255),
        sf320                       INTEGER(0..319),
        sf512                       INTEGER(0..511),
        sf640                       INTEGER(0..639),
        sf1024                      INTEGER(0..1023),
        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                                            -- Need OR
    }
}

-- ASN1STOP
```

***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-InactivityTimer 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.
drx-RetransmissionTimer 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.
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.
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*). Otherwise the power headroom shall be reported using the Power Headroom Report MAC control element defined in TS 36.321 [6]. E-UTRAN always configures the value *setup* if more than one Serving Cell with uplink is configured. E-UTRAN configures *extendedPHR* only if *phr-Config* is configured. The UE shall release *extendedPHR* if *phr-Config* is released.
longDRX-CycleStartOffset *longDRX-Cycle* and *drxStartOffset* in TS 36.321 [6]. The value of l*ongDRX-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.
maxHARQ-Tx Maximum number of transmissions for UL HARQ in TS 36.321 [6].
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.
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.
prohibitPHR-Timer Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes, sf100 corresponds to 100 subframes and so on.
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. 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 (although the associated functionality is performed independently for each 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.
sr-ProhibitTimer Timer for SR transmission on PUCCH in TS 36.321 [6]. Value in number of SR period(s). Value 0 means no timer for SR transmission on PUCCH is configured. Value 1 corresponds to one SR period, Value 2 corresponds to 2*SR periods and so on.
ttiBundling 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 only for configurations 0, 1 and 6. For TDD, E-UTRAN does not simultaneously enable TTI bundling and semi-persistent scheduling in this release of specification. Furthermore, E-UTRAN does not simultaneously configure TTI bundling and SCells with configured uplink.

– 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 ::=                     SEQUENCE {
    discardTimer                    ENUMERATED {
                                        ms50, ms100, ms150, ms300, ms500,
                                        ms750, ms1500, infinity
    }                                                   OPTIONAL,           -- Cond Setup
    rlc-AM                              SEQUENCE {
        statusReportRequired                BOOLEAN
    }                                                   OPTIONAL,           -- Cond Rlc-AM
    rlc-UM                              SEQUENCE {
        pdcp-SN-Size                    ENUMERATED {len7bits, len12bits}
    }                                                   OPTIONAL,           -- Cond Rlc-UM
    headerCompression                   CHOICE {
        notUsed                             NULL,
        rohc                            SEQUENCE {
            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
            },
            ...
        }
    },
    ...,
```

```
    [[  rn-IntegrityProtection-r10      ENUMERATED {enabled} OPTIONAL   -- Cond RN
    ]]
}


-- 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.
maxCID Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8].
pdcp-SN-Size Indicates the PDCP Sequence Number length in bits. Value len7bits means that the 7-bit PDCP SN format is used and len12bits means that the 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.
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 as specified in TS 36.323 [8].

Conditional presence	Explanation
Rlc-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 for a radio bearer configured with RLC AM. Otherwise the field is not present.
Rlc-UM	The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC UM. 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.

– 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),
    p-b                         INTEGER (0..3)
```

```
}

PDSCH-ConfigDedicated::=        SEQUENCE {
    p-a                         ENUMERATED {
                                    dB-6, dB-4dot77, dB-3, dB-1dot77,
                                    dB0, dB1, dB2, dB3}
}

-- ASN1STOP
```

***PDSCH-Config* field descriptions**
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-b Parameter: P_B , see TS 36.213 [23, Table 5.2-1].
referenceSignalPower Parameter: *Reference-signal power*, which provides the downlink reference-signal EPRE, see TS 36.213 [23, 5.2]. The actual value in dBm.

– 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
    pucch-ConfigDedicated               PUCCH-ConfigDedicated           OPTIONAL,       -- Need ON
    pusch-ConfigDedicated               PUSCH-ConfigDedicated           OPTIONAL,       -- Need ON
    uplinkPowerControlDedicated             UplinkPowerControlDedicated     OPTIONAL,       -- Need ON
    tpc-PDCCH-ConfigPUCCH                   TPC-PDCCH-Config                OPTIONAL,       -- Need ON
    tpc-PDCCH-ConfigPUSCH                   TPC-PDCCH-Config                OPTIONAL,       -- Need ON
    cqi-ReportConfig                    CQI-ReportConfig                OPTIONAL,       -- Cond CQI-r8
    soundingRS-UL-ConfigDedicated           SoundingRS-UL-ConfigDedicated OPTIONAL,       -- Need ON
    antennaInfo                         CHOICE {
        explicitValue                       AntennaInfoDedicated,
        defaultValue                        NULL
    }       OPTIONAL,                                                               -- Cond AI-r8
    schedulingRequestConfig                 SchedulingRequestConfig     OPTIONAL,           -- Need ON
    ...,
    [[  cqi-ReportConfig-v920               CQI-ReportConfig-v920   OPTIONAL,       -- Cond CQI-r8
        antennaInfo-v920                    AntennaInfoDedicated-v920   OPTIONAL        -- Cond AI-r8
    ]],
    [[  antennaInfo-r10                     CHOICE {
            explicitValue-r10               AntennaInfoDedicated-r10,
            defaultValue                    NULL
        }       OPTIONAL,                                                           -- Cond AI-r10
        antennaInfoUL-r10                   AntennaInfoUL-r10               OPTIONAL,       -- Need ON
        cif-Presence-r10                    BOOLEAN                             OPTIONAL,   -- Need ON
        cqi-ReportConfig-r10                CQI-ReportConfig-r10            OPTIONAL,       -- Cond CQI-r10
        csi-RS-Config-r10                   CSI-RS-Config-r10               OPTIONAL,       -- Need ON
        pucch-ConfigDedicated-v1020         PUCCH-ConfigDedicated-v1020         OPTIONAL,       -- Need ON
        pusch-ConfigDedicated-v1020         PUSCH-ConfigDedicated-v1020         OPTIONAL,       -- Need ON
        schedulingRequestConfig-v1020       SchedulingRequestConfig-v1020   OPTIONAL,       -- Need ON
        soundingRS-UL-ConfigDedicated-v1020
                                SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL,       -- Need ON
        soundingRS-UL-ConfigDedicatedAperiodic-r10
```

```
                                SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL,  -- Need ON
        uplinkPowerControlDedicated-v1020  UplinkPowerControlDedicated-v1020 OPTIONAL   -- Need ON
    ]],
    [[  additionalSpectrumEmissionCA-r10            CHOICE {
            release                                 NULL,
            setup                                   SEQUENCE {
                additionalSpectrumEmissionPCell-r10     AdditionalSpectrumEmission
            }
        }           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,  -- Need ON
        crossCarrierSchedulingConfig-r10    CrossCarrierSchedulingConfig-r10 OPTIONAL,  -- Need ON
        csi-RS-Config-r10                   CSI-RS-Config-r10         OPTIONAL,  -- Need ON
        pdsch-ConfigDedicated-r10           PDSCH-ConfigDedicated     OPTIONAL   -- Need ON
    }                                                   OPTIONAL,  -- Cond SCellAdd
    -- UL configuration
    ul-Configuration-r10                SEQUENCE {
        antennaInfoUL-r10                   AntennaInfoUL-r10         OPTIONAL,  -- Need ON
        pusch-ConfigDedicatedSCell-r10          PUSCH-ConfigDedicatedSCell-r10      OPTIONAL,  -- Need ON
        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,       -- Need ON
        soundingRS-UL-ConfigDedicatedAperiodic-r10
                                SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL   -- Need ON
    }                                                       OPTIONAL,  -- Cond CommonUL
    ...
}
```

```
-- ASN1STOP
```

***PhysicalConfigDedicated* field descriptions**
additionalSpectrumEmissionPCell E-UTRAN does not configure this field in this release of the specification.
antennaInfo A choice is used to indicate whether the *antennaInfo* is signalled explicitly or set to the default antenna configuration as specified in section 9.2.4.
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].

Conditional presence	Explanation
AI-r8	The field is optionally present, need ON, if *antennaInfoDedicated-r10* is absent. Otherwise the field is not present
AI-r10	The field is optionally present, need ON, if *antennaInfoDedicated* is absent. Otherwise the field is not present
CommonUL	The field is mandatory present if *ul-Configuration* of *RadioResourceConfigCommonSCell-r10* 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 *cqi-ReportConfig* is absent. Otherwise the field is not present
SCellAdd	The field is mandatory present if cellIdentification is present; otherwise it is optional, need ON.

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.

– P-Max

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].

P-Max information element

```
-- ASN1START

P-Max ::=               INTEGER (-30..33)

-- 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 ::=                 SEQUENCE {
    rootSequenceIndex                   INTEGER (0..837),
    prach-ConfigInfo                PRACH-ConfigInfo
}

PRACH-Config ::=                    SEQUENCE {
    rootSequenceIndex                   INTEGER (0..837),
    prach-ConfigInfo                PRACH-ConfigInfo                    OPTIONAL   -- Need ON
}

PRACH-ConfigSCell-r10 ::=               SEQUENCE {
    prach-ConfigIndex-r10                   INTEGER (0..63)
}

PRACH-ConfigInfo ::=                SEQUENCE {
    prach-ConfigIndex                   INTEGER (0..63),
    highSpeedFlag                       BOOLEAN,
    zeroCorrelationZoneConfig           INTEGER (0..15),
    prach-FreqOffset                INTEGER (0..94)
}

-- ASN1STOP
```

***PRACH-Config* field descriptions**
highSpeedFlag Parameter: High-speed-flag, see TS 36.211, [21, 5.7.2].TRUE corresponds to Restricted set and FALSE to Unrestricted set.
prach-ConfigIndex Parameter: *prach-ConfigurationIndex*, see TS 36.211 [21, 5.7.1].
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*.
rootSequenceIndex Parameter: *RACH_ROOT_SEQUENCE*, see TS 36.211 [21, 5.7.1].
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.

– 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 {
    deltaPUCCH-Shift                ENUMERATED {ds1, ds2, ds3},
    nRB-CQI                         INTEGER (0..98),
    nCS-AN                          INTEGER (0..7),
    n1PUCCH-AN                          INTEGER (0..2047)
}

PUCCH-ConfigDedicated ::=           SEQUENCE {
    ackNackRepetition               CHOICE{
        release                     NULL,
        setup                       SEQUENCE {
            repetitionFactor            ENUMERATED {n2, n4, n6, spare1},
            n1PUCCH-AN-Rep                  INTEGER (0..2047)
        }
    },
    tdd-AckNackFeedbackMode             ENUMERATED {bundling, multiplexing}     OPTIONAL    -- Cond TDD
}

PUCCH-ConfigDedicated-v1020 ::=     SEQUENCE {
```

```
    pucch-Format-r10                CHOICE {
        format3-r10                         SEQUENCE {
            n3PUCCH-AN-List-r10 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)    OPTIONAL,  -- Need ON
            twoAntennaPortActivatedPUCCH-Format3-r10        CHOICE {
                release                                 NULL,
                setup                                   SEQUENCE {
                    n3PUCCH-AN-ListP1-r10   SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)
                }
            }                                                   OPTIONAL   -- Need ON
        },
        channelSelection-r10            SEQUENCE {
            n1PUCCH-AN-CS-r10                   CHOICE {
                release                         NULL,
                setup                           SEQUENCE {
                    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
    simultaneousPUCCH-PUSCH-r10                         ENUMERATED {true}       OPTIONAL,  -- Need OR
    n1PUCCH-AN-RepP1-r10                            INTEGER (0..2047)       OPTIONAL   -- Need OR
}

N1PUCCH-AN-CS-r10 ::= SEQUENCE (SIZE (1..4)) 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].
deltaPUCCH-Shift Parameter: $\Delta_{\text{shift}}^{\text{PUCCH}}$, see 36.211 [21, 5.4.1], where ds1 corresponds to value 1 ds2 to 2 etc.
n1PUCCH-AN Parameter: $N_{PUCCH}^{(1)}$, see TS 36.213 [23, 10.1].
n1PUCCH-AN-CS-List Parameter: $n_{\text{PUCCH},i}^{(1)}$ for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1.2.2.1, 10.1.3.2.1].
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: $n_{\text{PUCCH}}^{(3,p)}$ 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].
nRB-CQI Parameter: $N_{\text{RB}}^{(2)}$, see TS 36.211 [21, 5.4].
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.
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, only when the *nonContiguousUL-RA-WithinCC-Info* is set to *supported* in the band on which PCell is configured.
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 *pucch-Format* is not present. If the *pucch-Format* is present, the field is not present. 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-ConfigDedicated ::=               SEQUENCE {
    betaOffset-ACK-Index                INTEGER (0..15),
    betaOffset-RI-Index                 INTEGER (0..15),
    betaOffset-CQI-Index                INTEGER (0..15)
}

PUSCH-ConfigDedicated-v1020 ::=         SEQUENCE {
    betaOffsetMC-r10                    SEQUENCE {
        betaOffset-ACK-Index-MC-r10             INTEGER (0..15),
        betaOffset-RI-Index-MC-r10              INTEGER (0..15),
        betaOffset-CQI-Index-MC-r10             INTEGER (0..15)
    }                                                           OPTIONAL,  -- Need OR
    groupHoppingDisabled-r10            ENUMERATED {true}               OPTIONAL,  -- Need OR
    dmrs-WithOCC-Activated-r10              ENUMERATED {true}               OPTIONAL   -- Need OR
}

PUSCH-ConfigDedicatedSCell-r10 ::=          SEQUENCE {
    groupHoppingDisabled-r10                ENUMERATED {true}           OPTIONAL,  -- Need OR
    dmrs-WithOCC-Activated-r10                  ENUMERATED {true}           OPTIONAL   -- Need OR
}

UL-ReferenceSignalsPUSCH ::=            SEQUENCE {
    groupHoppingEnabled                     BOOLEAN,
    groupAssignmentPUSCH                    INTEGER (0..29),
    sequenceHoppingEnabled                  BOOLEAN,
    cyclicShift                         INTEGER (0..7)
```

```
}

-- ASN1STOP
```

***PUSCH-Config* field descriptions**
betaOffset-ACK-Index, betaOffset-ACK-Index-MC Parameter: $I_{offset}^{HARQ-ACK}$, for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-1]. One value applies for all serving cells with an uplink (the associated functionality is common i.e. not performed independently for each cell).
betaOffset-CQI-Index, betaOffset-CQI-Index-MC Parameter: I_{offset}^{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 (the associated functionality is common i.e. not performed independently for each cell).
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 (the associated functionality is common i.e. not performed independently for each cell).
cyclicShift Parameters: *cyclicShift*, *s*ee TS 36.211 [21, Table 5.5.2.1.1-2].
dmrs-WithOCC-Activated Parameter: *Activate-DMRS-with OCC*, see TS 36.211 [21, 5.5.2.1].
enable64QAM See TS 36.213 [23, 8.6.1]. TRUE indicates that 64QAM is allowed while FALSE indicates that 64QAM is not allowed.
groupAssignmentPUSCH Parameter: *ΔSS* 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].
n-SB Parameter: N_{sb} see TS 36.211 [21, 5.3.4].
pusch-hoppingOffset Parameter: $N_{\mathrm{RB}}^{\mathrm{HO}}$, see TS 36.211 [21, 5.3.4].
sequenceHoppingEnabled Parameter: *Sequence-hopping-enabled*, see TS 36.211 [21, 5.5.1.4].
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                        SEQUENCE {
        numberOfRA-Preambles                    ENUMERATED {
                                                n4, n8, n12, n16 ,n20, n24, n28,
```

```
                                        n32, n36, n40, n44, n48, n52, n56,
                                        n60, n64},
    preamblesGroupAConfig                   SEQUENCE {
        sizeOfRA-PreamblesGroupA                ENUMERATED {
                                            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                  SEQUENCE {
    powerRampingStep                    ENUMERATED {dB0, dB2,dB4, dB6},
    preambleInitialReceivedTargetPower  ENUMERATED {
                                        dBm-120, dBm-118, dBm-116, dBm-114, dBm-112,
                                        dBm-110, dBm-108, dBm-106, dBm-104, dBm-102,
                                        dBm-100, dBm-98, dBm-96, dBm-94,
                                        dBm-92, dBm-90}
},
ra-SupervisionInfo                  SEQUENCE {
    preambleTransMax                    ENUMERATED {
                                        n3, n4, n5, n6, n7,     n8, n10, n20, n50,
                                        n100, n200},
    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),
...
```

```
}

-- ASN1STOP
```

RACH-ConfigCommon field descriptions
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.
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 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.
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.
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
    ]]
}

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
    pucch-ConfigCommon                  PUCCH-ConfigCommon                  OPTIONAL,   -- Need ON
    soundingRS-UL-ConfigCommon          SoundingRS-UL-ConfigCommon          OPTIONAL,   -- Need ON
```

```
    uplinkPowerControlCommon            UplinkPowerControlCommon            OPTIONAL,  -- Need ON
    antennaInfoCommon                   AntennaInfoCommon           OPTIONAL,  -- Need ON
    p-Max                               P-Max                           OPTIONAL,  -- Need OP
    tdd-Config                          TDD-Config                          OPTIONAL,  -- Cond TDD
    ul-CyclicPrefixLength               UL-CyclicPrefixLength,
    ...,
    [[  uplinkPowerControlCommon-v1020  UplinkPowerControlCommon-v1020      OPTIONAL   -- Need ON
    ]]
}

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
        antennaInfoCommon-r10                   AntennaInfoCommon,
        mbsfn-SubframeConfigList-r10        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-r10                      TDD-Config                  OPTIONAL   -- Cond TDDSCell
    },
    -- UL configuration
    ul-Configuration-r10                SEQUENCE {
        ul-FreqInfo-r10                 SEQUENCE {
            ul-CarrierFreq-r10              ARFCN-ValueEUTRA            OPTIONAL,  -- Need OP
            ul-Bandwidth-r10                ENUMERATED {n6, n15,
                                            n25, n50, n75, n100}OPTIONAL,  -- Need OP
            additionalSpectrumEmissionSCell-r10     AdditionalSpectrumEmission
        },
        p-Max-r10                       P-Max                       OPTIONAL,  -- Need OP
        uplinkPowerControlCommonSCell-r10       UplinkPowerControlCommonSCell-r10,
        -- A special version of IE UplinkPowerControlCommon may be introduced
```

```
        -- 3: Physical configuration, control
        soundingRS-UL-ConfigCommon-r10      SoundingRS-UL-ConfigCommon,
        ul-CyclicPrefixLength-r10           UL-CyclicPrefixLength,
        -- 4: Physical configuration, physical channels
        prach-ConfigSCell-r10               PRACH-ConfigSCell-r10       OPTIONAL,  -- Cond TDD-OR
        pusch-ConfigCommon-r10              PUSCH-ConfigCommon
    }                                                                   OPTIONAL,  -- Need OR
    ...,
    [[  ul-CarrierFreq-v1090                ARFCN-ValueEUTRA-v9e0           OPTIONAL    -- Need OP
    ]]
}

BCCH-Config ::=                     SEQUENCE {
    modificationPeriodCoeff             ENUMERATED {n2, n4, n8, n16}
}

PCCH-Config ::=                     SEQUENCE {
    defaultPagingCycle                  ENUMERATED {
                                            rf32, rf64, rf128, rf256},
    nB                                  ENUMERATED {
                                            fourT, twoT, oneT, halfT, quarterT, oneEighthT,
                                            oneSixteenthT, oneThirtySecondT}
}

UL-CyclicPrefixLength ::=           ENUMERATED {len1, len2}

-- ASN1STOP
```

***RadioResourceConfigCommon* field descriptions**
additionalSpectrumEmissionSCell The UE requirements related to IE *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.
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 and n16 corresponds to value 16.
nB 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.
p-Max Pmax to be used in the target cell. If absent the UE applies the maximum power according to the UE capability.
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.
UL-CyclicPrefixLength Parameter: Uplink cyclic prefix length see 36.211 [21, 5.2.1] where len1 corresponds to normal cyclic prefix and len2 corresponds to extended cyclic prefix.

Conditional presence	Explanation
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.
TDD-OR	The field is optional for TDD, Need OR; it is not present for FDD 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 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
    drb-ToAddModList                DRB-ToAddModList            OPTIONAL,       -- Cond HO-toEUTRA
    drb-ToReleaseList               DRB-ToReleaseList       OPTIONAL,       -- Need ON
    mac-MainConfig                  CHOICE {
            explicitValue           MAC-MainConfig,
            defaultValue            NULL
    }       OPTIONAL,                                               -- Cond HO-toEUTRA2
```

```
    sps-Config                          SPS-Config                  OPTIONAL,       -- Need ON
    physicalConfigDedicated             PhysicalConfigDedicated     OPTIONAL,       -- Need ON
    ...,
    [[  rlf-TimersAndConstants-r9       RLF-TimersAndConstants-r9   OPTIONAL    -- Need ON
    ]],
    [[  measSubframePatternPCell-r10 MeasSubframePatternPCell-r10   OPTIONAL    -- Need ON
    ]]
}

RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {
    -- UE specific configuration extensions applicable for an SCell
    physicalConfigDedicatedSCell-r10    PhysicalConfigDedicatedSCell-r10 OPTIONAL,  -- Need ON
    ...
}

SRB-ToAddModList ::=                SEQUENCE (SIZE (1..2)) OF SRB-ToAddMod

SRB-ToAddMod ::= SEQUENCE {
    srb-Identity                    INTEGER (1..2),
    rlc-Config                      CHOICE {
        explicitValue                   RLC-Config,
        defaultValue                    NULL
    }       OPTIONAL,                                                   -- Cond Setup
    logicalChannelConfig                CHOICE {
        explicitValue                   LogicalChannelConfig,
        defaultValue                    NULL
    }       OPTIONAL,                                                   -- Cond Setup
    ...
}

DRB-ToAddModList ::=                    SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod

DRB-ToAddMod ::=SEQUENCE {
    eps-BearerIdentity                  INTEGER (0..15)             OPTIONAL,       -- Cond DRB-Setup
    drb-Identity                    DRB-Identity,
```

```
    pdcp-Config                         PDCP-Config             OPTIONAL,       -- Cond PDCP
    rlc-Config                          RLC-Config              OPTIONAL,       -- Cond Setup
    logicalChannelIdentity              INTEGER (3..10)         OPTIONAL,       -- Cond DRB-Setup
    logicalChannelConfig                LogicalChannelConfig    OPTIONAL,       -- Cond Setup
    ...
}

DRB-ToReleaseList ::=               SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity

MeasSubframePatternPCell-r10 ::=    CHOICE {
    release                             NULL,
    setup                               MeasSubframePattern-r10
}

-- ASN1STOP
```

***RadioResourceConfigDedicated* field descriptions**
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.
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*".
measSubframePatternPCell Time domain measurement resource restriction pattern for the PCell measurements (RSRP, RSRQ and the radio link monitoring).
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 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 UM RLC SN field size only upon handover within E-UTRA or upon the first reconfiguration after RRC connection re-establishment.
sps-Config The default SPS configuration is specified in 9.2.3. Except for handover or releasing SPS, E-UTRAN does not reconfigure *sps-Config* when there is a configured downlink assignment or a configured uplink grant (see 36.321 [6]).
srb-Identity Value 1 is applicable for SRB1 only. Value 2 is applicable for SRB2 only.

Conditional presence	Explanation
DRB-Setup	The field is mandatory present if the corresponding DRB is being set up; 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; otherwise the field is optionally present, need ON. Upon connection establishment/ re-establishment only SRB1 is applicable.
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 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.
PDCP	The field is mandatory present if the corresponding DRB is being setup; the field is optionally present, need ON, upon handover within E-UTRA and upon the first reconfiguration after re-establishment but in both these cases only when fullConfig is not included in the RRCConnectionReconfiguration message; 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

The IE *RLC-Config* is used to specify the RLC configuration of SRBs and DRBs.

RLC-Config **information element**

```
-- ASN1START

RLC-Config ::=                  CHOICE {
    am                                  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
    },
    ...
}
```

```
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
}

SN-FieldLength ::=                  ENUMERATED {size5, size10}

T-PollRetransmit ::=            ENUMERATED {
                                    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, spare9, spare8,
                                    spare7, spare6, spare5, spare4, spare3,
```

```
                                        spare2, spare1}

PollPDU ::=                             ENUMERATED {
                                        p4, p8, p16, p32, p64, p128, p256, pInfinity}

PollByte ::=                        ENUMERATED {
                                        kB25, kB50, kB75, kB100, kB125, kB250, kB375,
                                        kB500, kB750, kB1000, kB1250, kB1500, kB2000,
                                        kB3000, kBinfinity, spare1}

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, spare1}

T-StatusProhibit ::=                ENUMERATED {
                                        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, spare8, spare7,
                                        spare6, spare5, spare4, spare3, spare2,
                                        spare1}

-- ASN1STOP
```

RLC-Config field descriptions
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.
pollPDU 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.
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.
t-Reordering Timer for reordering in TS 36.322 [7], in milliseconds. Value ms0 means 0ms, ms5 means 5ms and so on.
t-StatusProhibit Timer for status reporting in TS 36.322 [7], in milliseconds. Value ms0 means 0ms, ms5 means 5ms and so on.

– 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 {
    release                             NULL,
    setup                               SEQUENCE {
        t301-r9                             ENUMERATED {
                                            ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                            ms2000},
        t310-r9                             ENUMERATED {
                                            ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
        n310-r9                             ENUMERATED {
                                            n1, n2, n3, n4, n6, n8, n10, n20},
        t311-r9                             ENUMERATED {
                                            ms1000, ms3000, ms5000, ms10000, ms15000,
                                            ms20000, ms30000},
        n311-r9                             ENUMERATED {
                                            n1, n2, n3, n4, n5, n6, n8, n10},
        ...
    }
}
```

```
-- ASN1STOP
```

***RLF-TimersAndConstants* field descriptions**
n3xy 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, ms50 corresponds with 50 ms and so on.

– 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 {
                nrb6-r10                    BIT STRING (SIZE(6)),
                nrb15-r10                   BIT STRING (SIZE(8)),
                nrb25-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              CHOICE {
            interleaving-r10                ENUMERATED {crs},
            noInterleaving-r10                  ENUMERATED {crs, dmrs}
        },
        pdsch-Start-r10                 INTEGER (1..3),
        pucch-Config-r10                CHOICE {
            tdd                         CHOICE {
                channelSelectionMultiplexingBundling    SEQUENCE {
                    n1PUCCH-AN-List-r10         SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)
                },
                fallbackForFormat3              SEQUENCE {
                    n1PUCCH-AN-P0-r10               INTEGER (0..2047),
                    n1PUCCH-AN-P1-r10               INTEGER (0..2047)       OPTIONAL    -- Need OR
                }
            },
            fdd                         SEQUENCE {
                n1PUCCH-AN-P0-r10               INTEGER (0..2047),
                n1PUCCH-AN-P1-r10               INTEGER (0..2047)           OPTIONAL    -- Need OR
            }
        },
        ...
    }                                                       OPTIONAL,   -- Need ON
    ...
}

-- ASN1STOP
```

***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: $n_{\mathrm{PUCCH},i}^{(1)}$, 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: $n_{\mathrm{PUCCH}}^{(1,p)}$, 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].
resourceAllocationType 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 *SchedulingRequestConfig* is used to specify the Scheduling Request related parameters

SchedulingRequestConfig information element

```
-- ASN1START

SchedulingRequestConfig ::=        CHOICE {
    release                         NULL,
    setup                           SEQUENCE {
        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
}

-- 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.
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: $n^{(1,p)}_{\mathrm{PUCCH,SRI}}$ 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                         NULL,
    setup                           SEQUENCE {
        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,
        srs-MaxUpPts                    ENUMERATED {true}           OPTIONAL    -- Cond TDD
    }
}

SoundingRS-UL-ConfigDedicated ::= CHOICE{
    release                         NULL,
    setup                           SEQUENCE {
        srs-Bandwidth                   ENUMERATED {bw0, bw1, bw2, bw3},
        srs-HoppingBandwidth            ENUMERATED {hbw0, hbw1, hbw2, hbw3},
```

```
        freqDomainPosition              INTEGER (0..23),
        duration                        BOOLEAN,
        srs-ConfigIndex                 INTEGER (0..1023),
        transmissionComb                INTEGER (0..1),
        cyclicShift                     ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
    }
}

SoundingRS-UL-ConfigDedicated-v1020 ::= SEQUENCE {
    srs-AntennaPort-r10             SRS-AntennaPort
}

SoundingRS-UL-ConfigDedicatedAperiodic-r10 ::= CHOICE{
    release                         NULL,
    setup                           SEQUENCE {
        srs-ConfigIndexAp-r10           INTEGER (0..31),
        srs-ConfigApDCI-Format4-r10         SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r10    OPTIONAL,--Need
ON
        srs-ActivateAp-r10              CHOICE {
            release                     NULL,
            setup                       SEQUENCE {
                srs-ConfigApDCI-Format0-r10         SRS-ConfigAp-r10,
                srs-ConfigApDCI-Format1a2b2c-r10        SRS-ConfigAp-r10,
                ...
            }
        }                                                   OPTIONAL    -- Need ON
    }
}

SRS-ConfigAp-r10 ::= SEQUENCE {
    srs-AntennaPortAp-r10           SRS-AntennaPort,
    srs-BandwidthAp-r10                 ENUMERATED {bw0, bw1, bw2, bw3},
    freqDomainPositionAp-r10        INTEGER (0..23),
    transmissionCombAp-r10              INTEGER (0..1),
    cyclicShiftAp-r10               ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
```

```
}

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 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. See TS 36.211 [21, 5.5.3.1], where cs0 corresponds to 0 etc.
duration Parameter: Duration for periodic sounding reference signal transmission. See TS 36.213 [21, 8.2]. FALSE corresponds to 'single' and value TRUE to 'indefinite'.
freqDomainPosition, freqDomainPositionAp Parameter: n_{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_{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].
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. 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, 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 $m_{\mathrm{SRS},0}^{\max}$ applies for UpPts, otherwise reconfiguration does not apply.
srs-SubframeConfig Parameter: SRS SubframeConfiguration. 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 to value 1 and so on.
transmissionComb, transmissionCombAp Parameter: $\bar{k}_{\mathrm{TC}} \in \{0,1\}$ 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-ConfigDL ::=    CHOICE{
    release                         NULL,
    setup                           SEQUENCE {
        semiPersistSchedIntervalDL              ENUMERATED {
                                                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 {
                release                         NULL,
                setup                           SEQUENCE {
                    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, spare6,
                                            spare5, spare4, spare3, spare2,
                                            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
        ...
    }
}

N1PUCCH-AN-PersistentList ::=       SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)

-- ASN1STOP
```

***SPS-Config* field descriptions**
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.
n1PUCCH-AN-PersistentList , n1PUCCH-AN-PersistentListP1 List of parameter: $n_{\text{PUCCH}}^{(1,p)}$ 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 Semi-Persistent Scheduling, see TS 36.321 [6].
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.*
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.*
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.
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, 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.
twoIntervalsConfig Trigger of two-intervals-Semi-Persistent Scheduling in uplink. See TS 36.321 [6, 5.10]. If this field is present, two-intervals-SPS is enabled for uplink. Otherwise, two-intervals-SPS is disabled.

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.

– TDD-Config

The IE *TDD-Config* is used to specify the TDD specific physical channel configuration.

***TDD-Config* information element**

```
-- ASN1START

TDD-Config ::=                  SEQUENCE {
    subframeAssignment              ENUMERATED {
                                    sa0, sa1, sa2, sa3, sa4, sa5, sa6},
    specialSubframePatterns         ENUMERATED {
                                    ssp0, ssp1, ssp2, ssp3, ssp4,ssp5, ssp6, ssp7,
                                    ssp8}
}
```

```
-- ASN1STOP
```

***TDD-Config* field descriptions**
specialSubframePatterns Indicates Configuration as in TS 36.211 [21, table 4.2-1] where ssp0 point to Configuration 0, ssp1 to Configuration 1 etc.
subframeAssignment Indicates DL/UL subframe configuration where sa0 point to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. One value applies for all serving cells (the associated functionality is common i.e. not performed independently for each cell)

– TimeAlignmentTimer

The IE *TimeAlignmentTimer* is used to control how long the UE is considered uplink time aligned. Corresponds to the Timer for time alignment in TS 36.321 [6]. Value in number of sub-frames. Value sf500 corresponds to 500 sub-frames, sf750 corresponds to 750 sub-frames and so on. In this release of the specification, uplink time alignment is common for all serving cells.

***TimeAlignmentTimer* information element**

```
-- ASN1START

TimeAlignmentTimer ::=            ENUMERATED {
                                  sf500, sf750, sf1280, sf1920, sf2560, sf5120,
                                  sf10240, infinity}
-- ASN1STOP
```

– 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,
    setup                         SEQUENCE {
        tpc-RNTI                      BIT STRING (SIZE (16)),
        tpc-Index                     TPC-Index
    }
}

TPC-Index ::=                     CHOICE {
```

```
    indexOfFormat3                  INTEGER (1..15),
    indexOfFormat3A                 INTEGER (1..31)
}

-- 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-RNTI RNTI for power control using DCI format 3/3A, see TS 36.212 [22].

– 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                           ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1},
    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}
}

UplinkPowerControlCommonSCell-r10 ::=   SEQUENCE {
    p0-NominalPUSCH-r10                 INTEGER (-126..24),
```

```
    alpha-r10                           ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1}
}

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 {
    deltaTxD-OffsetListPUCCH-r10        DeltaTxD-OffsetListPUCCH-r10   OPTIONAL,      -- Need OR
    pSRS-OffsetAp-r10                   INTEGER (0..15)                     OPTIONAL        -- Need OR
}

UplinkPowerControlDedicatedSCell-r10 ::=        SEQUENCE {
    p0-UE-PUSCH-r10                         INTEGER (-8..7),
    deltaMCS-Enabled-r10                    ENUMERATED {en0, en1},
    accumulationEnabled-r10                 BOOLEAN,
    pSRS-Offset-r10                     INTEGER (0..15),
    pSRS-OffsetAp-r10                   INTEGER (0..15)                     OPTIONAL,  -- Need OR
    filterCoefficient-r10               FilterCoefficient                   DEFAULT fc4,
    pathlossReferenceLinking-r10        ENUMERATED {pCell, sCell}
}

DeltaFList-PUCCH ::=                SEQUENCE {
    deltaF-PUCCH-Format1                ENUMERATED {deltaF-2, deltaF0, deltaF2},
    deltaF-PUCCH-Format1b                   ENUMERATED {deltaF1, deltaF3, deltaF5},
    deltaF-PUCCH-Format2                ENUMERATED {deltaF-2, deltaF0, deltaF1, deltaF2},
    deltaF-PUCCH-Format2a                   ENUMERATED {deltaF-2, deltaF0, deltaF2},
    deltaF-PUCCH-Format2b                   ENUMERATED {deltaF-2, deltaF0, deltaF2}
}
```

```
DeltaTxD-OffsetListPUCCH-r10 ::=    SEQUENCE {
    deltaTxD-OffsetPUCCH-Format1-r10        ENUMERATED {dB0, dB-2},
    deltaTxD-OffsetPUCCH-Format1a1b-r10     ENUMERATED {dB0, dB-2},
    deltaTxD-OffsetPUCCH-Format22a2b-r10    ENUMERATED {dB0, dB-2},
    deltaTxD-OffsetPUCCH-Format3-r10        ENUMERATED {dB0, dB-2},
    ...
}


-- ASN1STOP
```

***UplinkPowerControl* field descriptions**
accumulationEnabled Parameter: Accumulation-enabled, see TS 36.213 [23, 5.1.1.1]. TRUE corresponds to 'enabled' whereas FALSE corresponds to 'disabled'.
alpha Parameter: *α* See TS 36.213 [23, 5.1.1.1] where al0 corresponds to 0, al04 corresponds to value 0.4, al05 to 0.5, al06 to 0.6, al07 to 0.7, al08 to 0.8, al09 to 0.9 and al1 corresponds to 1.
deltaF-PUCCH-FormatX Parameter: $\Delta_{\mathrm{F\_PUCCH}}(F)$ for the PUCCH formats 1, 1b, 2, 2a, 2b, 3 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'.
deltaPreambleMsg3 Parameter: $\Delta_{PREAMBLE\_Msg3}$ *see* TS 36.213 [23, 5.1.1.1]. Actual value = IE value * 2 [dB].
deltaTxD-OffsetPUCCH-FormatX Parameter: $\Delta_{TxD}(F')$ for the PUCCH formats 1, 1a/1b, 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-2 corresponds to -2 dB.
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-NominalPUCCH Parameter: $P_{\mathrm{O\_NOMINAL\_PUCCH}}$ See TS 36.213, 5.1.2.1, unit dBm.
p0-NominalPUSCH Parameter: $P_{\mathrm{O\_NOMINAL\_PUSCH}}(1)$ See TS 36.213, 5.1.1.1, unit dBm. This field is applicable for non-persistent scheduling, only.
p0-UE-PUCCH Parameter: $P_{\mathrm{O\_UE\_PUCCH}}$ See TS 36.213 [23, 5.1.2.1]. Unit dB
p0-UE-PUSCH Parameter: $P_{\mathrm{O\_UE\_PUSCH}}(1)$ See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for non-persistent scheduling, only.
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*).
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.

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**

```
-- ASN1START

SecurityAlgorithmConfig ::=         SEQUENCE {
    cipheringAlgorithm              ENUMERATED {
                                        eea0, eea1, eea2, spare5, spare4, spare3,
                                        spare2, spare1, ...},
    integrityProtAlgorithm          ENUMERATED {
                                        eia0-v920, eia1, eia2, spare5, spare4, spare3,
                                        spare2, spare1, ...}
}

-- ASN1STOP
```

***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

***AdditionalSpectrumEmission* information element**

```
-- ASN1START

AdditionalSpectrumEmission ::=      INTEGER (1..32)

-- ASN1STOP
```

– ARFCN-ValueCDMA2000

The IE *ARFCN-ValueCDMA2000* used to indicate the CDMA2000 carrier frequency within a CDMA2000 band, see C.S0002-A [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-E [24, table 1.5-1].

***BandclassCDMA2000* information element**

```
-- ASN1START

BandclassCDMA2000 ::=                    ENUMERATED {
                                    bc0, bc1, bc2, bc3, bc4, bc5, bc6, bc7, bc8,
                                    bc9, bc10, bc11, bc12, bc13, bc14, bc15, bc16,
                                    bc17, bc18-v9a0, bc19-v9a0, bc20-v9a0, bc21-v9a0,
                                    spare10, spare9, spare8, spare7, spare6, spare5, spare4,
                                    spare3, spare2, spare1, ...}

-- ASN1STOP
```

– 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 44.005 [43], which represents a list of GERAN BCCH carrier frequencies.

***CarrierFreqsGERAN* information element**

```
-- ASN1START

CarrierFreqsGERAN ::=           SEQUENCE {
    startingARFCN                       ARFCN-ValueGERAN,
    bandIndicator                   BandIndicatorGERAN,
    followingARFCNs                         CHOICE {
        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".

– 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
```

– 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 {
    sid                             BIT STRING (SIZE (15)),
    nid                             BIT STRING (SIZE (16)),
```

```
    multipleSID                 BOOLEAN,
    multipleNID                 BOOLEAN,
    homeReg                     BOOLEAN,
    foreignSIDReg               BOOLEAN,
    foreignNIDReg               BOOLEAN,
    parameterReg                BOOLEAN,
    powerUpReg                  BOOLEAN,
    registrationPeriod          BIT STRING (SIZE (7)),
    registrationZone            BIT STRING (SIZE (12)),
    totalZone                   BIT STRING (SIZE (3)),
    zoneTimer                   BIT STRING (SIZE (3))
}

CSFB-RegistrationParam1XRTT-v920 ::=SEQUENCE {
    powerDownReg-r9                 ENUMERATED {true}
}

-- 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.
sid 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
```

CellGlobalIdUTRA 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].
locationAreaCode 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.

CellGlobalIdCDMA2000 information element

```
-- ASN1START

CellGlobalIdCDMA2000 ::=            CHOICE {
    cellGlobalId1XRTT               BIT STRING (SIZE (47)),
    cellGlobalIdHRPD                BIT STRING (SIZE (128))
}

-- ASN1STOP
```

CellGlobalIdCDMA2000 field descriptions
cellGlobalId1XRTT Unique identifier for a CDMA2000 1xRTT cell, corresponds to BASEID, SID and NID parameters (in that order) defined in C.S0005-A [25].
cellGlobalIdHRPD Unique identifier for a CDMA2000 HRPD cell, corresponds to SECTOR ID parameter defined in C.S0024-A [26, 14.9].

– 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)


-- 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 *MobilityControlInfo* 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
    carrierBandwidth                CarrierBandwidthEUTRA           OPTIONAL,  -- Cond HO-toEUTRA
    additionalSpectrumEmission          AdditionalSpectrumEmission      OPTIONAL,  -- Cond HO-toEUTRA
    t304                            ENUMERATED {
                                        ms50, ms100, ms150, ms200, ms500, ms1000,
                                        ms2000, spare1},
    newUE-Identity                      C-RNTI,
    radioResourceConfigCommon           RadioResourceConfigCommon,
    rach-ConfigDedicated                RACH-ConfigDedicated            OPTIONAL,  -- Need OP
    ...,
    [[  carrierFreq-v9e0            CarrierFreqEUTRA-v9e0           OPTIONAL   -- Need ON
    ]]
}


CarrierBandwidthEUTRA ::=           SEQUENCE {
    dl-Bandwidth                    ENUMERATED {
                                            n6, n15, n25, n50, n75, n100, spare10,
                                            spare9, spare8, spare7, spare6, spare5,
                                            spare4, spare3, spare2, spare1},
```

```
    ul-Bandwidth                        ENUMERATED {
                                            n6, n15, n25, n50, n75, n100, spare10,
                                            spare9, spare8, spare7, spare6, spare5,
                                            spare4, spare3, spare2, spare1}  OPTIONAL -- Need OP
}

CarrierFreqEUTRA ::=                SEQUENCE {
    dl-CarrierFreq                      ARFCN-ValueEUTRA,
    ul-CarrierFreq                      ARFCN-ValueEUTRA                OPTIONAL   -- Cond FDD
}

CarrierFreqEUTRA-v9e0 ::=           SEQUENCE {
    dl-CarrierFreq-v9e0                 ARFCN-ValueEUTRA-r9,
    ul-CarrierFreq-v9e0                 ARFCN-ValueEUTRA-r9             OPTIONAL   -- Cond FDD
}

-- 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 *SystemInformationBlockType2* or *SystemInformationBlockType1*. The UE requirements related to IE *AdditionalSpectrumEmission* are defined in TS 36.101 [42, table 6.2.4.1]**.**
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.
dl-Bandwidth Parameter: *Downlink bandwidth*, see TS 36.101 [42].
rach-ConfigDedicated The dedicated random access parameters. If absent the UE applies contention based random access as specified in TS 36.321 [6].
t304 Timer T304 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on.
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.

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.
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 carrierFreq-v9e0 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.

– 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

The IE *MobilityStateParameters* contains parameters to determine UE mobility state.

MobilityStateParameters information element

```
-- ASN1START

MobilityStateParameters ::=         SEQUENCE {
    t-Evaluation                    ENUMERATED {
                                        s30, s60, s120, s180, s240, spare3, spare2, spare1},
    t-HystNormal                    ENUMERATED {
                                        s30, s60, s120, s180, s240, spare3, spare2, spare1},
    n-CellChangeMedium                  INTEGER (1..16),
    n-CellChangeHigh                INTEGER (1..16)
}

-- ASN1STOP
```

***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

MultiBandInfo-v9e0 ::=      SEQUENCE {
    freqBandIndicator-v9e0              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 a given frequency band. E-UTRAN does not include the same value of *additionalSpectrumEmission* in *SystemInformationType2* within this list.

***NS-PmaxList* information element**

```
-- ASN1START

NS-PmaxList-r10 ::=              SEQUENCE (SIZE (1..maxNS-Pmax-r10)) OF NS-PmaxValue-r10

NS-PmaxValue-r10 ::=             SEQUENCE {
    additionalPmax-r10                  P-Max                           OPTIONAL,  -- Need OP
    additionalSpectrumEmission              AdditionalSpectrumEmission
```

```
}

-- ASN1STOP
```

– PhysCellId

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.

PhysCellIdRange information element

```
-- ASN1START

PhysCellIdRange ::=             SEQUENCE {
    start                       PhysCellId,
    range                       ENUMERATED {
                                    n4, n8, n12, n16, n24, n32, n48, n64, n84,
                                    n96, n128, n168, n252, n504, spare2,
                                    spare1}             OPTIONAL    -- Need OP
}

-- ASN1STOP
```

***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**

```
-- ASN1START

PhysCellIdRangeUTRA-FDDList-r9::=        SEQUENCE (SIZE (1.. maxPhysCellIdRange-r9)) OF PhysCellIdRangeUTRA-FDD-r9

PhysCellIdRangeUTRA-FDD-r9 ::=           SEQUENCE {
    start-r9                             PhysCellIdUTRA-FDD,
    range-r9                             INTEGER (2..512)            OPTIONAL    -- Need OP
}

-- 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                                 MCC                 OPTIONAL,               -- Cond 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 *CellGlobalIdUTRA,* in *CellGlobalIdGERAN* or in *RegisteredMME*. This IE is also mandatory in the first occurrence of the IE *PLMN-Identity* within the IE *PLMN-IdentityList*. Otherwise it is optional, need OP.

– PreRegistrationInfoHRPD

```
-- ASN1START


PreRegistrationInfoHRPD ::=             SEQUENCE {
    preRegistrationAllowed              BOOLEAN,
    preRegistrationZoneId               PreRegistrationZoneIdHRPD   OPTIONAL, -- cond PreRegAllowed
    secondaryPreRegistrationZoneIdList  SecondaryPreRegistrationZoneIdListHRPD  OPTIONAL -- Need OR
```

```
}

SecondaryPreRegistrationZoneIdListHRPD ::=	SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD

PreRegistrationZoneIdHRPD ::=			INTEGER (0..255)

-- ASN1STOP
```

***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-A [26], C.S0087-A [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.
secondaryPreRegistrationZoneIdList List of SecondaryColorCodes (see C.S0024-A [26], C.S0087-A [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 re-register.

Conditional presence	Explanation
PreRegAllowed	*The field is mandatory in case the preRegistrationAllowed is set to true. 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 36.304 [4]. Actual value $Q_{qualmin}$ = IE 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 36.304 [4]. Actual value $Q_{rxlevmin}$ = IE 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 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

```
-- ASN1START

Q-OffsetRange ::=                    ENUMERATED {
                                        dB-24, dB-22, dB-20, dB-18, dB-16, dB-14,
                                        dB-12, dB-10, dB-8, dB-6, dB-5, dB-4, dB-3,
                                        dB-2, dB-1, dB0, dB1, dB2, dB3, dB4, dB5,
                                        dB6, dB8, dB10, dB12, dB14, dB16, dB18,
                                        dB20, dB22, dB24}

-- ASN1STOP
```

– 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 = IE 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 = IE 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)

-- 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)

-- 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

```
-- ASN1START

SpeedStateScaleFactors ::=          SEQUENCE {
    sf-Medium                           ENUMERATED {oDot25, oDot5, oDot75, lDot0},
    sf-High                             ENUMERATED {oDot25, oDot5, oDot75, lDot0}
}
-- ASN1STOP
```

***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	Not 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.

T-Reselection information element

```
-- ASN1START

T-Reselection ::=                INTEGER (0..7)

-- 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
```

– Hysteresis

The IE *Hysteresis* is a parameter used within the entry and leave condition of an event triggered reporting condition. The actual value is IE 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 {
        ellipsoid-Point-r10                 OCTET STRING,
        ellipsoidPointWithAltitude-r10      OCTET STRING,
    ...
    },
    horizontalVelocity-r10              OCTET STRING            OPTIONAL,
    gnss-TOD-msec-r10                   OCTET STRING            OPTIONAL,
    ...
}

-- ASN1STOP
```

***LocationInfo* field descriptions**
ellipsoid-Point Parameter *Ellipsoid-Point* defined in TS36.355 [54].
ellipsoidPointWithAltitude Parameter *EllipsoidPointWithAltitude* defined in TS36.355 [54].
gnss-TOD-msec Parameter *Gnss-TOD-msec* defined in TS36.355 [54]
horizontalVelocity Parameter *HorizontalVelocity* defined in TS36.355 [54].

– 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                   MeasGapConfig                   OPTIONAL,  -- Need ON
    s-Measure                   RSRP-Range                  OPTIONAL,  -- Need ON
    preRegistrationInfoHRPD             PreRegistrationInfoHRPD             OPTIONAL,  -- Need OP
    speedStatePars              CHOICE {
        release                     NULL,
        setup                       SEQUENCE {
            mobilityStateParameters             MobilityStateParameters,
            timeToTrigger-SF                    SpeedStateScaleFactors
        }
    }                                                           OPTIONAL,  -- Need ON
    ...,
    [[  measObjectToAddModList-v9e0         MeasObjectToAddModList-v9e0     OPTIONAL   -- Need ON
    ]]
}

MeasIdToRemoveList ::=              SEQUENCE (SIZE (1..maxMeasId)) OF MeasId

MeasObjectToRemoveList ::=          SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectId

ReportConfigToRemoveList ::=        SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigId

-- ASN1STOP
```

MeasConfig field descriptions
measGapConfig Used to setup and release measurement gaps.
measIdToRemoveList List of measurement identities to remove.
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).
measObjectToRemoveList List of measurement objects to remove.
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.

– MeasGapConfig

The IE *MeasGapConfig* specifies the measurement gap configuration and controls setup/ release of measurement gaps.

***MeasGapConfig* information element**

```
-- ASN1START


MeasGapConfig ::=                   CHOICE {
                                                 release                           NULL,
    setup                           SEQUENCE {
        gapOffset                       CHOICE {
                gp0                                 INTEGER (0..39),
                gp1                                 INTEGER (0..79),
                ...
        }
    }
}


-- 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. Also used to specify the measurement gap pattern to be applied, as defined in TS 36.133 [16].

– 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)

-- 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*.

MeasIdToAddModList information element

```
-- ASN1START

MeasIdToAddModList ::=          SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod

MeasIdToAddMod ::=  SEQUENCE {
    measId                          MeasId,
    measObjectId                    MeasObjectId,
    reportConfigId                  ReportConfigId
}

-- ASN1STOP
```

– 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,
```

```
    searchWindowSize                INTEGER (0..15)                 OPTIONAL,  -- Need ON
    offsetFreq                      Q-OffsetRangeInterRAT           DEFAULT 0,
    cellsToRemoveList               CellIndexList                   OPTIONAL,  -- Need ON
    cellsToAddModList               CellsToAddModListCDMA2000       OPTIONAL,  -- Need ON
    cellForWhichToReportCGI         PhysCellIdCDMA2000              OPTIONAL,  -- Need ON
    ...
}

CellsToAddModListCDMA2000 ::=   SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModCDMA2000

CellsToAddModCDMA2000 ::=   SEQUENCE {
    cellIndex                       INTEGER (1..maxCellMeas),
    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-A [25].

– MeasObjectEUTRA

The IE *MeasObjectEUTRA* specifies information applicable for intra-frequency or inter-frequency E-UTRA cells.

***MeasObjectEUTRA* information element**

```
-- ASN1START

MeasObjectEUTRA ::=             SEQUENCE {
    carrierFreq                     ARFCN-ValueEUTRA,
    allowedMeasBandwidth            AllowedMeasBandwidth,
```

```
    presenceAntennaPort1                PresenceAntennaPort1,
    neighCellConfig                     NeighCellConfig,
    offsetFreq                      Q-OffsetRange               DEFAULT dB0,
    -- Cell list
    cellsToRemoveList                   CellIndexList           OPTIONAL,       -- Need ON
    cellsToAddModList                   CellsToAddModList           OPTIONAL,       -- Need ON
    -- Black list
    blackCellsToRemoveList                  CellIndexList           OPTIONAL,       -- Need ON
    blackCellsToAddModList                  BlackCellsToAddModList      OPTIONAL,       -- Need ON
    cellForWhichToReportCGI                 PhysCellId                  OPTIONAL,       -- Need ON
    ...,
    [[measCycleSCell-r10                MeasCycleSCell-r10      OPTIONAL,       -- Need ON
        measSubframePatternConfigNeigh-r10      MeasSubframePatternConfigNeigh-r10      OPTIONAL
            -- Need ON
    ]]
}

MeasObjectEUTRA-v9e0 ::=            SEQUENCE {
    carrierFreq-v9e0                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                             NULL,
    setup                               SEQUENCE {
        measSubframePatternNeigh-r10            MeasSubframePattern-r10,
        measSubframeCellList-r10            MeasSubframeCellList-r10  OPTIONAL   -- Cond measSubframe
    }
}

MeasSubframeCellList-r10 ::=  SEQUENCE (SIZE (1..maxCellMeas)) OF PhysCellIdRange

-- ASN1STOP
```

***MeasObjectEUTRA* field descriptions**
blackCellsToAddMoList List of cells to add/ modify in the black list of cells.
blackCellsToRemoveList List of cells to remove from the black list of cells.
carrierFreq 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.
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.
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.
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 of cells in the black list.

Conditional presence	**Explanation**
measSubframe	The field is mandatory present if *measSubframePatternNeigh* is 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.

– MeasObjectId

The IE *MeasObjectId* used to identify a measurement object configuration.

***MeasObjectId* information element**

```
-- ASN1START

MeasObjectId ::=                    INTEGER (1..maxObjectId)

-- 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

MeasObjectToAddModList-v9e0 ::=     SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod-v9e0

MeasObjectToAddMod ::=  SEQUENCE {
    measObjectId                        MeasObjectId,
    measObject                          CHOICE {
        measObjectEUTRA                     MeasObjectEUTRA,
        measObjectUTRA                      MeasObjectUTRA,
        measObjectGERAN                     MeasObjectGERAN,
        measObjectCDMA2000                  MeasObjectCDMA2000,
        ...
    }
}
```

```
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* field *measObject* is set to *measObjectEUTRA* and its sub-field *carrierFreq* is set to *maxEARFCN*. Otherwise the field is not present.

– MeasObjectUTRA

The IE *MeasObjectUTRA* specifies information applicable for inter-RAT UTRA neighbouring cells.

***MeasObjectUTRA* information element**

```
-- ASN1START


MeasObjectUTRA ::=                      SEQUENCE {
    carrierFreq                         ARFCN-ValueUTRA,
    offsetFreq                      Q-OffsetRangeInterRAT          DEFAULT 0,
    cellsToRemoveList                   CellIndexList              OPTIONAL,           -- Need ON
    cellsToAddModList                   CHOICE {
        cellsToAddModListUTRA-FDD           CellsToAddModListUTRA-FDD,
        cellsToAddModListUTRA-TDD           CellsToAddModListUTRA-TDD
    }                                                          OPTIONAL,           -- Need ON
    cellForWhichToReportCGI                 CHOICE {
        utra-FDD                        PhysCellIdUTRA-FDD,
        utra-TDD                        PhysCellIdUTRA-TDD
    }                                                          OPTIONAL,  -- Need ON
    ...,
    [[  csg-allowedReportingCells-v930          CSG-AllowedReportingCells-r9    OPTIONAL        -- Need ON
    ]]
}


CellsToAddModListUTRA-FDD ::=       SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-FDD
```

```
CellsToAddModUTRA-FDD ::=   SEQUENCE {
    cellIndex                       INTEGER (1..maxCellMeas),
    physCellId                          PhysCellIdUTRA-FDD
}

CellsToAddModListUTRA-TDD ::=       SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-TDD

CellsToAddModUTRA-TDD ::=   SEQUENCE {
    cellIndex                       INTEGER (1..maxCellMeas),
    physCellId                          PhysCellIdUTRA-TDD
}

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.
cellIndex 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.

– MeasResults

The IE *MeasResults* covers measured results for intra-frequency, inter-frequency and inter- RAT mobility.

***MeasResults* information element**

```
-- ASN1START

MeasResults ::=                     SEQUENCE {
    measId                              MeasId,
    measResultPCell                 SEQUENCE {
        rsrpResult                      RSRP-Range,
```

```
        rsrqResult                      RSRQ-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
    ]]
}

MeasResultListEUTRA ::=             SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA

MeasResultEUTRA ::=  SEQUENCE {
    physCellId                      PhysCellId,
    cgi-Info                    SEQUENCE {
        cellGlobalId                CellGlobalIdEUTRA,
        trackingAreaCode                TrackingAreaCode,
        plmn-IdentityList           PLMN-IdentityList2              OPTIONAL
    }                                               OPTIONAL,
    measResult                      SEQUENCE {
        rsrpResult                  RSRP-Range                  OPTIONAL,
        rsrqResult                  RSRQ-Range                  OPTIONAL,
        ...,
        [[  additionalSI-Info-r9        AdditionalSI-Info-r9            OPTIONAL
        ]]
    }
}
```

```
MeasResultServFreqList-r10 ::=    SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServFreq-r10


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,
        rsrqResultNCell-r10                 RSRQ-Range
    }                                                   OPTIONAL,
    ...
}


MeasResultListUTRA ::=                  SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultUTRA


MeasResultUTRA ::=    SEQUENCE {
    physCellId                          CHOICE {
        fdd                             PhysCellIdUTRA-FDD,
        tdd                             PhysCellIdUTRA-TDD
    },
    cgi-Info                        SEQUENCE {
        cellGlobalId                    CellGlobalIdUTRA,
        locationAreaCode                    BIT STRING (SIZE (16))          OPTIONAL,
        routingAreaCode                     BIT STRING (SIZE (8))       OPTIONAL,
        plmn-IdentityList               PLMN-IdentityList2              OPTIONAL
    }                                                   OPTIONAL,
    measResult                          SEQUENCE {
        utra-RSCP                           INTEGER (-5..91)            OPTIONAL,
        utra-EcN0                       INTEGER (0..49)                 OPTIONAL,
        ...,
        [[  additionalSI-Info-r9            AdditionalSI-Info-r9        OPTIONAL
        ]]
```

```
    }
}

MeasResultListGERAN ::=             SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultGERAN

MeasResultGERAN ::= SEQUENCE {
    carrierFreq                     CarrierFreqGERAN,
    physCellId                      PhysCellIdGERAN,
    cgi-Info                    SEQUENCE {
        cellGlobalId                CellGlobalIdGERAN,
        routingAreaCode                 BIT STRING (SIZE (8))       OPTIONAL
    }                                                           OPTIONAL,
    measResult                      SEQUENCE {
        rssi                    INTEGER (0..63),
        ...
    }
}

MeasResultsCDMA2000 ::=                 SEQUENCE {
    preRegistrationStatusHRPD       BOOLEAN,
    measResultListCDMA2000              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),
        ...
    }
}
```

```
MeasResultForECID-r9 ::=      SEQUENCE {
    ue-RxTxTimeDiffResult-r9              INTEGER (0..4095),
    currentSFN-r9                         BIT STRING (SIZE (10))
}


PLMN-IdentityList2 ::=              SEQUENCE (SIZE (1..5)) OF PLMN-Identity


AdditionalSI-Info-r9 ::=          SEQUENCE {
    csg-MemberStatus-r9               ENUMERATED {member}               OPTIONAL,
    csg-Identity-r9                   CSG-Identity                  OPTIONAL
}


-- ASN1STOP
```

***MeasResults* field descriptions**
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.
locationAreaCode A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27].
measId Identifies the measurement identity for which the reporting is being performed.
measResult Measured result of an E-UTRA cell; Measured result of a UTRA cell; Measured result of a GERAN cell or frequency; or Measured result of a CDMA2000 cell. Measured result of UE Rx–Tx time difference.
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.
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.
measResultPCell Measured result of the PCell.
measResultsCDMA2000 Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements.

***MeasResults* field descriptions**
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.
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-A [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-A [25] for CDMA2000 1xRTT and C.S0024-A [26] for CDMA2000 HRPD.
plmn-IdentityList The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast. This field contains the list of identities starting from the second entry of PLMN Identities in the broadcast information.
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.
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.
rsrqResult 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.
ue-RxTxTimeDiffResult UE Rx-Tx time difference measurement result of the PCell, provided by lower layers. According to 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.

– QuantityConfig

The IE *QuantityConfig* specifies the measurement quantities and layer 3 filtering coefficients for E-UTRA and inter-RAT measurements.

QuantityConfig information element

```
-- ASN1START


QuantityConfig ::=              SEQUENCE {
    quantityConfigEUTRA             QuantityConfigEUTRA             OPTIONAL,  -- Need ON
    quantityConfigUTRA              QuantityConfigUTRA              OPTIONAL,  -- Need ON
    quantityConfigGERAN             QuantityConfigGERAN             OPTIONAL,  -- Need ON
    quantityConfigCDMA2000          QuantityConfigCDMA2000          OPTIONAL,  -- Need ON
    ...,
    [[  quantityConfigUTRA-v1020    QuantityConfigUTRA-v1020        OPTIONAL   -- Need ON
    ]]
}
```

```
QuantityConfigEUTRA ::=            SEQUENCE {
    filterCoefficientRSRP              FilterCoefficient          DEFAULT fc4,
    filterCoefficientRSRQ              FilterCoefficient          DEFAULT fc4
}

QuantityConfigUTRA ::=             SEQUENCE {
    measQuantityUTRA-FDD                   ENUMERATED {cpich-RSCP, cpich-EcN0},
    measQuantityUTRA-TDD                   ENUMERATED {pccpch-RSCP},
    filterCoefficient              FilterCoefficient          DEFAULT fc4
}

QuantityConfigUTRA-v1020 ::=       SEQUENCE {
    filterCoefficient2-FDD-r10         FilterCoefficient          DEFAULT fc4
}

QuantityConfigGERAN ::=            SEQUENCE {
    measQuantityGERAN                      ENUMERATED {rssi},
    filterCoefficient              FilterCoefficient          DEFAULT fc2
}

QuantityConfigCDMA2000 ::=         SEQUENCE {
    measQuantityCDMA2000                   ENUMERATED {pilotStrength, pilotPnPhaseAndPilotStrength}
}

-- 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*.
filterCoefficientRSRP Specifies the filtering coefficient used for RSRP.
filterCoefficientRSRQ Specifies the filtering coefficient used for RSRQ.
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.
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.

– ReportConfigEUTRA

The IE *ReportConfigEUTRA* specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events are labelled A*N* 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;

Event A4: Neighbour becomes better than absolute threshold;

Event A5: PCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.

Event A6: Neighbour becomes amount of offset better than SCell.

ReportConfigEUTRA information element

```
-- ASN1START


ReportConfigEUTRA ::=           SEQUENCE {
    triggerType                 CHOICE {
        event                   SEQUENCE {
            eventId                 CHOICE {
                eventA1                 SEQUENCE {
                    a1-Threshold        ThresholdEUTRA
                },
                eventA2                 SEQUENCE {
                    a2-Threshold        ThresholdEUTRA
```

```
                },
                eventA3                         SEQUENCE {
                    a3-Offset                   INTEGER (-30..30),
                    reportOnLeave                   BOOLEAN
                },
                eventA4                         SEQUENCE {
                    a4-Threshold                ThresholdEUTRA
                },
                eventA5                         SEQUENCE {
                    a5-Threshold1                   ThresholdEUTRA,
                    a5-Threshold2                   ThresholdEUTRA
                },
                ...,
                eventA6-r10                     SEQUENCE {
                    a6-Offset-r10               INTEGER (-30..30),
                    a6-ReportOnLeave-r10            BOOLEAN
                }
            },
            hysteresis                      Hysteresis,
            timeToTrigger                       TimeToTrigger
        },
        periodical                          SEQUENCE {
            purpose                                 ENUMERATED {
                                                    reportStrongestCells, reportCGI}
        }
    },
    triggerQuantity                     ENUMERATED {rsrp, rsrq},
    reportQuantity                      ENUMERATED {sameAsTriggerQuantity, both},
    maxReportCells                      INTEGER (1..maxCellReport),
    reportInterval                  ReportInterval,
    reportAmount                    ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    ...,
    [[  si-RequestForHO-r9              ENUMERATED {setup}      OPTIONAL,  -- Cond reportCGI
        ue-RxTxTimeDiffPeriodical-r9    ENUMERATED {setup}      OPTIONAL   -- Need OR
    ]],
```

```
    [[  includeLocationInfo-r10             ENUMERATED {true}      OPTIONAL,  -- Cond reportMDT
        reportAddNeighMeas-r10              ENUMERATED {setup}         OPTIONAL   -- Need OR
    ]]
}

ThresholdEUTRA ::=                      CHOICE{
    threshold-RSRP                      RSRP-Range,
    threshold-RSRQ                      RSRQ-Range
}

-- ASN1STOP
```

***ReportConfigEUTRA* field descriptions**
a3-Offset/ a6-Offset Offset value to be used in EUTRA measurement report triggering condition for event a3/ a6. The actual value is IE value * 0.5 dB.
aN-ThresholdM Threshold to be used in EUTRA measurement report triggering condition for event number aN. If multiple thresholds are defined for event number aN, the thresholds are differentiated by M.
eventId Choice of E-UTRA event triggered reporting criteria.
maxReportCells Max number of cells, excluding the serving cell, to include in the measurement report.
reportAmount Number of measurement reports applicable for *triggerType event* as well as for *triggerType periodical*. In case *purpose* is set to *reportCGI* only value 1 applies.
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.
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 IE value – 140 dBm. For RSRQ: RSRQ based threshold for event evaluation. The actual value is (IE value – 40)/2 dB.
timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report.
triggerQuantity The quantities used to evaluate the triggering condition for the event**.** The values rsrp and rsrq correspond to Reference Signal Received Power (RSRP) and Reference Signal Received Quality (RSRQ), see TS 36.214 [48].
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.

Conditional presence	Explanation
reportCGI	The field is optional, need OR, in case *purpose* is included and set to *reportCGI*; otherwise the field is not present.
reportMDT	The field is optional, need OR, in case triggerType is set to eventA2 or periodical; otherwise the field is not present.

– ReportConfigId

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 are labelled B*N* 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.

The b1 and b2 event thresholds for CDMA2000 are the CDMA2000 pilot detection thresholds are expressed as an unsigned binary number equal to [-2 x 10 log 10 E_c/I_o] in units of 0.5dB, see C.S0005-A [25] for details.

***ReportConfigInterRAT* information element**

```
-- ASN1START

ReportConfigInterRAT ::=            SEQUENCE {
    triggerType                         CHOICE {
        event                           SEQUENCE {
            eventId                             CHOICE {
                eventB1                             SEQUENCE {
                    b1-Threshold                    CHOICE {
                        b1-ThresholdUTRA                    ThresholdUTRA,
                        b1-ThresholdGERAN                       ThresholdGERAN,
                        b1-ThresholdCDMA2000                    ThresholdCDMA2000
                    }
                },
                eventB2                             SEQUENCE {
                    b2-Threshold1                       ThresholdEUTRA,
                    b2-Threshold2                       CHOICE {
                        b2-Threshold2UTRA                       ThresholdUTRA,
```

```
                        b2-Threshold2GERAN                      ThresholdGERAN,
                        b2-Threshold2CDMA2000                   ThresholdCDMA2000
                    }
                },
                ...
            },
            hysteresis                          Hysteresis,
            timeToTrigger                           TimeToTrigger
        },
        periodical                                  SEQUENCE {
            purpose                                         ENUMERATED {
                                                            reportStrongestCells,
                                                            reportStrongestCellsForSON,
                                                            reportCGI}
        }
    },
    maxReportCells                          INTEGER (1..maxCellReport),
    reportInterval                      ReportInterval,
    reportAmount                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    ...,
    [[  si-RequestForHO-r9                      ENUMERATED {setup}          OPTIONAL    -- Cond reportCGI
    ]],
    [[  reportQuantityUTRA-FDD-r10          ENUMERATED {both}       OPTIONAL    -- Need OR
    ]]
}

ThresholdUTRA ::=                   CHOICE{
    utra-RSCP                           INTEGER (-5..91),
    utra-EcN0                       INTEGER (0..49)
}

ThresholdGERAN ::=                  INTEGER (0..63)

ThresholdCDMA2000 ::=               INTEGER (0..63)
```

```
-- ASN1STOP
```

ReportConfigInterRAT field descriptions
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.
eventId 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.
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.
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.
ThresholdGERAN The actual value is IE value – 110 dBm.
ThresholdUTRA *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 IE value – 115 dBm. For *utra-EcN0*: The actual value is (IE value – 49)/2 dB.
timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

Conditional presence	Explanation
reportCGI	The field is optional, need OR, in case *purpose* is included and set to *reportCGI*; otherwise the field is not present.

– 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**

```
-- ASN1START

ReportInterval ::=                ENUMERATED {
                                  ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240,
                                  min1, min6, min12, min30, min60, spare3, spare2, spare1}

-- ASN1STOP
```

– RSRP-Range

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].

***RSRP-Range* information element**

```
-- ASN1START

RSRP-Range ::=                    INTEGER(0..97)

-- ASN1STOP
```

– RSRQ-Range

The IE *RSRQ-Range* specifies the value range used in RSRQ measurements and thresholds. Integer value for RSRQ measurements according to mapping table in TS 36.133 [16].

***RSRQ-Range* information element**

```
-- ASN1START
```

```
RSRQ-Range ::=                  INTEGER(0..34)


-- 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, ms40 corresponds to 40 ms, and so on.

***TimeToTrigger* information element**

```
-- ASN1START


TimeToTrigger ::=               ENUMERATED {
                                ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256,
                                ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560,
                                ms5120}


-- ASN1STOP
```

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 applies in the entire RPLMN of the UE at the point of receiving the configuration

***AreaConfiguration* information element**

```
-- ASN1START
```

```
AreaConfiguration-r10 ::=   CHOICE {
    cellGlobalIdList-r10            CellGlobalIdList-r10,
    trackingAreaCodeList-r10        TrackingAreaCodeList-r10
}

CellGlobalIdList-r10 ::=            SEQUENCE (SIZE (1..32)) OF CellGlobalIdEUTRA

TrackingAreaCodeList-r10 ::=            SEQUENCE (SIZE (1..8)) OF TrackingAreaCode

-- ASN1STOP
```

– 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 *DedicatedInfoCDMA200*0 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**

```
-- ASN1START

FilterCoefficient ::=                   ENUMERATED {
                                             fc0, fc1, fc2, fc3, fc4, fc5,
                                             fc6, fc7, fc8, fc9, fc11, fc13,
                                             fc15, fc17, fc19, spare1, ...}

-- ASN1STOP
```

– 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**

```
-- ASN1START

LoggingDuration-r10 ::=                 ENUMERATED {
                                        min10, min20, min40, min60, min90, min120, spare2, spare1}

-- ASN1STOP
```

– 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

```
-- ASN1START

LoggingInterval-r10 ::=         ENUMERATED {
                                ms1280, ms2560, ms5120, ms10240, ms20480,
                                ms30720, ms40960, ms61440}

-- ASN1STOP
```

– MeasSubframePattern

The IE *MeasSubframePattern* is used to specify time domain measurement resource restriction. 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 for measurement.

MeasSubframePattern information element

```
-- ASN1START

MeasSubframePattern-r10 ::= CHOICE {
    subframePatternFDD-r10          BIT STRING (SIZE (40)),
    subframePatternTDD-r10          CHOICE {
        subframeConfig1-5-r10           BIT STRING (SIZE (20)),
        subframeConfig0-r10                 BIT STRING (SIZE (70)),
        subframeConfig6-r10                 BIT STRING (SIZE (60)),
        ...
    },
    ...
}

-- ASN1STOP
```

– 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 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 *OtherConfig* contains configuration related to other configuration

***OtherConfig* information element**

```
-- ASN1START

OtherConfig-r9 ::= SEQUENCE    {
    reportProximityConfig-r9            ReportProximityConfig-r9        OPTIONAL,  -- Need ON
    ...
}
```

```
ReportProximityConfig-r9 ::= SEQUENCE {
    proximityIndicationEUTRA-r9     ENUMERATED {enabled}        OPTIONAL,       -- Need OR
    proximityIndicationUTRA-r9      ENUMERATED {enabled}        OPTIONAL        -- Need OR
}


-- ASN1STOP
```

***OtherConfig* field descriptions**
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.

NOTE: Enabling/ disabling of proximity indication includes enabling/ disabling of the related functionality e.g. autonomous search in connected mode.

– RAND-CDMA2000 (1xRTT)

The *RAND-CDMA200*0 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
```

– RAT-Type

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

```
-- ASN1START


RAT-Type ::=                        ENUMERATED {
                                        eutra, utra, geran-cs, geran-ps, cdma2000-1XRTT,
                                        spare3, spare2, spare1, ...}


-- 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

```
-- ASN1START

S-TMSI ::=                          SEQUENCE {
    mmec                            MMEC,
    m-TMSI                              BIT STRING (SIZE (32))
}

-- ASN1STOP
```

***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*, the seventh of octet of this octet string contains octet 2 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-C [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.

***UE-EUTRA-Capability* information element**

```
-- ASN1START

UE-EUTRA-Capability ::=             SEQUENCE {
    accessStratumRelease                AccessStratumRelease,
    ue-Category                         INTEGER (1..5),
    pdcp-Parameters                     PDCP-Parameters,
    phyLayerParameters                  PhyLayerParameters,
    rf-Parameters                   RF-Parameters,
    measParameters                      MeasParameters,
    featureGroupIndicators              BIT STRING (SIZE (32))              OPTIONAL,
    interRAT-Parameters                 SEQUENCE {
        utraFDD                             IRAT-ParametersUTRA-FDD             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 STRING (SIZE (32))              OPTIONAL,
    fdd-Add-UE-EUTRA-Capabilities-r9    UE-EUTRA-CapabilityAddXDD-Mode-r9   OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-r9    UE-EUTRA-CapabilityAddXDD-Mode-r9   OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v9c0-IEs        OPTIONAL
}
```

```
UE-EUTRA-Capability-v9c0-IEs ::=        SEQUENCE {
    interRAT-ParametersUTRA-v9c0        IRAT-ParametersUTRA-v9c0        OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v9d0-IEs    OPTIONAL
}

UE-EUTRA-Capability-v9d0-IEs ::=        SEQUENCE {
    phyLayerParameters-v9d0             PhyLayerParameters-v9d0         OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v9e0-IEs    OPTIONAL
}

UE-EUTRA-Capability-v9e0-IEs ::=    SEQUENCE {
    rf-Parameters-v9e0                  RF-Parameters-v9e0              OPTIONAL,
    nonCriticalExtension                UE-EUTRA-Capability-v9h0-IEs    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,
    nonCriticalExtension                UE-EUTRA-Capability-v10i0-IEs   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        SEQUENCE {}                         OPTIONAL
}

UE-EUTRA-Capability-v10j0-IEs ::=  SEQUENCE {
    rf-Parameters-v10j0                 RF-Parameters-v10j0                     OPTIONAL,
    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,
    interRAT-ParametersCDMA2000-v920        IRAT-ParametersCDMA2000-1XRTT-v920  OPTIONAL,
    deviceType-r9                           ENUMERATED {noBenFromBatConsumpOpt} OPTIONAL,
    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,
    nonCriticalExtension               UE-EUTRA-Capability-v1060-IEs          OPTIONAL
}

UE-EUTRA-Capability-v1060-IEs ::= SEQUENCE {
    fdd-Add-UE-EUTRA-Capabilities-v1060  UE-EUTRA-CapabilityAddXDD-Mode-v1060    OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-v1060  UE-EUTRA-CapabilityAddXDD-Mode-v1060    OPTIONAL,
    rf-Parameters-v1060                   RF-Parameters-v1060                         OPTIONAL,
    nonCriticalExtension               UE-EUTRA-Capability-v1090-IEs          OPTIONAL
}

UE-EUTRA-Capability-v1090-IEs ::= SEQUENCE {
    rf-Parameters-v1090                   RF-Parameters-v1090                         OPTIONAL,
    nonCriticalExtension               SEQUENCE {}                                OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-r9 ::=     SEQUENCE {
    phyLayerParameters-r9                 PhyLayerParameters                    OPTIONAL,
    featureGroupIndicators-r9             BIT STRING (SIZE (32))                  OPTIONAL,
    featureGroupIndRel9Add-r9                BIT STRING (SIZE (32))                  OPTIONAL,
    interRAT-ParametersGERAN-r9              IRAT-ParametersGERAN                    OPTIONAL,
    interRAT-ParametersUTRA-r9           IRAT-ParametersUTRA-v920           OPTIONAL,
    interRAT-ParametersCDMA2000-r9        IRAT-ParametersCDMA2000-1XRTT-v920  OPTIONAL,
    neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9OPTIONAL,
    ...
}

UE-EUTRA-CapabilityAddXDD-Mode-v1060 ::=    SEQUENCE {
    phyLayerParameters-v1060             PhyLayerParameters-v1020           OPTIONAL,
    featureGroupIndRel10-v1060              BIT STRING (SIZE (32))                  OPTIONAL,
    interRAT-ParametersCDMA2000-v1060  IRAT-ParametersCDMA2000-1XRTT-v1020OPTIONAL,
    interRAT-ParametersUTRA-TDD-v1060  IRAT-ParametersUTRA-TDD-v1020       OPTIONAL,
    ...,
```

```
    [[  otdoa-PositioningCapabilities-r10   OTDOA-PositioningCapabilities-r10   OPTIONAL
    ]]
}

AccessStratumRelease ::=            ENUMERATED {
                                    rel8, rel9, rel10, spare5, spare4, spare3,
                                    spare2, spare1, ...}

PDCP-Parameters ::=                 SEQUENCE {
    supportedROHC-Profiles              SEQUENCE {
        profile0x0001                   BOOLEAN,
        profile0x0002                   BOOLEAN,
        profile0x0003                   BOOLEAN,
        profile0x0004                   BOOLEAN,
        profile0x0006                   BOOLEAN,
        profile0x0101                   BOOLEAN,
        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,
    ...
}

PhyLayerParameters ::=              SEQUENCE {
    ue-TxAntennaSelectionSupported      BOOLEAN,
    ue-SpecificRefSigsSupported     BOOLEAN
}

PhyLayerParameters-v920 ::=         SEQUENCE {
    enhancedDualLayerFDD-r9         ENUMERATED {supported}          OPTIONAL,
    enhancedDualLayerTDD-r9         ENUMERATED {supported}          OPTIONAL
```

```
}

PhyLayerParameters-v9d0 ::=            SEQUENCE {
    tm5-FDD-r9                         ENUMERATED {supported}           OPTIONAL,
    tm5-TDD-r9                         ENUMERATED {supported}           OPTIONAL
}

PhyLayerParameters-v1020 ::=           SEQUENCE {
    twoAntennaPortsForPUCCH-r10                ENUMERATED {supported}               OPTIONAL,
    tm9-With-8Tx-FDD-r10                   ENUMERATED {supported}               OPTIONAL,
    pmi-Disabling-r10                      ENUMERATED {supported}               OPTIONAL,
    crossCarrierScheduling-r10             ENUMERATED {supported}               OPTIONAL,
    simultaneousPUCCH-PUSCH-r10                ENUMERATED {supported}               OPTIONAL,
    multiClusterPUSCH-WithinCC-r10             ENUMERATED {supported}               OPTIONAL,
    nonContiguousUL-RA-WithinCC-List-r10    NonContiguousUL-RA-WithinCC-List-r10    OPTIONAL
}

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}                   OPTIONAL
}

RF-Parameters ::=                      SEQUENCE {
    supportedBandListEUTRA                 SupportedBandListEUTRA
}

RF-Parameters-v9e0 ::=                 SEQUENCE {
    supportedBandListEUTRA-v9e0                SupportedBandListEUTRA-v9e0              OPTIONAL
}

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 ::=                 SEQUENCE {
    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
}

SupportedBandCombination-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-r10

SupportedBandCombinationExt-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF
BandCombinationParametersExt-r10

SupportedBandCombination-v1090 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-
v1090

SupportedBandCombination-v10i0 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-
v10i0

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-v1090

BandCombinationParameters-v10i0::= SEQUENCE {
bandParameterList-v10i0         SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF
        BandParameters-v10i0    OPTIONAL
}

SupportedBandwidthCombinationSet-r10 ::= BIT STRING (SIZE (1..maxBandwidthCombSet-r10))

BandParameters-r10 ::= SEQUENCE {
    bandEUTRA-r10               INTEGER (1..64),
    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-v10i0
}

BandParametersUL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF 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
```

```
CA-MIMO-ParametersDL-r10 ::= SEQUENCE {
    ca-BandwidthClassDL-r10             CA-BandwidthClass-r10,
    supportedMIMO-CapabilityDL-r10      MIMO-CapabilityDL-r10               OPTIONAL
}

CA-MIMO-ParametersDL-v10i0 ::= SEQUENCE {
    fourLayerTM3-TM4-r10                ENUMERATED {supported}              OPTIONAL
}

CA-BandwidthClass-r10 ::= ENUMERATED {a, b, c, d, e, f, ...}

MIMO-CapabilityUL-r10 ::= ENUMERATED {twoLayers, fourLayers}

MIMO-CapabilityDL-r10 ::= ENUMERATED {twoLayers, fourLayers, eightLayers}

SupportedBandListEUTRA ::=          SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA

SupportedBandListEUTRA-v9e0::=          SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v9e0

SupportedBandEUTRA ::=              SEQUENCE {
    bandEUTRA                           INTEGER (1..64),
    halfDuplex                          BOOLEAN
}

SupportedBandEUTRA-v9e0 ::=         SEQUENCE {
    bandEUTRA-v9e0                      FreqBandIndicator-v9e0      OPTIONAL
}

MeasParameters ::=                  SEQUENCE {
    bandListEUTRA                       BandListEUTRA
}

MeasParameters-v1020 ::=            SEQUENCE {
    bandCombinationListEUTRA-r10        BandCombinationListEUTRA-r10
```

```
}

BandListEUTRA ::=                   SEQUENCE (SIZE (1..maxBands)) OF BandInfoEUTRA

BandCombinationListEUTRA-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandInfoEUTRA

BandInfoEUTRA ::=                   SEQUENCE {
    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 ::=               SEQUENCE {
    interRAT-NeedForGaps                BOOLEAN
}

IRAT-ParametersUTRA-FDD ::=         SEQUENCE {
    supportedBandListUTRA-FDD           SupportedBandListUTRA-FDD
}

IRAT-ParametersUTRA-v920 ::=        SEQUENCE {
    e-RedirectionUTRA-r9                ENUMERATED {supported}
}

IRAT-ParametersUTRA-v9c0 ::=        SEQUENCE {
    voiceOverPS-HS-UTRA-FDD-r9                  ENUMERATED {supported}      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,
    srvcc-FromUTRA-TDD128-ToUTRA-TDD128-r9          ENUMERATED {supported}      OPTIONAL,
    srvcc-FromUTRA-TDD128-ToGERAN-r9                ENUMERATED {supported}      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, bandXV, bandXVI, ...,
                                    bandXVII-8a0, bandXVIII-8a0, bandXIX-8a0, bandXX-8a0,
                                    bandXXI-8a0, bandXXII-8a0, bandXXIII-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 ::=        SEQUENCE {
    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,
    interRAT-PS-HO-ToGERAN                    BOOLEAN
}

IRAT-ParametersGERAN-v920 ::=         SEQUENCE {
    dtm-r9                           ENUMERATED {supported}           OPTIONAL,
    e-RedirectionGERAN-r9                 ENUMERATED {supported}           OPTIONAL
}

SupportedBandListGERAN ::=            SEQUENCE (SIZE (1..maxBands)) OF SupportedBandGERAN

SupportedBandGERAN ::=                ENUMERATED {
                                     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-1XRTT-r9                      ENUMERATED {supported},
    e-CSFB-ConcPS-Mob1XRTT-r9                ENUMERATED {supported}            OPTIONAL
}

IRAT-ParametersCDMA2000-1XRTT-v1020 ::=SEQUENCE {
    e-CSFB-dual-1XRTT-r10                ENUMERATED {supported}
}

SupportedBandList1XRTT ::=           SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

CSG-ProximityIndicationParameters-r9 ::=    SEQUENCE {
    intraFreqProximityIndication-r9    ENUMERATED {supported}            OPTIONAL,
    interFreqProximityIndication-r9    ENUMERATED {supported}            OPTIONAL,
    utran-ProximityIndication-r9       ENUMERATED {supported}            OPTIONAL
}

NeighCellSI-AcquisitionParameters-r9 ::=SEQUENCE {
    intraFreqSI-AcquisitionForHO-r9  ENUMERATED {supported}            OPTIONAL,
    interFreqSI-AcquisitionForHO-r9  ENUMERATED {supported}            OPTIONAL,
```

```
    utran-SI-AcquisitionForHO-r9        ENUMERATED {supported}          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
}

OTDOA-PositioningCapabilities-r10 ::=   SEQUENCE {
    otdoa-UE-Assisted-r10               ENUMERATED {supported},
    interFreqRSTD-Measurement-r10           ENUMERATED {supported}      OPTIONAL
}

-- ASN1STOP
```

UE-EUTRA-Capability **field descriptions**	***FDD/ TDD diff***
accessStratumRelease Set to rel10 in this version of the specification.	-
bandCombinationListEUTRA One entry corresponding to each supported band combination listed in the same order as in *supportedBandCombination.*	-
BandCombinationParameters-v1090 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*.	-
bandParametersUL, bandParametersDL Indicates the supported parameters for the band. UE shall indicate parameters for only one CA uplink or downlink bandwidth class in a single band entry for one band combination entry.	-
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.	-
crossCarrierScheduling	Yes
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.	-
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
enhancedDualLayerTDD Indicates whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD or not.	-
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 *RRCConnectionRelease* or not.	Yes
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
fourLayerTM3-TM4 Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4.	-
halfDuplex If *halfDuplex* is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported.	-
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	-

***UE-EUTRA-Capability* field descriptions**	***FDD/ TDD diff***
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 *interRAT-Parameters*.	-
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-PS-HO-ToGERAN Indicates whether the UE supports inter-RAT PS handover to GERAN or not.	Yes
intraFreqProximityIndication Indicates whether the UE supports proximity indication for intra-frequency E-UTRAN CSG member cells.	-
intraFreqSI-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 intra-frequency cell.	Yes
loggedMeasurementsIdle Indicates whether the UE supports logged measurements in Idle mode.	-
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*.	-
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 [63].	-
MIMO-CapabilityDL The number of supported layers for spatial multiplexing in DL.	-
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.	-
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.	-
multiClusterPUSCH-WithinCC	Yes
multiNS-Pmax Indicates whether the UE supports the mechanisms defined for cells broadcasting *NS-PmaxList*.	-
NonContiguousUL-RA-WithinCC-List One entry corresponding to each supported E-UTRA band listed in the same order as in *supportedBandListEUTRA*.	No
otdoa-UE-Assisted Indicates whether the UE supports UE-assisted OTDOA positioning [54].	Yes
pmi-Disabling	Yes
rach-Report Indicates whether the UE supports delivery of rachReport.	-
simultaneousPUCCH-PUSCH	Yes
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	-

***UE-EUTRA-Capability* field descriptions**	***FDD/ TDD diff***
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.	-
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.	-
supportedBandCombination Includes the supported CA band combinations, if any, and may include all the supported non-CA bands. The UE shall include all the supported non-CA bands, regardless of whether it supports carrier aggregation, if: a) it includes *ue-Category-v1020* (i.e. category 6 to 8); or b) for at least one of the non-CA bands, it supports more MIMO layers with TM9 than implied by the UE category	-
SupportedBandCombinationExt, SupportedBandCombination-v1090 , SupportedBandCombination-v10i0 If included, the UE shall include the same number of entries, and listed in the same order, as in *supportedBandCombination-r10*.	-
SupportedBandGERAN GERAN band as defined in TS 45.005 [20].	No
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 If included, the UE shall include the same number of entries, and listed in the same order, as in *supportedListEUTRA* (i.e. without suffix).	-
SupportedBandListGERAN	No
SupportedBandListHRPD One entry corresponding to each supported CDMA2000 HRPD band class.	-
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.	-
tm9-With-8Tx-FDD	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.	-
twoAntennaPortsForPUCCH	No
ue-Category UE category as defined in TS 36.306 [5]. Set to values 1 to 8 in this version of the specification.	-
ue-SpecificRefSigsSupported	No
ue-TxAntennaSelectionSupported TRUE indicates that the UE is capable of supporting UE transmit antenna selection as described in TS 36.213 [23, 8.7].	Yes
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	Yes

***UE-EUTRA-Capability* field descriptions**	***FDD/ TDD diff***
a neighbouring UMTS cell.	
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.	-

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).

NOTE 3: All the combinations of *CA-MIMO-ParametersUL* and *CA-MIMO-ParametersDL* for one band and across all the bands in each *BandCombinationParameters* are supported by the UE and have the same measurement gap requirement (i.e. the same *BandInfoEUTRA* applies). 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.

– 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


UE-TimersAndConstants ::=           SEQUENCE {
    t300                            ENUMERATED {
                                        ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                        ms2000},
    t301                            ENUMERATED {
                                        ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
                                        ms2000},
    t310                            ENUMERATED {
                                        ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
    n310                            ENUMERATED {
                                        n1, n2, n3, n4, n6, n8, n10, n20},
    t311                            ENUMERATED {
                                        ms1000, ms3000, ms5000, ms10000, ms15000,
                                        ms20000, ms30000},
```

```
    n311                                ENUMERATED {
                                            n1, n2, n3, n4, n5, n6, n8, n10},
    ...
}

-- ASN1STOP
```

***UE-TimersAndConstants* field descriptions**
n3xy 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, ms50 corresponds with 50 ms and so on.

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)
}

-- 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 modificaton 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. TDD: Value 1, 2, 3, 4, and 5 correspond with subframe #3, #4, #7, #8, and #9 respectively.

– 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                     INTEGER (0..255),
    non-MBSFNregionLength                   ENUMERATED {s1, s2},
    notificationIndicator-r9            INTEGER (0..7),
    mcch-Config-r9                      SEQUENCE {
        mcch-RepetitionPeriod-r9            ENUMERATED {rf32, rf64, rf128, rf256},
        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}
    },
    ...
}

-- ASN1STOP
```

***MBSFN-AreaInfoList* field descriptions**
mbsfn-AreaId Indicates the MBSFN area ID, parameter N_{ID}^{MBSFN} in TS 36.211 [21, 6.10.2.1].
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 in-between them.
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.
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, Section 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 Modulation and Coding Scheme (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_{MCS} in TS 36.213 [23, Table 7.1.7.1-1], and so on.

– 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},
    radioframeAllocationOffset      INTEGER (0..7),
    subframeAllocation              CHOICE {
        oneFrame                    BIT STRING (SIZE(6)),
        fourFrames                      BIT STRING (SIZE(24))
    }
}
-- 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. Uplink subframes are not allocated.
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. Uplink subframes are not allocated. The last bit is not used.
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. The information provided for an individual PMCH includes the configuration parameters of the sessions that are carried by the concerned PMCH.

PMCH-InfoList information element

```
-- ASN1START

PMCH-InfoList-r9 ::=            SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-Info-r9

PMCH-Info-r9 ::=                SEQUENCE {
    pmch-Config-r9                  PMCH-Config-r9,
    mbms-SessionInfoList-r9         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),
    ...
}
```

```
PMCH-Config-r9 ::=                SEQUENCE {
    sf-AllocEnd-r9                    INTEGER (0..1535),
    dataMCS-r9                        INTEGER (0..28),
    mch-SchedulingPeriod-r9           ENUMERATED {
                                  rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
    ...
}

TMGI-r9 ::=                    SEQUENCE {
    plmn-Id-r9                        CHOICE {
        plmn-Index-r9                     INTEGER (1..6),
        explicitValue-r9              PLMN-Identity
    },
    serviceId-r9                  OCTET STRING (SIZE (3))
}

-- ASN1STOP
```

***PMCH-InfoList* field descriptions**
dataMCS Indicates the value for parameter I_{MCS} in TS 36.213 [23, Table 7.1.7.1-1], which defines the Modulation and Coding Scheme (MCS) applicable for the subframes of this (P)MCH as indicated by the field *commonSF-Alloc*. 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.*
plmn-Index Index of the entry in field *plmn-IdentityList* 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.
serviceId 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 n^{th} 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 n^{th} listed (P)MCH. Value 0 corresponds with the first subframe defined by field *commonSF-Alloc*.

6.4 RRC multiplicity and type constraint values

– Multiplicity and type constraint definitions

```
-- ASN1START


maxBandComb-r10                 INTEGER ::=128      -- Maximum number of band combinations.
maxBands                INTEGER ::= 64 -- Maximum number of bands listed in EUTRA UE caps
maxBandwidthClass-r10           INTEGER ::=16  -- Maximum number of supported CA BW classes per band
maxBandwidthCombSet-r10         INTEGER ::=32  -- Maximum number of bandwidth combination sets per
                                            -- supported band combination
maxCDMA-BandClass           INTEGER ::= 32 -- Maximum value of the CDMA band classes
maxCellBlack                INTEGER ::= 16 -- Maximum number of blacklisted physical cell identity
                                            -- ranges listed in SIB type 4 and 5
maxCellInfoGERAN-r9     INTEGER ::=32  -- Maximum number of GERAN cells for which system in-
                                            -- formation can be provided as redirection assistance
maxCellInfoUTRA-r9          INTEGER ::=16  -- Maximum number of UTRA cells for which system
                                            -- information can be provided as redirection
                                            -- assistance
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
maxCellListGERAN            INTEGER ::= 3   -- Maximum number of lists of GERAN cells
maxCellMeas                 INTEGER ::= 32 -- Maximum number of entries in each of the
                                            -- cell lists in a measurement object
maxCellReport               INTEGER ::= 8   -- Maximum number of reported cells
maxDRB                      INTEGER ::= 11 -- Maximum number of Data Radio Bearers
maxEARFCN                   INTEGER ::= 65535-- Maximum value of EUTRA carrier frequency
maxEARFCN-Plus1                 INTEGER ::= 65536-- Lowest value extended EARFCN range
maxEARFCN2                      INTEGER ::= 262143    -- Highest value extended EARFCN range
```

```
maxFBI                    INTEGER ::= 64 -- Maximum value of fequency band indicator
maxFBI-Plus1              INTEGER ::= 65 -- Lowest value extended FBI range
maxFBI2                   INTEGER ::= 256    -- Highest value extended FBI range
maxFreq                   INTEGER ::= 8   -- Maximum number of carrier frequencies
maxGERAN-SI                   INTEGER ::= 10 -- Maximum number of GERAN SI blocks that can be
                                      -- provided as part of NACC information
maxGNFG                       INTEGER ::= 16 -- Maximum number of GERAN neighbour freq groups
maxLogMeasReport-r10      INTEGER ::= 520    -- Maximum number of logged measurement entries
                                      --  that can be reported by the UE in one message
maxMBSFN-Allocations          INTEGER ::= 8   -- Maximum number of MBSFN frame allocations with
                                      -- different offset
maxMBSFN-Area                 INTEGER ::= 8
maxMBSFN-Area-1               INTEGER ::= 7
maxMeasId                 INTEGER ::= 32
maxMultiBands             INTEGER ::= 8   -- Maximum number of additional frequency bands
                                      -- that a cell belongs to
maxNS-Pmax-r10                INTEGER ::= 8   -- Maximum number of NS and P-Max values per band
maxObjectId               INTEGER ::= 32
maxPageRec                INTEGER ::= 16 --
maxPhysCellIdRange-r9                                      INTEGER ::= 4   -- Maximum number of physical
                                                         cell identity ranges
maxPNOffset               INTEGER ::=511     -- Maximum number of CDMA2000 PNOffsets
maxPMCH-PerMBSFN              INTEGER ::= 15
maxRAT-Capabilities           INTEGER ::= 8   -- Maximum number of interworking RATs (incl EUTRA)
maxReportConfigId         INTEGER ::= 32
maxRSTD-Freq-r10          INTEGER ::= 3   -- Maximum number of frequency layers for RSTD
                                      -- measurement
maxSCell-r10          INTEGER ::= 4   -- Maximum number of SCells
maxServCell-r10           INTEGER ::= 5   -- Maximum number of Serving cells
maxServiceCount           INTEGER ::= 16 -- Maximum number of MBMS services that can be included
                                      --  in an MBMS counting request and response
maxServiceCount-1         INTEGER ::= 15
maxSessionPerPMCH             INTEGER ::= 29
maxSessionPerPMCH-1           INTEGER ::= 28
maxSIB                    INTEGER ::= 32 -- Maximum number of SIBs
```

```
maxSIB-1                    INTEGER ::= 31
maxSI-Message               INTEGER ::= 32 -- Maximum number of SI messages
maxSimultaneousBands-r10INTEGER ::= 64 -- Maximum number of simultaneously aggregated bands
maxUTRA-FDD-Carrier         INTEGER ::= 16 -- Maximum number of UTRA FDD carrier frequencies
maxUTRA-TDD-Carrier         INTEGER ::= 16 -- Maximum number of UTRA TDD carrier frequencies


-- ASN1STOP
```

NOTE: The value of maxDRB align with SA2.

– End of EUTRA-RRC-Definitions

```
-- ASN1START


END


-- ASN1STOP
```

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,
    CarrierFreqGERAN,
```

```
    CellIdentity,
    SpeedStateScaleFactors,
    C-RNTI,
    LoggingDuration-r10,
    LoggingInterval-r10,
    LogMeasInfo-r10,
    MeasId,
    MeasIdToAddModList,
    MeasObjectToAddModList,
    MeasObjectToAddModList-v9e0,
    MobilityStateParameters,
    NeighCellConfig,
    PhysCellId,
    PhysCellIdCDMA2000,
    PhysCellIdGERAN,
    PhysCellIdUTRA-FDD,
    PhysCellIdUTRA-TDD,
    PLMN-Identity,
    QuantityConfig,
    ReportConfigToAddModList,
    RLF-Report-r9,
    RSRP-Range,
    TraceReference-r10,
    maxCellMeas,
    maxMeasId
FROM EUTRA-RRC-Definitions;


-- 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 and inter-RAT mobility related measurements.

***VarLogMeasConfig* UE variable**

```
-- ASN1START
```

```
VarLogMeasConfig-r10 ::=            SEQUENCE {
    areaConfiguration-r10           AreaConfiguration-r10       OPTIONAL,
    loggingDuration-r10             LoggingDuration-r10,
    loggingInterval-r10             LoggingInterval-r10
}

-- ASN1STOP
```

– VarLogMeasReport

The UE variable *VarLogMeasReport* includes the logged measurements information.

***VarLogMeasReport* UE variable**

```
-- ASN1START

VarLogMeasReport-r10 ::=            SEQUENCE {
    traceReference-r10                  TraceReference-r10,
    traceRecordingSessionRef-r10            OCTET STRING (SIZE (2)),
    tce-Id-r10                      OCTET STRING (SIZE (1)),
    plmn-Identity-r10                   PLMN-Identity,
    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
    measIdList                       MeasIdToAddModList              OPTIONAL,
    -- Measurement objects
    measObjectList                   MeasObjectToAddModList          OPTIONAL,
    measObjectList-v9i0              MeasObjectToAddModList-v9e0         OPTIONAL,
    -- Reporting configurations
    reportConfigList             ReportConfigToAddModList        OPTIONAL,
    -- Other parameters
    quantityConfig                   QuantityConfig                  OPTIONAL,
    s-Measure                    INTEGER (-140..-44)             OPTIONAL,
    speedStatePars                   CHOICE {
        release                      NULL,
        setup                        SEQUENCE {
            mobilityStateParameters          MobilityStateParameters,
            timeToTrigger-SF                 SpeedStateScaleFactors
        }
    }                                                        OPTIONAL
}

-- ASN1STOP
```

– VarMeasReportList

The UE variable *VarMeasReportList* includes information about the measurements for which the triggering conditions have been met.

***VarMeasReportList* UE variable**

```
-- ASN1START

VarMeasReportList ::=            SEQUENCE (SIZE (1..maxMeasId)) OF VarMeasReport

VarMeasReport ::=                SEQUENCE {
    -- List of measurement that have been triggered
```

```
    measId                          MeasId,
    cellsTriggeredList              CellsTriggeredList              OPTIONAL,
    numberOfReportsSent                 INTEGER
}

CellsTriggeredList ::=          SEQUENCE (SIZE (1..maxCellMeas)) OF CHOICE {
    physCellIdEUTRA                     PhysCellId,
    physCellIdUTRA                      CHOICE {
        fdd                             PhysCellIdUTRA-FDD,
        tdd                             PhysCellIdUTRA-TDD
    },
    physCellIdGERAN                     SEQUENCE {
        carrierFreq                     CarrierFreqGERAN,
        physCellId                      PhysCellIdGERAN
    },
    physCellIdCDMA2000                  PhysCellIdCDMA2000
}
-- 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
}

-- ASN1STOP
```

– 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.

– Multiplicity and type constraint definitions

This section includes multiplicity and type constraints applicable (only) for UE variables.

```
-- ASN1START

maxLogMeas-r10              INTEGER ::= 4060-- Maximum number of logged measurement entries
                                --  that can be stored by the UE

-- ASN1STOP
```

– End of EUTRA-UE-Variables

```
-- ASN1START

END

-- ASN1STOP
```

7.2 Counters

Counter	Reset	Incremented	When reaching max value

7.3 Timers (Informative)

Timer	Start	Stop	At expiry
T300	Transmission of *RRCConnectionRequest*	Reception of *RRCConnectionSetup* or *RRCConnectionReject* message, cell re-selection and upon abortion of connection establishment by upper layers	Perform the actions as specified in 5.3.3.6
T301	Transmission of *RRCConnectionReestabilshmentRequest*	Reception of *RRCConnectionReestablishment* or *RRCConnectionReestablishmentReject* 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 *RRCConnectionReconfiguration* message including the *MobilityControl Info* or reception of *MobilityFromEUTRACommand* message including *CellChangeOrder*	Criterion for successful completion of handover to EUTRA 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
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
T310	Upon detecting physical layer problems i.e. upon receiving N310 consecutive out-of-sync indications from lower layers	Upon receiving N311 consecutive in-sync indications from lower layers, 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	Upon initiating the RRC connection re-establishment procedure	Selection of a suitable E-UTRA cell or a cell using another RAT.	Enter RRC_IDLE
T320	Upon receiving *t320* 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 *measId*
T330	Upon receiving *LoggedMeasurementConfiguration* message	Upon log volume exceeding the suitable UE memory, upon initiating the release of *LoggedMeasurementConfiguration* procedure	Perform the actions specified in 5.6.6.4

7.4 Constants

Constant	Usage
N310	Maximum number of consecutive "out-of-sync" indications received from lower layers
N311	Maximum number of consecutive "in-sync" indications received from lower layers

8 Protocol data unit abstract syntax

8.1 General

The RRC PDU contents in clause 6 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, 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 and BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.

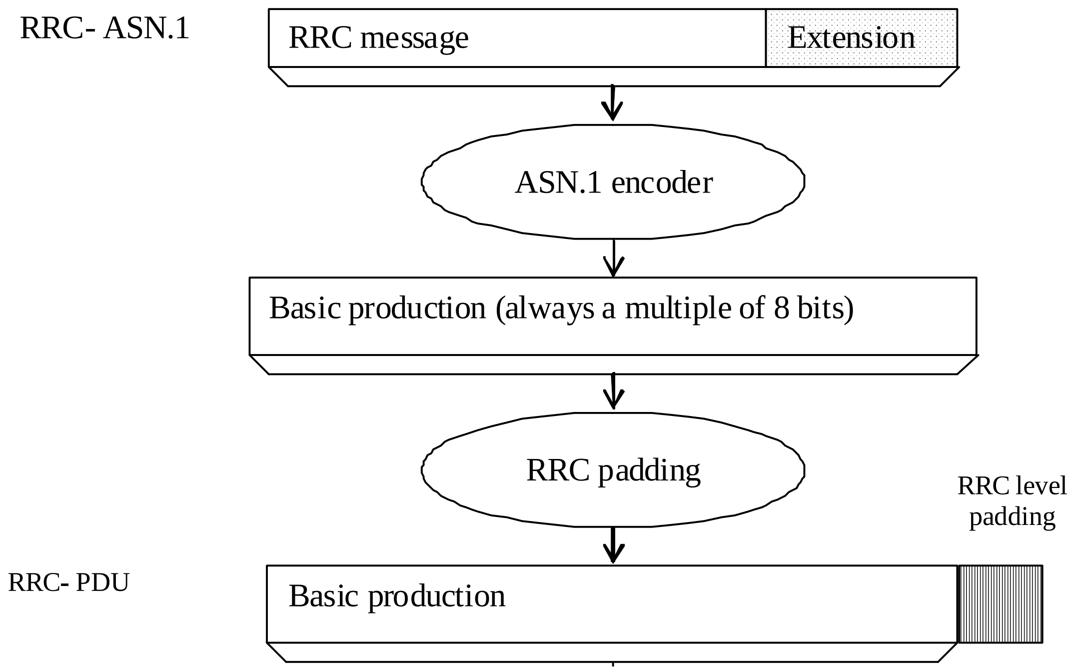

Figure 8.5-1: RRC level padding

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

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.

9.1.1.2 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		

9.1.2 SRB configurations

9.1.2.1 SRB1

Parameters

Name	Value	Semantics description	Ver
RLC configuration			
logicalChannelIdentity	1		

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. 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	Semantics description	Ver
RLC configuration CHOICE	am		
ul-RLC-Config *>t-PollRetransmit* *>pollPDU* *>pollByte* *>maxRetxThreshold*	 ms45 infinity infinity t4		
dl-RLC-Config *>t-Reordering* *>t-StatusProhibit*	 ms35 ms0		
Logical channel configuration			
priority	1	Highest priority	
prioritisedBitRate	infinity		
bucketSizeDuration	N/A		
logicalChannelGroup	0		

9.2.1.2 SRB2

Parameters

Name	Value	Semantics description	Ver
RLC configuration CHOICE	am		
ul-RLC-Config *>t-PollRetransmit* *>pollPDU* *>pollByte* *>maxRetxThreshold*	 ms45 infinity infinity t4		
dl-RLC-Config *>t-Reordering* *>t-StatusProhibit*	 ms35 ms0		
Logical channel configuration			
priority	3		
prioritisedBitRate	infinity		
bucketSizeDuration	N/A		
logicalChannelGroup	0		

9.2.2 Default MAC main configuration

Parameters

Name	Value	Semantics description	Ver
MAC main configuration			
maxHARQ-tx	n5		
periodicBSR-Timer	infinity		
retxBSR-Timer	sf2560		
ttiBundling	FALSE		
drx-Config	release		
phr-Config	release		

9.2.3 Default semi-persistent scheduling configuration

SPS-Config *>sps-ConfigDL* *>sps-ConfigUL*	 release release		

9.2.4 Default physical channel configuration

Parameters

Name	Value	Semantics description	Ver
PDSCH-ConfigDedicated *>p-a*	 dB0		
PUCCH-ConfigDedicated *> tdd-AckNackFeedbackMode* *>ackNackRepetition*	 bundling release	Only valid for TDD mode	
PUSCH-ConfigDedicated *>betaOffset-ACK-Index* *>betaOffset-RI-Index* *>betaOffset-CQI-Index*	 10 12 15		
UplinkPowerControlDedicated *>p0-UE-PUSCH* *>deltaMCS-Enabled* *>accumulationEnabled* *>p0-UE-PUCCH* *>pSRS-Offset* *> filterCoefficient*	 0 en0 (disabled) TRUE 0 7 fc4		
tpc-pdcch-ConfigPUCCH	release		

Name	Value	Semantics description	Ver
tpc-pdcch-ConfigPUSCH	release		
CQI-ReportConfig *> CQI-ReportPeriodic* *> cqi-ReportModeAperiodic* *> nomPDSCH-RS-EPRE-Offset*	 release N/A N/A		
SoundingRS-UL-ConfigDedicated	release		
AntennaInfoDedicated *>transmissionMode* *>codebookSubsetRestriction* *>ue-TransmitAntennaSelection*	 tm1, tm2 N/A release	 If the number of PBCH antenna ports is one, tm1 is used as default; otherwise tm2 is used as default	
SchedulingRequestConfig	release		

9.2.5 Default values timers and constants

Parameters

Name	Value	Semantics description	Ver
t310	ms1000		
n310	n1		
t311	ms1000		
n311	n1		

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
    AntennaInfoCommon,
    AntennaInfoDedicated-v10i0,
    CellIdentity,
    C-RNTI,
    DL-DCCH-Message,
    ARFCN-ValueEUTRA,
    ARFCN-ValueEUTRA-v9e0,
    MasterInformationBlock,
    maxFreq,
    MeasConfig,
    OtherConfig-r9,
    PhysCellId,
    RadioResourceConfigDedicated,
    RSRP-Range,
    RSRQ-Range,
    SCellToAddModList-r10,
    SecurityAlgorithmConfig,
    ShortMAC-I,
    SystemInformationBlockType1,
    SystemInformationBlockType1-v890-IEs,
    SystemInformationBlockType2,
    UECapabilityInformation,
    UE-CapabilityRAT-ContainerList
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, which is transparently transferred by the source RAN to the UE.

Direction: target eNB to source eNB/ source RAN

***HandoverCommand* message**

```
-- ASN1START

HandoverCommand ::=                 SEQUENCE {
    criticalExtensions              CHOICE {
        c1                          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 {
    handoverCommandMessage              OCTET STRING (CONTAINING DL-DCCH-Message),
    nonCriticalExtension            SEQUENCE {}                             OPTIONAL
}

-- ASN1STOP
```

***HandoverCommand* field descriptions**
handoverCommandMessage Contains the entire DL-DCCH-Message including the *RRCConnectionReconfiguration* message used to perform handover to E-UTRAN, generated (entirely) by the target eNB.

– 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 {
```

```
    criticalExtensions                  CHOICE {
        c1                              CHOICE{
            handoverPreparationInformation-r8     HandoverPreparationInformation-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

HandoverPreparationInformation-r8-IEs ::= SEQUENCE {
    ue-RadioAccessCapabilityInfo        UE-CapabilityRAT-ContainerList,
    as-Config                       AS-Config                   OPTIONAL,       -- Cond HO
    rrm-Config                          RRM-Config                  OPTIONAL,
    as-Context                          AS-Context                  OPTIONAL,       -- Cond HO
    nonCriticalExtension            HandoverPreparationInformation-v920-IEs         OPTIONAL
}

HandoverPreparationInformation-v920-IEs    ::= SEQUENCE {
    ue-ConfigRelease-r9                 ENUMERATED {
                                    rel9, rel10, spare6, spare5, v10j0, spare3,
                                    spare2, spare1, ...}            OPTIONAL,  -- Cond HO2
    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
```

```
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
    nonCriticalExtension            HandoverPreparationInformation-v10j0-IEs        OPTIONAL
}

HandoverPreparationInformation-v10j0-IEs ::= SEQUENCE {
    as-Config-v10j0                     AS-Config-v10j0         OPTIONAL,  -- Need ON
    -- Following field is only for late non-critical extensions from REL-10
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL
}

-- Regular non-critical extensions:
HandoverPreparationInformation-v9e0-IEs     ::= SEQUENCE {
    as-Config-v9e0                      AS-Config-v9e0                  OPTIONAL,  -- Cond HO2
    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.
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 E-UTRA radio access capabilities are always included and in case of inter-RAT handover to E-UTRA, UTRA radio access capabilities may be included. (If UTRA radio access capabilities are received from the source RAN, they are ignored by target eNB.) In case of inter-RAT handover to E-UTRA and the source is GERAN, GERAN capabilities are always included.

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.

Conditional presence	Explanation
HO	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.

– 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.

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 re-establishment.

***AS-Config* information element**

```
-- ASN1START

AS-Config ::=                    SEQUENCE {
    sourceMeasConfig                    MeasConfig,
    sourceRadioResourceConfig               RadioResourceConfigDedicated,
    sourceSecurityAlgorithmConfig           SecurityAlgorithmConfig,
    sourceUE-Identity                   C-RNTI,
    sourceMasterInformationBlock        MasterInformationBlock,
    sourceSystemInformationBlockType1   SystemInformationBlockType1(WITH COMPONENTS
                                        {..., nonCriticalExtension ABSENT}),
    sourceSystemInformationBlockType2   SystemInformationBlockType2,
    antennaInfoCommon                   AntennaInfoCommon,
    sourceDl-CarrierFreq                ARFCN-ValueEUTRA,
    ...,
    [[  sourceSystemInformationBlockType1Ext OCTET STRING (CONTAINING
                                            SystemInformationBlockType1-v890-IEs)OPTIONAL,
        sourceOtherConfig-r9                OtherConfig-r9
    ]],
    [[  sourceSCellConfigList-r10           SCellToAddModList-r10           OPTIONAL
    ]]
}

AS-Config-v9e0 ::=               SEQUENCE {
    sourceDl-CarrierFreq-v9e0       ARFCN-ValueEUTRA-v9e0
}

AS-Config-v10j0 ::=              SEQUENCE {
    antennaInfoDedicatedPCell-v10i0     AntennaInfoDedicated-v10i0          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**
antennaInfoCommon 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 *sourceDl-CarrierFreq* (i.e. without suffix) to *maxEARFCN*.
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.
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* transmitted in the source PCell.
sourceSystemInformationBlockType2 *SystemInformationBlockType2* transmitted in the source PCell.

– 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
}

-- ASN1STOP
```

AS-Context field descriptions
reestablishmentInfo Including information needed for the RRC connection re-establishment.

Conditional presence	Explanation
HO	The field is mandatory 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 {
    sourcePhysCellId                PhysCellId,
    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 re-establishment 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
    rsrpResult-r10                      RSRP-Range          OPTIONAL,
    rsrqResult-r10                      RSRQ-Range          OPTIONAL,
    ...,
    [[  dl-CarrierFreq-v1090            ARFCN-ValueEUTRA-v9e0       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 information elements 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.

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
#DRBs	The number of DRBs that a UE shall support	8
#RLC-AM	The number of RLC AM entities that a UE shall support	10
#minCellperMeasObjectEUTRA	The minimum number of neighbour cells (excluding black list cells) that a UE shall be able to store within a MeasObjectEUTRA. NOTE.	32
#minBlackCellRangesperMeasObjectEUTRA	The minimum number of blacklist cell PCI ranges that a UE shall be able to store within a MeasObjectEUTRA	32
#minCellperMeasObjectUTRA	The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectUTRA. NOTE.	32
#minCellperMeasObjectGERAN	The minimum number of neighbour cells that a UE shall be able to store within a measObjectGERAN. NOTE.	32
#minCellperMeasObjectCDMA2000	The minimum number of neighbour cells that a UE shall be able to store within a measObjectCDMA2000. NOTE.	32
#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
NOTE: In case of CGI reporting, the limit regarding the cells E-UTRAN can configure includes the cell for which the UE is requested to report CGI i.e. the amount of neighbour cells that can be included is at most (# minCellperMeasObjectRAT - 1), where RAT represents EUTRA/UTRA/GERAN/CDMA2000 respectively.		

11.2 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following table, 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.

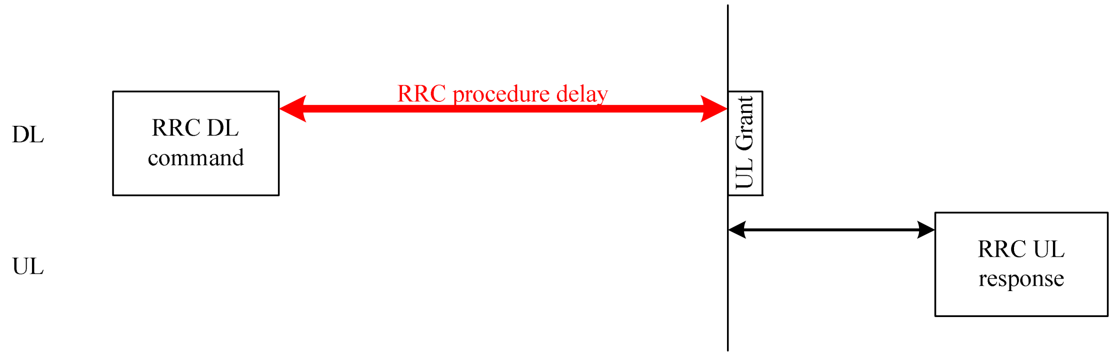

Figure 11.2-1: Illustration of RRC procedure delay

Procedure title:	E-UTRAN -> UE	UE -> E-UTRAN	N	Notes

Procedure title:	E-UTRAN -> UE	UE -> E-UTRAN	N	Notes
RRC Connection Control Procedures				
RRC connection establishment	*RRCConnectionSetup*	*RRCConnectionSetupComplete*	15	
RRC connection release	*RRCConnectionRelease*		NA	
RRC connection re-configuration (radio resource configuration)	*RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	15	
RRC connection re-configuration (measurement configuration)	*RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	15	
RRC connection re-configuration (intra-LTE mobility)	*RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	15	
RRC connection reconfiguration (SCell addition/release)	*RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	20	
RRC connection re-establishment	*RRCConnectionReestablishment*	*RRCConnectionReestablishmentComplete*	15	
Initial security activation	*SecurityModeCommand*	*SecurityModeCommandComplete/SecurityModeCommandFailure*	10	
Initial security activation + RRC connection re-configuration (RB establishment)	*SecurityModeCommand, RRCConnectionReconfiguration*	*RRCConnectionReconfigurationComplete*	20	The two DL messages are transmitted in the same TTI
Paging	*Paging*		NA	
Inter RAT mobility				
Handover to E-UTRA	*RRCConnectionReconfiguration (sent by other RAT)*	*RRCConnectionReconfigurationComplete*	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	*MobilityFromEUTRACommand*		NA	The performance of this procedure is specified in [16]
Handover from E-UTRA to CDMA2000	*HandoverFromEUTRAPreparationRequest (CDMA2000)*		NA	Used to trigger the handover preparation procedure with a CDMA2000 RAT. The performance of this procedure is specified in [16]
Measurement procedures				
Measurement Reporting		*MeasurementReport*	NA	
Other procedures				
UE capability transfer	*UECapabilityEnquiry*	*UECapabilityInformation*	10	
Counter check	*CounterCheck*	*CounterCheckResponse*	10	
Proximity indication		*ProximityIndication*	NA	
UE information	*UEInformationRequest*	*UEInformationResponse*	15	
MBMS counting	*MBMSCountingRequest*	*MBMSCountingResponse*	NA	

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.*, *Foo-r9* for the Rel-9 version of the ASN.1 type *Foo*. 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.

Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

Abbreviation	Abbreviated word
Conf	Confirmation
Config	Configuration
DL	Downlink
Freq	Frequency
Id	Identity
Ind	Indication
Info	Information
Meas	Measurement
Neigh	Neighbour(ing)
Param(s)	Parameter(s)
Persist	Persistent
Phys	Physical
Reestab	Reestablishment
Req	Request
Sched	Scheduling
Thresh	Threshold
Transm	Transmission
UL	Uplink

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)
    }       OPTIONAL
}

-- 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 {
    message                     DL-DCCH-MessageType
}

DL-DCCH-MessageType ::= CHOICE {
    c1                          CHOICE {
        dlInformationTransfer                   DLInformationTransfer,
        handoverFromEUTRAPreparationRequest     HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand                MobilityFromEUTRACommand,
        rrcConnectionReconfiguration            RRCConnectionReconfiguration,
        rrcConnectionRelease                    RRCConnectionRelease,
        securityModeCommand                     SecurityModeCommand,
        ueCapabilityEnquiry                     UECapabilityEnquiry,
        spare1 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.

```
-- /example/ ASN1START


RRCConnectionReconfiguration ::=    SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        c1                                      CHOICE{
            rrcConnectionReconfiguration-r8         RRCConnectionReconfiguration-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}


RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
    -- Enter the IEs here.
    ...
}


-- ASN1STOP
```

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.

```
-- /example/ ASN1START

RRCConnectionReconfigurationComplete ::= SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        rrcConnectionReconfigurationComplete-r8
                                        RRCConnectionReconfigurationComplete-r8-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
    -- Enter the IEs here. --                                       -- Cond condTag
    ...
}

-- ASN1STOP
```

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/ ASN1START

RRCMessage-r8-IEs ::=                       SEQUENCE {
    field1                              InformationElement1,
    field2                              InformationElement2,
    nonCriticalExtension                SEQUENCE {}                 OPTIONAL    -- Need OP
}

-- ASN1STOP
```

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-TypeIdentifier%* 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 {
    rootSequenceIndex                INTEGER (0..1023),
    prach-ConfigInfo             PRACH-ConfigInfo
}

PRACH-Config ::=                 SEQUENCE {
    rootSequenceIndex                INTEGER (0..1023),
    prach-ConfigInfo             PRACH-ConfigInfo                OPTIONAL   -- Need ON
}

PRACH-ConfigInfo ::=             SEQUENCE {
    prach-ConfigIndex                ENUMERATED {ffs},
    highSpeedFlag                    ENUMERATED {ffs},
    zeroCorrelationZoneConfig        ENUMERATED {ffs}
}

-- 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.

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:

```
-- /example/ ASN1START

PLMN-IdentityInfoList ::=           SEQUENCE (SIZE (1..6)) OF PLMN-IdentityInfo

PLMN-IdentityInfo ::=               SEQUENCE {
    plmn-Identity                   PLMN-Identity,
    cellReservedForOperatorUse          ENUMERATED {reserved, notReserved}
}

-- ASN1STOP
```

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

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{
            rrcMessage-r8                       RRCMessage-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

-- ASN1STOP
```

```
-- /example/ ASN1START                      -- Later release

RRCMessage ::=                          SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        c1                              CHOICE{
            rrcMessage-r8                       RRCMessage-r8-IEs,
            rrcMessage-r10                      RRCMessage-r10-IEs,
            rrcMessage-r11                      RRCMessage-r11-IEs,
            rrcMessage-r14                      RRCMessage-r14-IEs
        },
        later                           CHOICE {
            c2                                  CHOICE{
                rrcMessage-r16                          RRCMessage-r16-IEs,
                spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
                spare3 NULL, spare2 NULL, spare1 NULL
            },
            criticalExtensionsFuture            SEQUENCE {}
        }
    }
}

-- ASN1STOP
```

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, 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 is not provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions.

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 ::=         SEQUENCE {
    field1                      ENUMERATED {
                                    value1, value2, value3, value4-v880,
                                    ..., value5-v960 },
    field2                      CHOICE {
        field2a                     BOOLEAN,
        field2b                     InformationElement2b,
        ...,
        field2c-v960                InformationElement2c-r9
    },
    ...,
    [[  field3-r9                   InformationElement3-r9      OPTIONAL        -- Need OR
    ]],
    [[  field3-v9a0                     InformationElement3-v9a0  OPTIONAL,       -- Need OR
```

```
        field4-r9                       InformationElement4         OPTIONAL        -- Need OR
    ]]
}

InformationElement1-r10 ::=             SEQUENCE {
    field1                          ENUMERATED {
                                        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)
    },
    field3-r9                       InformationElement3-r10     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
    field5-v860                     BOOLEAN                             OPTIONAL,  -- Cond C54
    nonCriticalExtension        RRCMessage-v940-IEs
}

RRCMessage-v940-IEs ::=             SEQUENCE {
    field6-v940                     InformationElement6-r9          OPTIONAL,  -- Need OR
    nonCriticalExtensions           SEQUENCE {}                         OPTIONAL   -- Need OP
}


-- 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.

ParentIE-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
    ]]
}

-- 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

ChildIE1-WithoutEM ::=              SEQUENCE {
    -- Root encoding, including:
    chIE1-ConfigurableFeature       ChIE1-ConfigurableFeature     OPTIONAL        -- Need ON
}

ChildIE1-WithoutEM-vNx0 ::=     SEQUENCE {
    chIE1-ConfigurableFeature-vNx0      ChIE1-ConfigurableFeature-vNx0  OPTIONAL   -- Cond ConfigF
}

ChIE1-ConfigurableFeature ::=   CHOICE {
    release                     NULL,
    setup                       SEQUENCE {
        -- Root encoding
    }
}

ChIE1-ConfigurableFeature-vNx0 ::=  SEQUENCE {
    chIE1-NewField-rN               INTEGER (0..31)
}

-- ASN1STOP
```

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
}


-- ASN1STOP
```

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	P	A-I	A-C	Comment
CSFBParametersRequestCDMA2000	+	-	-	
CSFBParametersResponseCDMA2000	+	-	-	
CounterCheck	-	-	-	
CounterCheckResponse	-	-	-	
DLInformationTransfer	+	-	-	
HandoverFromEUTRAPreparationRequest (CDMA2000)	-	-	-	
InterFreqRSTDMeasurementIndication	-	-	-	
LoggedMeasurementsConfiguration	-	-	-	
MasterInformationBlock	+	+	+	
MBMSCountingRequest	+	+	+	
MBMSCountingResponse	-	-	-	
MBSFNAreaConfiguration	+	+	+	
MeasurementReport	-	-	-	RAN2 agreed that measurement configuration may be sent prior to security activation. But: In order to protect privacy of UEs MeasurementReport 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.
RRCConnectionReestablishmentComplete	-	-	-	
RRCConnectionReestablishmentReject	-	+	+	One reason to send this may be that the security context has been lost, therefore sent as unprotected.
RRCConnectionReestablishmentRequest	-	-	+	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	
RRCConnectionSetup	+	NA	NA	
RRCConnectionSetupComplete	+	NA	NA	
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.
SystemInformation	+	+	+	
SystemInformationBlockType1	+	+	+	
UECapabilityEnquiry	+	-	-	
UECapabilityInformation	+	-	-	
UEInformationRequest	-	-	-	

Message	P	A-I	A-C	Comment
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	+	-	-	

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]'.

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, 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.

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			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			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	No
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 not support VoLTE	Yes, if UE supports VoLTE	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 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
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, 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	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	Yes for FDD, if UE supports only UTRAN FDD and does not support UTRAN TDD or GERAN or 1xRTT or HRPD	Yes
16	- Intra-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells*; - Inter-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells*, if the UE has set bit number 25 to 1 - Inter-RAT periodical measurement reporting where *triggerType* 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 - Inter-RAT periodical measurement reporting where *triggerType* 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 reporting (i.e., with *triggerType* set to *event* and with *reportAmount* > 1) is a mandatory functionality of event triggered reporting and therefore not the subject of this bit.		Yes	No

17	Intra-frequency ANR features including: - Intra-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells* - Intra-frequency 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 to 1.	Yes	No
18	Inter-frequency ANR features including: - Inter-frequency periodical measurement reporting where *triggerType* is set to *periodical* and *purpose* is set to *reportStrongestCells* - Inter-frequency 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 25 to 1.	Yes, unless UE only supports band 13	No
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 UTRANTDD 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 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 *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, 39, 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 - 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
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			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		Yes for FDD, if UE supports UTRA FDD	Yes
23	- GERAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode			Yes
24	- 1xRTT measurements, reporting and measurement reporting event B2 in E-UTRA connected mode		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.		Yes, unless UE only supports band 13	No
26	- HRPD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode		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]	Yes for FDD, if UE supports VoLTE and UTRA FDD	Yes
28	- TTI bundling		Yes for FDD	Yes
29	- Semi-Persistent Scheduling			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 *multiBandInfoList*, 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

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			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		Yes for FDD, unless UE has set bit number 15 to 1	Yes
42	Undefined			
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.

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 for PS handover	Group 8/38 (PS handover) or Group 27/40 (SRVCC handover)	Group 12	Group 11	Group 13 (within FDD o TDD) Group 30 (between FDI 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.		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	- 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	- 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 PUCCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured	- this bit can be set to 1 only if indices 2 (Table B.1-1) and 103 are set to 1.		Yes

106	- Periodic CQI/PMI/RI/PTI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured	- this bit can be set to 1 only 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") and if index 2 (Table B.1-1) is set to 1.		Yes
107	- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured	- this bit can be set to 1 only if indices 1 (Table B.1-1) and 103 are set to 1.		Yes
108	- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured	- this bit can be set to 1 only 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") and if index 1 (Table B.1-1) is set to 1.		Yes
109	- Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 1	- this bit can be set to 1 only 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").		Yes
110	- Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 2	- this bit can be set to 1 only 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").		Yes
111	- Measurement reporting trigger Event A6	- this bit can be set to 1 only if the UE supports carrier aggregation.		Yes
112	- SCell addition within the Handover to EUTRA procedure	- this bit can be set to 1 only if the UE supports carrier aggregation and the Handover to EUTRA procedure.		Yes
113	- Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells NOTE: X = number of supported component carriers in a given band combination	- this bit can be set to 1 only if the UE supports carrier aggregation in UL.		Yes
114	- Reporting of both UTRA CPICH RSCP and Ec/N0 in a Measurement Report	- this bit can be set to 1 only if index 22 (Table B.1-1) is set to 1.		No
115	- time domain ICIC RLM/RRM measurement subframe restriction for the serving cell - time domain ICIC RRM measurement subframe restriction for neighbour cells - time domain ICIC CSI measurement			Yes

	subframe restriction			
116	- Relative transmit phase continuity for spatial multiplexing in UL	- this bit can be set to 1 only if the UE supports two or more layers for spatial multiplexing in UL.		Yes
117	Undefined			
118	Undefined			
119	Undefined			
120	Undefined			
121	Undefined			
122	Undefined			
123	Undefined			
124	Undefined			
125	Undefined			
126	Undefined			
127	Undefined			
128	Undefined			
129	Undefined			
130	Undefined			
131	Undefined			
132	Undefined			

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD.

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.
- E-UTRAN uses B64 to indicate the presence of B90 in *freqBandIndciator-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. The UE applies the first listed band which it supports.

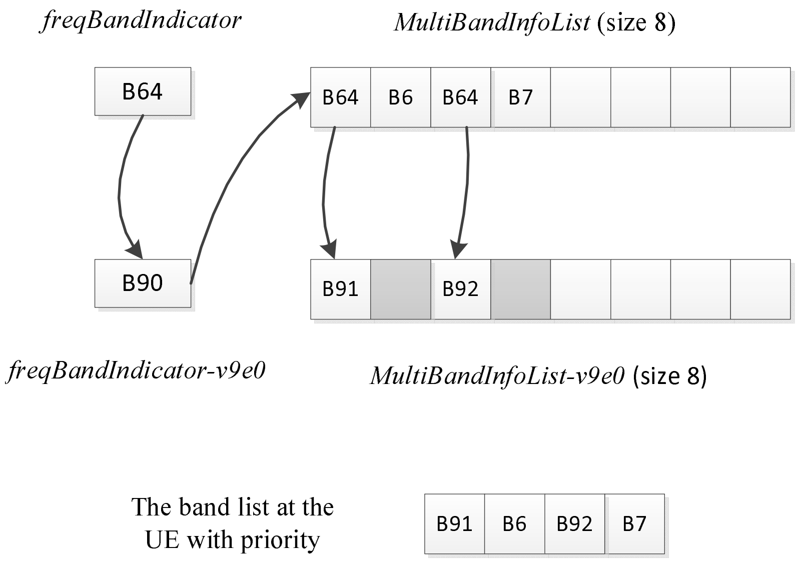

Figure D.1.1-1: Mapping of frequency bands to *MultiBandInfoList/MultiBandInfoList-v9e0*

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: 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 bands 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*.

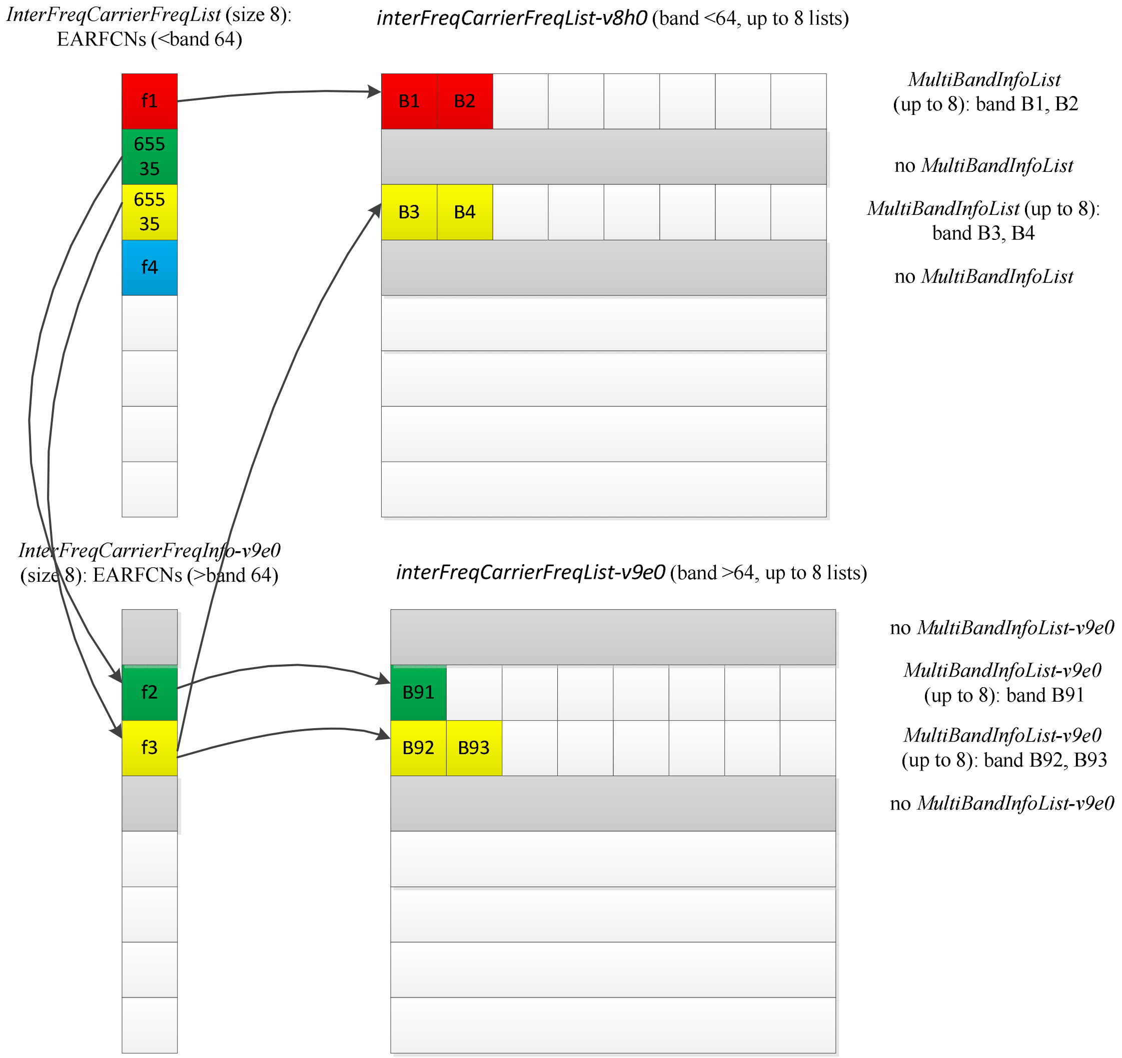

Figure D.1.2-1: Mapping of EARFCNs to *MultiBandInfoList/MultiBandInfoList-v9e0*

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-UTRA includes 4 UTRAN FDD frequencies.

- The bands associated with f1 and f4 have no overlapping bands. The band associated f2 has two overlapping bands, B1 and B2. The band associated with f3 has one overlapping band, B3.

- E-UTRA include 4 lists in *carrierFreqListUTRA-FDD-v8h0* with the first and fourth entry not including *MultiBandInfoList*.

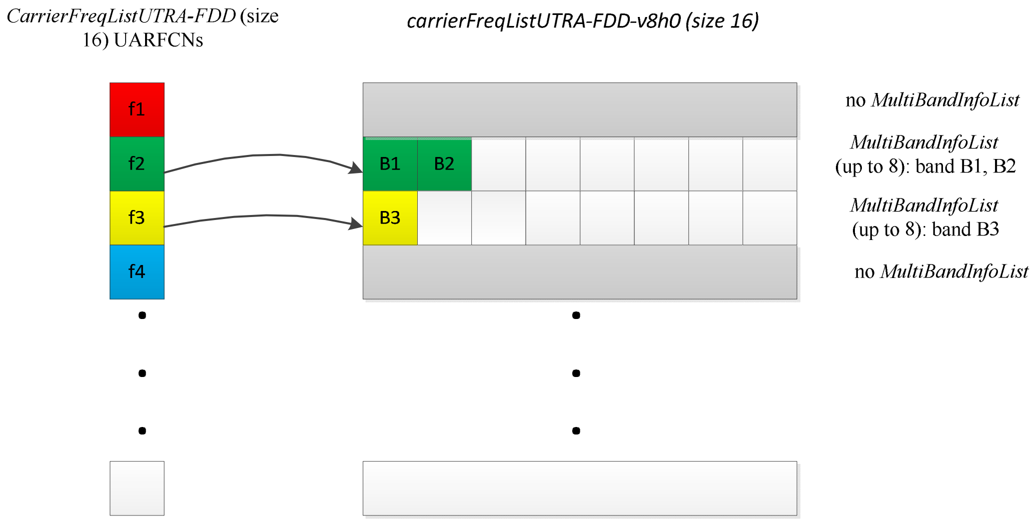

Figure D.1.3-1: Mapping of UARFCNs to *MultiBandInfoList*

Annex E (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
12/2007	RP-38	RP-070920	-		Approved at TSG-RAN #38 and placed under Change Control	1.0.0	8.0.0
03/2008	RP-39	RP-080163	0001	4	CR to 36.331 with Miscellaneous corrections	8.0.0	8.1.0
03/2008	RP-39	RP-080164	0002	2	CR to 36.331 to convert RRC to agreed ASN.1 format	8.0.0	8.1.0
05/2008	RP-40	RP-080361	0003	1	CR to 36.331 on Miscellaneous clarifications/ corrections	8.1.0	8.2.0
09/2008	RP-41	RP-080693	0005	-	CR on Miscellaneous corrections and clarifications	8.2.0	8.3.0
12/2008	RP-42	RP-081021	0006	-	Miscellaneous corrections and clarifications	8.3.0	8.4.0
03/2009	RP-43	RP-090131	0007	-	Correction to the Counter Check procedure	8.4.0	8.5.0
	RP-43	RP-090131	0008	-	CR to 36.331-UE Actions on Receiving SIB11	8.4.0	8.5.0
	RP-43	RP-090131	0009	1	Spare usage on BCCH	8.4.0	8.5.0
	RP-43	RP-090131	0010	-	Issues in handling optional IE upon absence in GERAN NCL	8.4.0	8.5.0
	RP-43	RP-090131	0011	-	CR to 36.331 on Removal of useless RLC re-establishment at RB release	8.4.0	8.5.0
	RP-43	RP-090131	0012	1	Clarification to RRC level padding at PCCH and BCCH	8.4.0	8.5.0
	RP-43	RP-090131	0013	-	Removal of Inter-RAT message	8.4.0	8.5.0
	RP-43	RP-090131	0014	-	Padding of the SRB-ID for security input	8.4.0	8.5.0
	RP-43	RP-090131	0015	-	Validity of ETWS SIB	8.4.0	8.5.0
	RP-43	RP-090131	0016	1	Configuration of the Two-Intervals-SPS	8.4.0	8.5.0
	RP-43	RP-090131	0017	-	Corrections on Scaling Factor Values of Qhyst	8.4.0	8.5.0
	RP-43	RP-090131	0018	1	Optionality of srsMaxUppts	8.4.0	8.5.0
	RP-43	RP-090131	0019	-	CR for discussion on field name for common and dedicated IE	8.4.0	8.5.0
	RP-43	RP-090131	0020	-	Corrections to Connected mode mobility	8.4.0	8.5.0
	RP-43	RP-090131	0021	-	Clarification regarding the measurement reporting procedure	8.4.0	8.5.0
	RP-43	RP-090131	0022	1	Corrections on s-Measure	8.4.0	8.5.0
	RP-43	RP-090131	0023	1	R1 of CR0023 (R2-091029) on combination of SPS and TTI bundling for TDD	8.4.0	8.5.0
	RP-43	RP-090131	0024	-	L3 filtering for path loss measurements	8.4.0	8.5.0
	RP-43	RP-090131	0025	1	S-measure handling for reportCGI	8.4.0	8.5.0
	RP-43	RP-090131	0026	1	Measurement configuration clean up	8.4.0	8.5.0
	RP-43	RP-090131	0027	-	Alignment of measurement quantities for UTRA	8.4.0	8.5.0
	RP-43	RP-090131	0028	-	CR to 36.331 on L1 parameters ranges alignment	8.4.0	8.5.0
	RP-43	RP-090131	0029	-	Default configuration for transmissionMode	8.4.0	8.5.0
	RP-43	RP-090131	0030	-	CR to 36.331 on RRC Parameters for MAC, RLC and PDCP	8.4.0	8.5.0
	RP-43	RP-090131	0031	1	CR to 36.331 - Clarification on Configured PRACH Freq Offset	8.4.0	8.5.0
	RP-43	RP-090131	0032	-	Clarification on TTI bundling configuration	8.4.0	8.5.0
	RP-43	RP-090131	0033	1	Update of R2-091039 on Inter-RAT UE Capability	8.4.0	8.5.0
	RP-43	RP-090133	0034	-	Feature Group Support Indicators	8.4.0	8.5.0
	RP-43	RP-090131	0036	-	Corrections to RLF detection	8.4.0	8.5.0
	RP-43	RP-090131	0037	-	Indication of Dedicated Priority	8.4.0	8.5.0
	RP-43	RP-090131	0038	2	Security Clean up	8.4.0	8.5.0
	RP-43	RP-090131	0039	-	Correction of TTT value range	8.4.0	8.5.0
	RP-43	RP-090131	0040	-	Correction on CDMA measurement result IE	8.4.0	8.5.0
	RP-43	RP-090131	0041	1	Clarification of Measurement Reporting	8.4.0	8.5.0
	RP-43	RP-090131	0042	-	Spare values in DL and UL Bandwidth in MIB and SIB2	8.4.0	8.5.0
	RP-43	RP-090131	0044	1	Clarifications to System Information Block Type 8	8.4.0	8.5.0
	RP-43	RP-090131	0045	-	Reception of ETWS secondary notification	8.4.0	8.5.0
	RP-43	RP-090131	0046	1	Validity time for ETWS message Id and Sequence No	8.4.0	8.5.0
	RP-43	RP-090131	0047	-	CR for Timers and constants values used during handover to E-UTRA	8.4.0	8.5.0
	RP-43	RP-090131	0048	-	Inter-RAT Security Clarification	8.4.0	8.5.0
	RP-43	RP-090131	0049	-	CR to 36.331 on consistent naming of 1xRTT identifiers	8.4.0	8.5.0
	RP-43	RP-090131	0050	-	Capturing RRC behavior regarding NAS local release	8.4.0	8.5.0
	RP-43	RP-090131	0051	-	Report CGI before T321 expiry and UE null reporting	8.4.0	8.5.0
	RP-43	RP-090131	0052	-	System Information and 3 hour validity	8.4.0	8.5.0
	RP-43	RP-090131	0053	1	Inter-Node AS Signalling	8.4.0	8.5.0
	RP-43	RP-090131	0054	-	Set of values for the parameter "messagePowerOffsetGroupB"	8.4.0	8.5.0
	RP-43	RP-090131	0055	-	CR to paging reception for ETWS capable UEs in RRC_CONNECTED	8.4.0	8.5.0
	RP-43	RP-090131	0056	1	CR for CSG related items in 36.331	8.4.0	8.5.0
	RP-43	RP-090131	0057	1	SRS common configuration	8.4.0	8.5.0
	RP-43	RP-090131	0058	-	RRC processing delay	8.4.0	8.5.0
	RP-43	RP-090131	0059	-	CR for HNB Name	8.4.0	8.5.0
	RP-43	RP-090131	0060	3	Handover to EUTRA delta configuration	8.4.0	8.5.0
	RP-43	RP-090131	0063	-	Delivery of Message Identifier and Serial Number to upper layers for ETWS	8.4.0	8.5.0
	RP-43	RP-090131	0066	-	Clarification on the maximum size of cell lists	8.4.0	8.5.0
	RP-43	RP-090131	0067	-	Missing RRC messages in 'Protection of RRC messages'	8.4.0	8.5.0
	RP-43	RP-090131	0069	1	Clarification on NAS Security Container	8.4.0	8.5.0
	RP-43	RP-090131	0071	-	Extension of range of CQI/PMI configuration index	8.4.0	8.5.0
	RP-43	RP-090131	0072	1	Access barring alleviation in RRC connection establishment	8.4.0	8.5.0
	RP-43	RP-090367	0077	6	Corrections to feature group support indicators	8.4.0	8.5.0
	RP-43	RP-090131	0078	-	CR from email discussion to capture DRX and TTT handling	8.4.0	8.5.0

	RP-43	RP-090131	0079	1	Need Code handling on BCCH messages	8.4.0	8.5.0
	RP-43	RP-090131	0080	-	Unification of T300 and T301 and removal of miscallaneous FFSs	8.4.0	8.5.0
	RP-43	RP-090131	0084	1	Proposed CR modifying the code-point definitions of neighbourCellConfiguration	8.4.0	8.5.0
	RP-43	RP-090131	0087	2	Remove Redundant Optionality in SIB8	8.4.0	8.5.0
	RP-43	RP-090131	0089	-	Corrections to the generic error handling	8.4.0	8.5.0
	RP-43	RP-090131	0090	-	Configurability of T301	8.4.0	8.5.0
	RP-43	RP-090131	0091	1	Correction related to TTT	8.4.0	8.5.0
	RP-43	RP-090131	0095	-	CR for 36.331 on SPS-config	8.4.0	8.5.0
	RP-43	RP-090131	0096	2	CR for Deactivation of periodical measurement	8.4.0	8.5.0
	RP-43	RP-090131	0099	2	SMC and reconfiguration	8.4.0	8.5.0
	RP-43	RP-090131	0101	-	TDD handover	8.4.0	8.5.0
	RP-43	RP-090131	0102	-	Corrections to system information acquisition	8.4.0	8.5.0
	RP-43	RP-090131	0106	-	Some Corrections and Clarifications to 36.331	8.4.0	8.5.0
	RP-43	RP-090131	0109	-	Clarification on the Maximum number of ROHC context sessions parameter	8.4.0	8.5.0
	RP-43	RP-090131	0110	-	Transmission of rrm-Config at Inter-RAT Handover	8.4.0	8.5.0
	RP-43	RP-090131	0111	1	Use of SameRefSignalsInNeighbor parameter	8.4.0	8.5.0
	RP-43	RP-090131	0112	-	Default serving cell offset for measurement event A3	8.4.0	8.5.0
	RP-43	RP-090131	0114	-	dl-EARFCN missing in HandoverPreparationInformation	8.4.0	8.5.0
	RP-43	RP-090131	0115	-	Cleanup of references to 36.101	8.4.0	8.5.0
	RP-43	RP-090131	0117	-	Correction to the value range of UE-Categories	8.4.0	8.5.0
	RP-43	RP-090131	0122	1	Correction on RRC connection re-establishment	8.4.0	8.5.0
	RP-43	RP-090131	0124	-	Performing Measurements to report CGI for CDMA2000	8.4.0	8.5.0
	RP-43	RP-090131	0125	-	CDMA2000-SystemTimeInfo in VarMeasurementConfiguration	8.4.0	8.5.0
	RP-43	RP-090131	0126	-	UE Capability Information for CDMA2000 1xRTT	8.4.0	8.5.0
	RP-43	RP-090131	0127	-	CDMA2000 related editorial changes	8.4.0	8.5.0
	RP-43	RP-090131	0128	-	Draft CR to 36.331 on State mismatch recovery at re-establishment	8.4.0	8.5.0
	RP-43	RP-090131	0129	1	Draft CR to 36.331 on Renaming of AC barring related IEs	8.4.0	8.5.0
	RP-43	RP-090131	0130	2	Draft CR to 36.331 on Inheriting of dedicated priorities at inter-RAT reselection	8.4.0	8.5.0
	RP-43	RP-090131	0135	-	Proposed CR to 36.331 Description alignment for paging parameter, nB	8.4.0	8.5.0
	RP-43	RP-090131	0139	2	Miscellaneous corrections and clarifications resulting from ASN.1 review	8.4.0	8.5.0
	RP-43	RP-090131	0141	1	Correction regarding Redirection Information fo GERAN	8.4.0	8.5.0
	RP-43	RP-090131	0142	-	Further ASN.1 review related issues	8.4.0	8.5.0
	RP-43	RP-090131	0143	-	Periodic measurements	8.4.0	8.5.0
	RP-43	RP-090131	0144	1	Further analysis on code point "OFF" for ri-ConfigIndex	8.4.0	8.5.0
	RP-43	RP-090131	0145	1	Adding and deleting same measurement or configuration in one message	8.4.0	8.5.0
	RP-43	RP-090131	0147	-	Corrections to IE dataCodingScheme in SIB11	8.4.0	8.5.0
	RP-43	RP-090131	0148	-	Clarification on Mobility from E-UTRA	8.4.0	8.5.0
	RP-43	RP-090131	0149	-	36.331 CR related to 'not applicable'	8.4.0	8.5.0
	RP-43	RP-090131	0150	1	UE radio capability transfer	8.4.0	8.5.0
	RP-43	RP-090131	0151	-	CR to 36.331 on value of CDMA band classes	8.4.0	8.5.0
	RP-43	RP-090131	0152	-	Corrections to DRB modification	8.4.0	8.5.0
	RP-43	RP-090131	0153	-	Correction to presence condition for pdcp-config	8.4.0	8.5.0
	RP-43	RP-090131	0155	-	TDD HARQ-ACK feedback mode	8.4.0	8.5.0
	RP-43	RP-090275	0157	-	Corrections regarding use of carrierFreq for CDMA (SIB8) and GERAN (measObject)	8.4.0	8.5.0
	RP-43	RP-090321	0156	1	Sending of GERAN SI/PSI information at Inter-RAT Handover	8.4.0	8.5.0
	RP-43	RP-090339	0158	-	Clarification of CSG support	8.4.0	8.5.0
06/2009	RP-44	RP-090516	0159	-	Octet alignment of VarShortMAC-Input	8.5.0	8.6.0
	RP-44	RP-090516	0160	3	Minor corrections to the feature grouping	8.5.0	8.6.0
	RP-44	RP-090516	0161	-	Security clarification	8.5.0	8.6.0
	RP-44	RP-090516	0162	1	Sending of GERAN SI/PSI information at Inter-RAT Handover	8.5.0	8.6.0
	RP-44	RP-090516	0163	1	Correction of UE measurement model	8.5.0	8.6.0
	RP-44	RP-090516	0164	-	Restricting the reconfiguration of UM RLC SN field size	8.5.0	8.6.0
	RP-44	RP-090516	0165	1	36.331 CR on Clarification on cell change order from GERAN to E-UTRAN	8.5.0	8.6.0
	RP-44	RP-090516	0166	-	36.331 CR - Handling of expired TAT and failed D-SR	8.5.0	8.6.0
	RP-44	RP-090516	0167	1	Proposed CR to 36.331 Clarification on mandatory information in AS-Config	8.5.0	8.6.0
	RP-44	RP-090516	0168	2	Miscellaneous small corrections	8.5.0	8.6.0
	RP-44	RP-090516	0173	-	Clarification on the basis of delta signalling	8.5.0	8.6.0
	RP-44	RP-090516	0177	-	CR on Alignment of CCCH and DCCH handling of missing mandatory field	8.5.0	8.6.0
	RP-44	RP-090516	0180	2	Handling of Measurement Context During HO Preparation	8.5.0	8.6.0
	RP-44	RP-090516	0181	-	Clarification of key-eNodeB-Star in AdditionalReestabInfo	8.5.0	8.6.0
	RP-44	RP-090516	0182	1	UE Capability Transfer	8.5.0	8.6.0
	RP-44	RP-090516	0186	1	Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup	8.5.0	8.6.0

	RP-44	RP-090516	0188	1	Correction and completion of specification conventions	8.5.0	8.6.0
	RP-44	RP-090516	0195	2	RB combination in feature group indicator	8.5.0	8.6.0
	RP-44	RP-090516	0196	1	CR for need code for fields in mobilityControlInfo	8.5.0	8.6.0
	RP-44	RP-090497	0197	-	Alignment of pusch-HoppingOffset with 36.211	8.5.0	8.6.0
	RP-44	RP-090570	0198	-	Explicit srb-Identity values for SRB1 and SRB2	8.5.0	8.6.0
	RP-44	RP-090516	0199	-	Removing use of *defaultValue* for *mac-MainConfig*	8.5.0	8.6.0
09/2009	RP-45	RP-090906	0200	-	Proposed update of the feature grouping	8.6.0	8.7.0
	RP-45	RP-090906	0201	-	Clarification on measurement object configuration for serving frequency	8.6.0	8.7.0
	RP-45	RP-090906	0202	-	Correction regarding SRVCC	8.6.0	8.7.0
	RP-45	RP-090906	0203	-	Indication of DRB Release during HO	8.6.0	8.7.0
	RP-45	RP-090906	0204	1	Correction regarding application of dedicated resource configuration upon handover	8.6.0	8.7.0
	RP-45	RP-090906	0205	-	REL-9 protocol extensions in RRC	8.6.0	8.7.0
	RP-45	RP-090906	0206	-	In-order delivery of NAS PDUs at RRC connection reconfiguration	8.6.0	8.7.0
	RP-45	RP-090906	0207	-	Correction on Threshold of Measurement Event	8.6.0	8.7.0
	RP-45	RP-090906	0210	-	Clarification on dedicated resource of RA procedure	8.6.0	8.7.0
	RP-45	RP-090906	0213	1	Cell barring when MasterInformationBlock or SystemInformationBlock1 is missing	8.6.0	8.7.0
	RP-45	RP-090915	0218	-	Security threat with duplicate detection for ETWS	8.6.0	8.7.0
	RP-45	RP-090906	0224	-	Clarification on supported handover types in feature grouping	8.6.0	8.7.0
	RP-45	RP-090906	0250	1	Handling of unsupported / non-comprehended frequency band and emission requirement	8.6.0	8.7.0
	RP-45	RP-090906	0251	-	RB combinations in feature group indicator 20	8.6.0	8.7.0
09/2009	RP-45	RP-090934	0220	1	Introduction of Per-QCI radio link failure timers (option 1)	8.7.0	9.0.0
	RP-45	RP-090926	0222	-	Null integrity protection algorithm	8.7.0	9.0.0
	RP-45	RP-090926	0223	-	Emergency Support Indicator in BCCH	8.70	9.0.0
	RP-45	RP-090934	0230	2	CR to 36.331 for Enhanced CSFB to 1xRTT with concurrent PS handover	8.7.0	9.0.0
	RP-45	RP-090934	0243	-	REL-9 on Miscellaneous editorial corrections	8.7.0	9.0.0
	RP-45	RP-090934	0247	-	Periodic CQI/PMI/RI masking	8.7.0	9.0.0
	RP-45	RP-090933	0252	-	Introduction of CMAS	8.7.0	9.0.0
12/2009	RP-46	RP-091346	0253	1	(Rel-9)-clarification on the description of redirectedCarrierInfo	9.0.0	9.1.0
	RP-46	RP-091346	0254	1	Adding references to RRC processing delay for inter-RAT mobiltiy messages	9.0.0	9.1.0
	RP-46	RP-091314	0256	-	Alignment of srs-Bandwidth with 36.211	9.0.0	9.1.0
	RP-46	RP-091341	0257	5	Baseline CR capturing eMBMS agreements	9.0.0	9.1.0
	RP-46	RP-091343	0258	3	Capturing agreements on inbound mobility	9.0.0	9.1.0
	RP-46	RP-091314	0260	-	Clarification of preRegistrationZoneID/secondaryPreRegistrationZoneID	9.0.0	9.1.0
	RP-46	RP-091346	0261	-	Clarification on NCC for IRAT HO	9.0.0	9.1.0
	RP-46	RP-091314	0263	-	Clarification on P-max	9.0.0	9.1.0
	RP-46	RP-091314	0265	1	Clarification on the definition of maxCellMeas	9.0.0	9.1.0
	RP-46	RP-091346	0266	-	Correction of q-RxLevMin reference in SIB7	9.0.0	9.1.0
	RP-46	RP-091346	0267	-	Correction on SPS-Config field descriptions	9.0.0	9.1.0
	RP-46	RP-091346	0268	1	correction on the definition of CellsTriggeredList	9.0.0	9.1.0
	RP-46	RP-091345	0269	-	Correction relating to CMAS UE capability	9.0.0	9.1.0
	RP-46	RP-091314	0271	1	Feature grouping bit for SRVCC handover	9.0.0	9.1.0
	RP-46	RP-091314	0272	1	Correction and completion of extension guidelines	9.0.0	9.1.0
	RP-46	RP-091344	0273	-	RACH optimization Stage-3	9.0.0	9.1.0
	RP-46	RP-091345	0274	-	Stage 3 correction for CMAS	9.0.0	9.1.0
	RP-46	RP-091346	0276	1	SR prohibit mechanism for UL SPS	9.0.0	9.1.0
	RP-46	RP-091346	0277	-	Parameters used for enhanced 1xRTT CS fallback	9.0.0	9.1.0
	RP-46	RP-091346	0281	-	Correction on UTRAN UE Capability transfer	9.0.0	9.1.0
	RP-46	RP-091346	0285	-	Maximum number of CDMA2000 neighbors in SIB8	9.0.0	9.1.0
	RP-46	RP-091340	0288	1	Introduction of UE Rx-Tx Time Difference measurement	9.0.0	9.1.0
	RP-46	RP-091346	0297	-	Introduction of SR prohibit timer	9.0.0	9.1.0
	RP-46	RP-091346	0298	-	Remove FFSs from RAN2 specifications	9.0.0	9.1.0
	RP-46	RP-091343	0301	1	Renaming Allowed CSG List (36.331 Rel-9)	9.0.0	9.1.0
	RP-46	RP-091346	0305	-	Re-introduction of message segment discard time	9.0.0	9.1.0
	RP-46	RP-091346	0306	1	Application of ASN.1 extension guidelines	9.0.0	9.1.0
	RP-46	RP-091346	0309	1	Support for Dual Radio 1xCSFB	9.0.0	9.1.0
	RP-46	RP-091346	0311	-	Shorter SR periodicity	9.0.0	9.1.0
	RP-46	RP-091342	0316	-	CR to 36.331 for Introduction of Dual Layer Transmission	9.0.0	9.1.0
	RP-46	RP-091343	0318	1	Draft CR to 36.331 on Network ordered SI reporting	9.0.0	9.1.0
	RP-46	RP-091346	0322	-	UE e1xcsfb capabilities correction	9.0.0	9.1.0
	RP-46	RP-091331	0327	1	Clarification on coding of ETWS related IEs	9.0.0	9.1.0
03/2010	RP-47	RP-100285	0331	-	Clarification of CGI reporting	9.1.0	9.2.0
	RP-47	RP-100305	0332	-	Clarification on MCCH change notification	9.1.0	9.2.0
	RP-47	RP-100308	0333	-	Clarification on measurement for serving cell only	9.1.0	9.2.0
	RP-47	RP-100306	0334	-	Clarification on proximity indication configuraiton in handover to E-UTRA	9.1.0	9.2.0
	RP-47	RP-100308	0335	-	Clarification on radio resource configuration in handover to E-UTRA procedure	9.1.0	9.2.0

	RP-47	RP-100308	0336	-	Clarification on UE maximum transmission power	9.1.0	9.2.0
	RP-47	RP-100308	0337	-	Correction to field descriptions of UE-EUTRA-Capability	9.1.0	9.2.0
	RP-47	RP-100305	0338	-	Correction to MBMS scheduling terminology	9.1.0	9.2.0
	RP-47	RP-100308	0339	-	Corrections to SIB8	9.1.0	9.2.0
	RP-47	RP-100306	0340	-	CR 36.331 R9 for Unifying SI reading for ANR and inbound mobility	9.1.0	9.2.0
	RP-47	RP-100308	0341	1	CR to 36.331 for 1xRTT pre-registration information in SIB8	9.1.0	9.2.0
	RP-47	RP-100305	0342	-	CR to 36.331 on corrections for MBMS	9.1.0	9.2.0
	RP-47	RP-100306	0343	1	CR to 36.331 on CSG identity reporting	9.1.0	9.2.0
	RP-47	RP-100308	0344	2	CR to 36.331 on Optionality of Rel-9 UE features	9.1.0	9.2.0
	RP-47	RP-100308	0345	1	CR to 36.331 on Service Specific Acces Control (SSAC)	9.1.0	9.2.0
	RP-47	RP-100308	0346	-	Introduction of power-limited device indication in UE capability.	9.1.0	9.2.0
	RP-47	RP-100305	0347	-	Missing agreement in MCCH change notification.	9.1.0	9.2.0
	RP-47	RP-100305	0348	1	Corrections related to MCCH change notification and value ranges	9.1.0	9.2.0
	RP-47	RP-100306	0349	2	Prohibit timer for proximity indication	9.1.0	9.2.0
	RP-47	RP-100306	0350	1	Proximity Indication after handover and re-establishment	9.1.0	9.2.0
	RP-47	RP-100305	0351	-	Specifying the exact mapping of notificationIndicator in SIB13 to PDCCH bits	9.1.0	9.2.0
	RP-47	RP-100308	0352	-	Corrections out of ASN.1 review scope	9.1.0	9.2.0
	RP-47	RP-100308	0353	-	CR on clarification of system information change	9.1.0	9.2.0
	RP-47	RP-100285	0358	-	Measurement Result CDMA2000 Cell	9.1.0	9.2.0
	RP-47	RP-100304	0361	-	Correction on the range of UE Rx-Tx time difference measurement result	9.1.0	9.2.0
	RP-47	RP-100305	0362	-	Small clarifications regarding MBMS	9.1.0	9.2.0
	RP-47	RP-100308	0363	-	Introduction of REL-9 indication within field accessStratumRelease	9.1.0	9.2.0
	RP-47	RP-100306	0364	-	Extending mobility description to cover inbound mobility	9.1.0	9.2.0
	RP-47	RP-100308	0365	1	Clarification regarding enhanced CSFB to 1XRTT	9.1.0	9.2.0
	RP-47	RP-100308	0368	-	Handling of dedicated RLF timers	9.1.0	9.2.0
	RP-47	RP-100305	0370	1	Clarification on UE's behavior of receiving MBMS service	9.1.0	9.2.0
	RP-47	RP-100305	0371	-	MBMS Service ID and Session ID	9.1.0	9.2.0
	RP-47	RP-100305	0372	1	Inclusion of non-MBSFN region length in SIB13	9.1.0	9.2.0
	RP-47	RP-100309	0374	1	CR to 36.331 for e1xCSFB access class barring parameters in SIB8	9.1.0	9.2.0
	RP-47	RP-100308	0375	-	Multiple 1xRTT/HRPD target cells in MobilityFromEUTRACommand	9.1.0	9.2.0
	RP-47	RP-100308	0376	-	Independent support indicators for Dual-Rx CSFB and S102 in SIB8	9.1.0	9.2.0
	RP-47	RP-100285	0378	-	Clarification on DRX StartOffset for TDD	9.1.0	9.2.0
	RP-47	RP-100308	0379	1	Miscellaneous corrections from REL-9 ASN.1 review	9.1.0	9.2.0
	RP-47	RP-100308	0381	-	Need codes and missing conventions	9.1.0	9.2.0
	RP-47	RP-100308	0383	1	Introduction of Full Configuration Handover for handling earlier eNB releases	9.1.0	9.2.0
	RP-47	RP-100308	0385	-	Clarification to SFN reference in RRC	9.1.0	9.2.0
	RP-47	RP-100308	0390	-	RSRP and RSRQ based Thresholds	9.1.0	9.2.0
	RP-47	RP-100189	0392	3	Redirection enhancements to GERAN	9.1.0	9.2.0
	RP-47	RP-100308	0398	-	Cell reselection enhancements CR for 36.331	9.1.0	9.2.0
	RP-47	RP-100307	0401	3	CR on UE-originated RLFreporting for MRO SON use case	9.1.0	9.2.0
	RP-47	RP-100309	0402	3	CR to 36.331 on Redirection enhancements to UTRAN	9.1.0	9.2.0
	RP-47	RP-100306	0403	2	Proximity status indication handling at mobility	9.1.0	9.2.0
	RP-47	RP-100305	0404	-	Upper layer aspect of MBSFN area id	9.1.0	9.2.0
	RP-47	RP-100308	0405	-	Redirection for enhanced 1xRTT CS fallback with concurrent PSHO	9.1.0	9.2.0
	RP-47	RP-100301	0406	-	Avoiding interleaving transmission of CMAS notifications	9.1.0	9.2.0
	RP-47	RP-100308	0407	1	Introduction of UE GERAN DTM capability indicator	9.1.0	9.2.0
	RP-47	RP-100381	0408	2	Introducing provisions for late ASN.1 corrections	9.1.0	9.2.0
	RP-47	RP-100245	0411	-	Correction/ alignment of REL-9 UE capability signalling	9.1.0	9.2.0
06/2010	RP-48	RP-100553	0412	-	Clarification for mapping between warning message and CB-data	9.2.0	9.3.0
	RP-48	RP-100556	0413	-	Clarification of radio link failure related actions	9.2.0	9.3.0
	RP-48	RP-100554	0414	-	Clarification on UE actions upon leaving RRC_CONNECTED	9.2.0	9.3.0
	RP-48	RP-100553	0415	-	Correction on CMAS system information	9.2.0	9.3.0
	RP-48	RP-100554	0416	1	Corrections to MBMS	9.2.0	9.3.0
	RP-48	RP-100536	0418	-	Decoding of unknown future extensions	9.2.0	9.3.0
	RP-48	RP-100556	0419	1	Miscellaneous small corrections and clarifications	9.2.0	9.3.0
	RP-48	RP-100551	0420	-	Prohibit timer for proximity indication	9.2.0	9.3.0
	RP-48	RP-100556	0421	-	RLF report for MRO correction	9.2.0	9.3.0
	RP-48	RP-100546	0423	1	Missing UTRA bands in IRAT-ParametersUTRA-FDD	9.2.0	9.3.0
	RP-48	RP-100556	0424	-	Correction on handling of dedicated RLF timers	9.2.0	9.3.0
	RP-48	RP-100556	0431	1	Protection of RRC messages	9.2.0	9.3.0
	RP-48	RP-100556	0433	-	Handling missing Essential system information	9.2.0	9.3.0
	RP-48	RP-100551	0434	1	Clarification on UMTS CSG detected cell reporting in LTE	9.2.0	9.3.0
	RP-48	RP-100556	0436	-	Introducing provisions for late corrections	9.2.0	9.3.0
	RP-48	RP-100556	0437	-	Clarification regarding / alignment of REL-9 UE capabilities	9.2.0	9.3.0

09/2010	RP-49	RP-100845	0440	-	Correction to 3GPP2 reference for interworking with cdma2000 1x	9.3.0	9.4.0
	RP-49	RP-100851	0441	-	Clarification on UL handover preparation transfer	9.3.0	9.4.0
	RP-49	RP-100851	0442	1	Clarifications regarding fullConfiguration	9.3.0	9.4.0
	RP-49	RP-100851	0443	-	Clarifications regarding handover to E-UTRAN	9.3.0	9.4.0
	RP-49	RP-100854	0444	-	Correction on the table of conditionally mandatory Release 9 features	9.3.0	9.4.0
	RP-49	RP-100851	0445	-	Corrections to TS36.331 on MeasConfig IE	9.3.0	9.4.0
	RP-49	RP-100853	0446	2	CR to 36.331 on clarification for MBMS PTM RBs	9.3.0	9.4.0
	RP-49	RP-100851	0447	-	Introduction of late corrections container for E-UTRA UE capabilities	9.3.0	9.4.0
	RP-49	RP-100851	0448	-	Renaming of containers for late non-critical extensions	9.3.0	9.4.0
	RP-49	RP-100851	0452	-	Clarifications Regarding Redirection from LTE	9.3.0	9.4.0
	RP-49	RP-100845	0456	-	Description of multi-user MIMO functionality in feature group indicator table	9.3.0	9.4.0
	RP-49	RP-100845	0458	-	Correct the PEMAX_H to PEMAX	9.3.0	9.4.0
	RP-49	RP-100851	0460	-	Clarification for feature group indicator bit 11	9.3.0	9.4.0
	RP-49	RP-100851	0465	1	Clarification of FGI setting for inter-RAT features not supported by the UE	9.3.0	9.4.0
	RP-49	RP-101008	0475	1	FGI settings in Rel-9	9.3.0	9.4.0
12/2010	RP-50	RP-101197	0483	-	Clarification on Meaning of FGI Bits	9.4.0	9.5.0
	RP-50	RP-101197	0485	-	Clarification regarding reconfiguration of the quantityConfig	9.4.0	9.5.0
	RP-50	RP-101210	0486	1	Corrections to the presence of IE regarding DRX and CQI	9.4.0	9.5.0
	RP-50	RP-101210	0493	-	The field descriptions of MeasObjectEUTRA	9.4.0	9.5.0
	RP-50	RP-101197	0498	1	Clarification of FGI settings non ANR periodical measurement reporting	9.4.0	9.5.0
	RP-50	RP-101209	0500	-	Corrections to RLF Report	9.4.0	9.5.0
	RP-50	RP-101206	0519	1	T321 timer fix	9.4.0	9.5.0
	RP-50	RP-101197	0524	-	Restriction of AC barring parameter setting	9.4.0	9.5.0
	RP-50	RP-101210	0525	-	Removal of SEQUENCE OF SEQUENCE in UEInformationResponse	9.4.0	9.5.0
	RP-50	RP-101197	0526	1	Clarification regarding default configuration value N/A	9.4.0	9.5.0
	RP-50	RP-101431	0532	-	Splitting FGI bit 3	9.4.0	9.5.0
	RP-50	RP-101183	0476	4	36.331 CR on Introduction of Minimization of Drive Tests	9.4.0	10.0.0
	RP-50	RP-101293	0477	4	AC-Barring for Mobile Originating CSFB call	9.4.0	10.0.0
	RP-50	RP-101214	0478	-	Addition of UE-EUTRA-Capability descriptions	9.4.0	10.0.0
	RP-50	RP-101214	0481	-	Clarification on Default Configuration for CQI-ReportConfig	9.4.0	10.0.0
	RP-50	RP-101215	0487	-	CR to 36.331 adding e1xCSFB support for dual Rx/Tx UE	9.4.0	10.0.0
	RP-50	RP-101227	0488	1	Introduction of Carrier Aggregation and UL/ DL MIMO	9.4.0	10.0.0
	RP-50	RP-101228	0489	1	Introduction of relays in RRC	9.4.0	10.0.0
	RP-50	RP-101214	0490	1	Priority indication for CSFB with re-direction	9.4.0	10.0.0
	RP-50	RP-101214	0491	-	SIB Size Limitations	9.4.0	10.0.0
	RP-50	RP-101214	0513	-	Combined Quantity Report for IRAT measurement of UTRAN	9.4.0	10.0.0
	RP-50	RP-101214	0527	1	UE power saving and Local release	9.4.0	10.0.0
	RP-50	RP-101429	0530	1	Inclusion of new UE categories in Rel-10	9.4.0	10.0.0
03/2011	RP-51	RP-110282	0533	-	36331_CRxxx_Protection of Logged Measurements Configuration	10.0.0	10.1.0
	RP-51	RP-110294	0534	1	Stage-3 CR for MBMS enhancement	10.0.0	10.1.0
	RP-51	RP-110282	0535	-	Clean up MDT-related text	10.0.0	10.1.0
	RP-51	RP-110282	0536	-	Clear MDT configuration and logs when the UE is not registered	10.0.0	10.1.0
	RP-51	RP-110280	0537	-	Correction to the field description of nB	10.0.0	10.1.0
	RP-51	RP-110289	0538	-	CR on impact on UP with remove&add approach_2	10.0.0	10.1.0
	RP-51	RP-110282	0539	-	CR to 36.331 on corrections for MDT	10.0.0	10.1.0
	RP-51	RP-110290	0543	-	Introduction of CA/MIMO capability signalling and measurement capability signalling in CA	10.0.0	10.1.0
	RP-51	RP-110282	0544	-	MDT PDU related clarifications	10.0.0	10.1.0
	RP-51	RP-110282	0545	-	Correction on release of logged measurement configuration while in another RAT	10.0.0	10.1.0
	RP-51	RP-110289	0546	-	Miscellaneous Corrections for CA Running RRC CR	10.0.0	10.1.0
	RP-51	RP-110280	0547	1	Miscellaneous small clarifications and corrections	10.0.0	10.1.0
	RP-51	RP-110293	0548	4	Necessary changes for RLF reporting enhancements	10.0.0	10.1.0
	RP-51	RP-110282	0549	1	Memory size for logged measurements capable UE	10.0.0	10.1.0
	RP-51	RP-110289	0550	-	Parameters confusion of non-CA and CA configurations	10.0.0	10.1.0
	RP-51	RP-110272	0553	-	Presence condition for cellSelectionInfo-v920 in SIB1	10.0.0	10.1.0
	RP-51	RP-110282	0554	1	Removal of MDT configuration at T330 expiry	10.0.0	10.1.0
	RP-51	RP-110289	0556	1	Signalling aspects of existing LTE-A parameters	10.0.0	10.1.0
	RP-51	RP-110280	0557	1	Some Corrections on measurement	10.0.0	10.1.0
	RP-51	RP-110291	0558	-	Stored system information for RNs	10.0.0	10.1.0
	RP-51	RP-110291	0559	-	Support of Integrity Protection for Relay	10.0.0	10.1.0
	RP-51	RP-110290	0561	2	Updates of L1 parameters for CA and UL/DL MIMO	10.0.0	10.1.0
	RP-51	RP-110291	0571	1	Note for Dedicated SIB for RNs	10.0.0	10.1.0
	RP-51	RP-110272	0579	-	Correction to cs-fallbackIndicator field description	10.0.0	10.1.0
	RP-51	RP-110289	0580	-	Clarification to the default configuration of sCellDeactivationTimer	10.0.0	10.1.0
	RP-51	RP-110289	0581	-	Miscellaneous corrections to TS 36.331 on Carrier Aggregation	10.0.0	10.1.0
	RP-51	RP-110280	0584	-	Correction of configuration description in SIB2	10.0.0	10.1.0
	RP-51	RP-110265	0587	-	Clarification of band indicator in handover from E-UTRAN to	10.0.0	10.1.0

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	RP-51	RP-110285	0588	1	36331_CRxxxx Support of Delay Tolerant access requests	10.0.0	10.1.0
	RP-51	RP-110292	0590	-	Update of R2-110807 on CSI measurement resource restriction for time domain ICIC	10.0.0	10.1.0
	RP-51	RP-110292	0591	-	Update of R2-110821 on RRM/RLM resource restriction for time domain ICIC	10.0.0	10.1.0
	RP-51	RP-110290	0592	-	Corrections on UE capability related parameters	10.0.0	10.1.0
	RP-51	RP-110282	0596	-	Validity time for location information in Immediate MDT	10.0.0	10.1.0
	RP-51	RP-110280	0597	-	CR to 36.331 adding UE capability indicator for dual Rx/Tx e1xCSFB	10.0.0	10.1.0
	RP-51	RP-110289	0598	-	Miscellaneous corrections to CA	10.0.0	10.1.0
	RP-51	RP-110280	0599	-	Further correction to combined measurement report of UTRAN	10.0.0	10.1.0
	RP-51	RP-110280	0600	-	Correction to the reference of ETWS	10.0.0	10.1.0
	RP-51	RP-110269	0602	1	Introduction of OTDOA inter-freq RSTD measurement indication procedure	10.0.0	10.1.0
	RP-51	RP-110280	0603	-	Correction of use of RRCConnectionReestablishment message for contention resolution	10.0.0	10.1.0
	RP-51	RP-110282	0604	-	CR to 36.331 on MDT neighbour cell measurements logging	10.0.0	10.1.0
	RP-51	RP-110272	0609	-	Minor ASN.1 corrections for the UEInformationResponse message	10.0.0	10.1.0
	RP-51	RP-110280	0613	-	Clarification regarding dedicated RLF timers and constants	10.0.0	10.1.0
	RP-51	RP-110282	0615	-	Release of Logged Measurement Configuration	10.0.0	10.1.0
	RP-51	RP-110280	0616	-	Some corrections on TS 36.331	10.0.0	10.1.0
	RP-51	RP-110280	0623	-	AC barring procedure clean up	10.0.0	10.1.0
	RP-51	RP-110282	0624	-	Counter proposal to R2-110826 on UE capabilities for MDT	10.0.0	10.1.0
	RP-51	RP-110280	0628	1	UE information report for RACH	10.0.0	10.1.0
	RP-51	RP-110289	0629	2	Measurement on the deactivated SCells	10.0.0	10.1.0
	RP-51	RP-110282	0632	1	Trace configuration paremeters for Logged MDT	10.0.0	10.1.0
	RP-51	RP-110282	0635	-	Clarification on stop condition for timer T3330	10.0.0	10.1.0
	RP-51	RP-110282	0637	-	User consent for MDT	10.0.0	10.1.0
	RP-51	RP-110280	0638	-	Correction on the range of CQI resource index	10.0.0	10.1.0
	RP-51	RP-110272	0640	1	Small corrections to ETWS & CMAS system information	10.0.0	10.1.0
	RP-51	RP-110290	0641	1	UE capability signaling structure w.r.t carrier aggregation, MIMO and measurement gap	10.0.0	10.1.0
	RP-51	RP-110289	0642	1	Normal PHR and the multiple uplink carriers	10.0.0	10.1.0
	RP-51	RP-110280	0643	1	Corrections to TS36.331 on SIB2 handling	10.0.0	10.1.0
	RP-51	RP-110280	0644	1	Adding a Power Management indication in PHR	10.0.0	10.1.0
	RP-51	RP-110289	0646	1	Clarification for CA and TTI bundling in RRC	10.0.0	10.1.0
	RP-51	RP-110443	0648	1	Updates to FGI settings	10.0.0	10.1.0
06/2011	RP-52	RP-110836	0651	-	Add MBMS counting procedure to processing delay requirement for RRC procedure Section 11.2	10.1.0	10.2.0
	RP-52	RP-110830	0653	-	Add pre Rel-10 procedures to processing delay requirement for RRC procedure Section 11.2	10.1.0	10.2.0
	RP-52	RP-110847	0654	1	Addition of a specific reference for physical configuration fields	10.1.0	10.2.0
	RP-52	RP-110839	0656	-	Clarification of inter-frequency RSTD measurement indication procedure	10.1.0	10.2.0
	RP-52	RP-110830	0658	-	Clarification of optionality of UE features without capability	10.1.0	10.2.0
	RP-52	RP-110839	0660	-	Clarification on the definition of maxCellBlack	10.1.0	10.2.0
	RP-52	RP-110839	0661	-	Clarification on upper layer requested connection release	10.1.0	10.2.0
	RP-52	RP-110850	0662	3	Clarification regarding eICIC measurements	10.1.0	10.2.0
	RP-52	RP-110839	0663	-	CR for s-measure handling	10.1.0	10.2.0
	RP-52	RP-110851	0664	1	CR on clarification of RLF Report in Carrier Aggregation	10.1.0	10.2.0
	RP-52	RP-110830	0669	-	FGI bit for handover between LTE FDD/TDD	10.1.0	10.2.0
	RP-52	RP-110847	0670	2	Further updates on L1 parameters	10.1.0	10.2.0
	RP-52	RP-110839	0671	2	General error handling for extension fields	10.1.0	10.2.0
	RP-52	RP-110851	0672	2	Additional information for RLF report	10.1.0	10.2.0
	RP-52	RP-110843	0673	-	Introduction of TCE ID for logged MDT	10.1.0	10.2.0
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	RP-52	RP-110839	0677	-	UE actions upon leaving RRC_CONNECTED	10.1.0	10.2.0
	RP-52	RP-110847	0678	-	Clarification on bandEUTRA-r10 and supportedBandListEUTRA	10.1.0	10.2.0
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	RP-52	RP-110839	0680	1	Value range of DRX-InactivityTimer	10.1.0	10.2.0
	RP-52	RP-110828	0693	1	Correction for SR-VCC and QCI usage	10.1.0	10.2.0
	RP-52	RP-110847	0694	-	Restructuring of CQI-ReportConfig-r10	10.1.0	10.2.0
	RP-52	RP-110839	0695	2	Correction on DL allocations in MBSFN subframes	10.1.0	10.2.0
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	RP-52	RP-110846	0701	-	Clarifications to CA related field descriptions	10.1.0	10.2.0
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	RP-52	RP-110839	0714	-	Explicit AS signalling for mapped PTMSI/GUTI	10.1.0	10.2.0

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	RP-53	RP-111283	0775	2	Clarifications to P-max on CA	10.2.0	10.3.0
	RP-53	RP-111280	0784	-	Clarification on for which subframes signalling MCS applies	10.2.0	10.3.0
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	RP-54	RP-111716	0813	-	Clarifications to Default Radio Configurations	10.3.0	10.4.0
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