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Technical Specification

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Foreword

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Contents

Foreword

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

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

Version x.y.z

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- x the first digit:
  - 1 presented to TSG for information;
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  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document defines the E-UTRA UE Radio Access Capability Parameters.

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] 3GPP TS 36.323: "Evolved Universal Terrestrial Radio Access (E-UTRA) Packet Data Convergence Protocol (PDCP) specification".

[3] 3GPP TS 36.322: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Link Control (RLC) specification".

[4] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA) Medium Access Control (MAC) specification".

[5] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC) specification".

[6] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA) radio transmission and reception".

[7] IETF RFC 4995: "The RObust Header Compression (ROHC) Framework".

[8] IETF RFC 4996: "RObust Header Compression (ROHC): A Profile for TCP/IP (ROHC-TCP)".

[9] IETF RFC 3095: "RObust Header Compression (RoHC): Framework and four profiles: RTP, UDP, ESP and uncompressed".

[10] IETF RFC 3843: "RObust Header Compression (RoHC): A Compression Profile for IP".

[11] IETF RFC 4815: "RObust Header Compression (ROHC): Corrections and Clarifications to RFC 3095".

[12] IETF RFC 5225: "RObust Header Compression (ROHC) Version 2: Profiles for RTP, UDP, IP, ESP and UDP Lite'.

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].

***<defined term>**: <definition>.*

3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

3.3 Abbreviations

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

1xRTT	CDMA2000 1x Radio Transmission Technology
BCCH	Broadcast Control Channel
CSG	Closed Subscriber Group
DL-SCH	Downlink Shared Channel
E-UTRA	Evolved Universal Terrestrial Radio Access
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
FDD	Frequency Division Duplex
GERAN	GSM/EDGE Radio Access Network
HARQ	Hybrid Automatic Repeat Request
HRPD	High Rate Packet Data
MAC	Medium Access Control
PDCP	Packet Data Convergence Protocol
RACH	Random Access CHannel
RAT	Radio Access Technology
RLC	Radio Link Control
ROHC	RObust Header Compression
RRC	Radio Resource Control
SI	System Information
SON	Self Organizing Networks
TDD	Time Division Duplex
TTI	Transmission Time Interval
UE	User Equipment
UL-SCH	Uplink Shared Channel
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access

4 UE radio access capability parameters

The following subclauses define the UE radio access capability parameters. Only parameters for which there is the possibility for UEs to signal different values are considered as UE radio access capability parameters. Therefore, mandatory capabilities that are the same for all UEs are not listed here.

E-UTRAN needs to respect the signalled UE radio access capability parameters when configuring the UE and when scheduling the UE.

All parameters shown in italics are signalled and correspond to a field defined in TS 36.331 [5].

4.1 ue-Category

The field *ue-Category* defines a combined uplink and downlink capability. The parameters set by the UE Category are defined in subclause 4.2. Tables 4.1-1 and 4.1-2 define the downlink and, respectively, uplink physical layer parameter values for each UE Category.

Table 4.1-1: Downlink physical layer parameter values set by the field *ue-Category*

UE Category	Maximum number of DL-SCH transport block bits received within a TTI	Maximum number of bits of a DL-SCH transport block received within a TTI	Total number of soft channel bits	Maximum number of supported layers for spatial multiplexing in DL
Category 1	10296	10296	250368	1
Category 2	51024	51024	1237248	2
Category 3	102048	75376	1237248	2
Category 4	150752	75376	1827072	2
Category 5	299552	149776	3667200	4

Table 4.1-2: Uplink physical layer parameter values set by the field *ue-Category*

UE Category	Maximum number of bits of an UL-SCH transport block transmitted within a TTI	Support for 64QAM in UL
Category 1	5160	No
Category 2	25456	No
Category 3	51024	No
Category 4	51024	No
Category 5	75376	Yes

Table 4.1-3: Total layer 2 buffer sizes set by the field *ue-Category*

UE Category	Total layer 2 buffer size [bytes]
Category 1	150 000
Category 2	700 000
Category 3	1 400 000
Category 4	1 900 000
Category 5	3 500 000

4.2 Parameters set by the field *ue-Category*

4.2.1 Transport channel parameters in downlink

4.2.1.1 Maximum number of DL-SCH transport block bits received within a TTI

Defines the maximum number of DL-SCH transport blocks bits that the UE is capable of receiving within a DL-SCH TTI.

In case of spatial multiplexing, this is the sum of the number of bits delivered in each of the two transport blocks.

This number does not include the bits of a DL-SCH transport block carrying BCCH in the same subframe.

4.2.1.2 Maximum number of bits of a DL-SCH transport block received within a TTI

Defines the maximum number of DL-SCH transport block bits that the UE is capable of receiving in a single transport block within a DL-SCH TTI.

4.2.1.3 Total number of DL-SCH soft channel bits

Defines the total number of soft channel bits available for HARQ processing.

4.2.2 Transport channel parameters in uplink

4.2.2.1 Maximum number of bits of an UL-SCH transport block transmitted within a TTI

Defines the maximum number of bits of UL-SCH transport block transmitted within an UL-SCH TTI.

4.2.3 Physical channel parameters in downlink (DL)

4.2.3.1 Maximum number of supported layers for spatial multiplexing in DL

Defines the maximum number of supported layers for spatial multiplexing per UE.

4.2.4 Physical channel parameters in uplink (UL)

4.2.4.1 Support for 64QAM in UL

Defines if 64QAM is supported in UL.

4.2.5 Total layer 2 buffer size

This parameter defines the total layer 2 buffer size. The total layer 2 buffer size is defined as the sum of the number of bytes that the UE is capable of storing in the RLC transmission windows and RLC reception and reordering windows for all radio bearers.

4.3 Parameters independent of the field *ue-Category*

4.3.1 PDCP Parameters

4.3.1.1 supportedROHC-Profiles

This field defines which ROHC profiles from the list below are supported by the UE.

- 0x0000 ROHC uncompressed (RFC 4995)
- 0x0001 ROHC RTP (RFC 3095, RFC 4815)
- 0x0002 ROHC UDP (RFC 3095, RFC 4815)
- 0x0003 ROHC ESP (RFC 3095, RFC 4815)
- 0x0004 ROHC IP (RFC 3843, RFC 4815)
- 0x0006 ROHC TCP (RFC 4996)
- 0x0101 ROHCv2 RTP (RFC 5225)
- 0x0102 ROHCv2 UDP (RFC 5225)
- 0x0103 ROHCv2 ESP (RFC 5225)
- 0x0104 ROHCv2 IP (RFC 5225)

A UE that supports one or more of the listed ROHC profiles shall support ROHC profile 0x0000 ROHC uncompressed (RFC 4995).

'IMS capable UEs supporting voice' shall support ROHC profiles 0x0000, 0x0001, 0x0002 and be able to compress and decompress headers of PDCP SDUs at a PDCP SDU rate corresponding to supported IMS voice codecs.

4.3.1.2 maxNumberROHC-ContextSessions

This field defines the maximum number of header compression context sessions supported by the UE, excluding context sessions that leave all headers uncompressed.

4.3.2 RLC parameters

4.3.2.1 Void

4.3.3 Void

4.3.4 Physical layer parameters

4.3.4.1 ue-TxAntennaSelectionSupported

This field defines whether the UE supports transmit antenna selection.

4.3.4.2 ue-SpecificRefSigsSupported

This field defines whether the UE supports PDSCH transmission mode 7 for FDD.

4.3.4.3 Void

4.3.4.4 enhancedDualLayerFDD

This field defines whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for FDD.

4.3.4.5 enhancedDualLayerTDD

This field defines whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD.

NOTE: Enhanced dual layer should be supported by Rel-9 UEs supporting TDD.

4.3.5 RF parameters

4.3.5.1 supportedBandListEUTRA

This field defines which E-UTRA radio frequency bands [6] are supported by the UE. For each band, support for either only half duplex operation, or full duplex operation is indicated. For TDD, the half duplex indication is not applicable.

4.3.6 Measurement parameters

4.3.6.1 interFreqNeedForGaps and interRAT-NeedForGaps

These fields define for each supported E-UTRA band whether measurement gaps are required to perform measurements on each other supported E-UTRA radio frequency band and on each supported RAT/band combination.

4.3.7 Inter-RAT parameters

4.3.7.1 Support of UTRA FDD

This parameter defines whether the UE supports UTRA FDD.

A UE that supports UTRAN FDD shall support inter-RAT PS handover to UTRAN.

4.3.7.2 supportedBandListUTRA-FDD

Only applicable if the UE supports UTRA FDD. This field defines which UTRA FDD radio frequency bands are supported by the UE.

4.3.7.3 Support of UTRA TDD 1.28 Mcps

This parameter defines whether the UE supports UTRA TDD 1.28 Mcps.

A UE that supports UTRAN TDD 1.28 Mcps shall support inter-RAT PS handover to UTRAN.

4.3.7.4 supportedBandListUTRA-TDD128

Only applicable if the UE supports UTRA TDD 1.28 Mcps. This field defines which UTRA TDD 1.28 Mcps radio frequency bands are supported by the UE.

4.3.7.5 Support of UTRA TDD 3.84 Mcps

This parameter defines whether the UE supports UTRA TDD 3.84 Mcps.

A UE that supports UTRAN TDD 3.84 Mcps shall support inter-RAT PS handover to UTRAN.

4.3.7.6 supportedBandListUTRA-TDD384

Only applicable if the UE supports UTRA TDD 3.84 Mcps. This field defines which UTRA TDD 3.84 Mcps radio frequency bands are supported by the UE.

4.3.7.7 Support of UTRA TDD 7.68 Mcps

This parameter defines whether the UE supports UTRA TDD 7.68 Mcps.

A UE that supports UTRAN TDD 7.68 Mcps shall support inter-RAT PS handover to UTRAN.

4.3.7.8 supportedBandListUTRA-TDD768

Only applicable if the UE supports UTRA TDD 7.68 Mcps. This field defines which UTRA TDD 7.68 Mcps radio frequency bands are supported by the UE.

4.3.7.9 Support of GERAN

This parameter defines whether the UE supports GERAN.

4.3.7.10 supportedBandListGERAN

Only applicable if the UE supports GERAN. This field defines which GERAN radio frequency bands are supported by the UE.

4.3.7.11 interRAT-PS-HO-ToGERAN

Only applicable if the UE supports GERAN. This field defines whether the UE supports inter-RAT PS handover to GERAN.

4.3.7.12 Support of HRPD

This parameter defines whether the UE supports HRPD.

4.3.7.13 supportedBandListHRPD

Only applicable if the UE supports HRPD. This field defines which HRPD radio frequency bands are supported by the UE.

4.3.7.14 tx-ConfigHRPD

Only applicable if the UE supports HRPD. This field defines whether the UE supports single or dual transmitter. With dual transmitter, UE can transmit simultaneously on both E-UTRAN and HRPD.

4.3.7.15 rx-ConfigHRPD

Only applicable if the UE supports HRPD. This field defines whether the UE supports single or dual receiver. With dual receiver, UE can receive simultaneously on both E-UTRAN and HRPD.

4.3.7.16 Support of 1xRTT

This parameter defines whether the UE supports 1xRTT.

4.3.7.17 supportedBandList1XRTT

Only applicable if the UE supports 1xRTT. This field defines which 1xRTT radio frequency bands are supported by the UE.

4.3.7.18 tx-Config1XRTT

Only applicable if the UE supports 1xRTT. This field defines whether the UE supports single or dual transmitter. With dual transmitter, UE can transmit simultaneously on both E-UTRAN and 1xRTT.

4.3.7.19 rx-Config1XRTT

Only applicable if the UE supports 1xRTT. This field defines whether the UE supports single or dual receiver. With dual receiver, UE can receive simultaneously on both E-UTRAN and 1xRTT.

4.3.7.20 e-CSFB-1XRTT

Only applicable if the UE supports CDMA2000 1xRTT. This field defines whether the UE supports enhanced 1xRTT CS fallback.

4.3.7.21 e-CSFB-ConcPS-Mob1XRTT

Only applicable if the UE supports CDMA2000 1xRTT and CDMA2000 HRPD simultaneously. This field defines whether the UE supports concurrent enhanced CS fallback to CDMA2000 1xRTT and handover/redirection to CDMA2000 HRPD.

4.3.7.22 e-RedirectionUTRA

This parameter defines whether the UE supports use of UTRA system information provided by *RRCConnectionRelease* upon redirection.

4.3.7.23 e-RedirectionGERAN

This parameter defines whether the UE supports use of GERAN system information provided by *RRCConnectionRelease* upon redirection.

4.3.7.24 *dtm*

This parameter defines whether the UE supports Dual Transfer Mode (DTM) in GERAN.

4.3.8 General parameters

4.3.8.1 accessStratumRelease

This field defines the release of the E-UTRA layer 1, 2, and 3 specifications supported by the UE e.g. Rel-8, Rel-9, etc.

4.3.8.2 deviceType

This field defines whether the device does not benefit from NW-based battery consumption optimisation.

4.3.9 Void

4.3.10 CSG Proximity Indication parameters

4.3.10.1 intraFreqProximityIndication

This parameter defines whether the UE supports proximity indication for intra-frequency E-UTRAN cells whose CSG Identities are in the UE"s CSG Whitelist.

Conditions for setting this bit are FFS.

4.3.10.2 interFreqProximityIndication

This parameter defines whether the UE supports proximity indication for inter-frequency E-UTRAN cells whose CSG Identities are in the UE"s CSG Whitelist.

Conditions for setting this bit are FFS.

4.3.10.3 utran-ProximityIndication

This parameter defines whether the UE supports proximity indication for UTRAN cells whose CSG IDs are in the UE"s CSG Whitelist.

4.3.11 Neighbour cell SI acquisition parameters

4.3.11.1 intraFreqSI-AcquisitionForHO

This parameter defines whether the UE supports, upon configuration of *si-RequestForHO* by the network, acquisition of relevant information from a neighbouring intra-frequency cell by reading the SI of the neighbouring cell using autonomous gaps and reporting the acquired information to the network as specified in [5].

Conditions for setting this bit are FFS.

4.3.11.2 interFreqSI-AcquisitionForHO

This parameter defines whether the UE supports, upon configuration of *si-RequestForHO* by the network, acquisition of relevant information from a neighbouring inter-frequency cell by reading the SI of the neighbouring cell using autonomous gaps and reporting the acquired information to the network as specified in [5].

Conditions for setting this bit are FFS.

4.3.11.3 utran-SI-AcquisitionForHO

This parameter defines whether the UE supports, upon configuration of *si-RequestForHO* by the network, acquisition of relevant information from a neighbouring UMTS cell by reading the SI of the neighbouring cell using autonomous gaps and reporting the acquired information to the network as specified in [5].

4.3.12 SON parameters

4.3.12 rach-Report

This parameter defines whether the UE supports delivery of *rachReport* upon request from the network.

5 Void

Annex A (informative): Guideline on maximum number of DL PDCP SDUs per TTI

In order to help the dimensioning of the UE design, values for the maximum number of DL PDCP SDUs per TTI from Table A-1 may be used.

Note: Due to the need for the network buffer data for efficient scheduling, values for Category 1 and 2 are same. It is not expected that category 1 UE has to sustain the same rate of PDCP SDUs per TTI as category 2 for prolonged period of time.

Table A-1: Maximum values for DL PDCP SDUs per TTI

UE Category	Maximum number of PDCP SDUs per TTI
Category 1	10
Category 2	10
Category 3	20
Category 4	30
Category 5	50

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
11/2007	RP-38	RP-070916			Presented for approval at TSG RAN-38	0.2.0	1.0.0
12/2007		-			Approved at TSG RAN-38 and placed under change control	1.0.0	8.0.0
03/2008	RP-39	RP-080194	0001	1	CR to 36.306 with Update to E-UTRA UE capabilities	8.0.0	8.1.0
05/2008	RP-40	RP-080409	0002	1	Update to E-UTRA UE capabilities: CR 0002r1 to 36.306 with status after RAN2 #62	8.1.0	8.2.0
03/2009	RP-43	RP-090126	0007	-	CR to remove the sections on MBMS	8.2.0	8.3.0
	RP-43	RP-090126	0008	-	Final values for L2 buffer sizes	8.2.0	8.3.0
	RP-43	RP-090126	0009	-	Various Corrections	8.2.0	8.3.0
	RP-43	RP-090126	0010	-	CR to update uplink transmit diversity (UE transmit antenna selection)	8.2.0	8.3.0
	RP-43	RP-090126	0011	-	Downlink PDCP SDU limitation	8.2.0	8.3.0
	RP-43	RP-090126	0014	-	Thoughts on UE capability for RoHC	8.2.0	8.3.0
	RP-43	RP-090126	0015	1	Capturing USIMless UE to stage 3	8.2.0	8.3.0
06/2009	RP-44	RP-090511	0016	2	Support of inter-RAT PS handover to GERAN Editor Note Removal	8.3.0	8.4.0
	RP-44	RP-090511	0017	1	Clarification of Half Duplex in TDD	8.3.0	8.4.0
	RP-44	RP-090511	0018	-	Correcting the maximum number of bits received during one TTI	8.3.0	8.4.0
	RP-44	RP-090511	0019	-	Clarification of field names used in TS 36.331	8.3.0	8.4.0
	RP-44	RP-090511	0021	-	Clarification on disabling E-UTRA capabilities with a USIM	8.3.0	8.4.0
09/2009	RP-45	RP-090906	0023	-	Unit for "Total layer 2 buffer size"	8.4.0	8.5.0
12/2009	RP-46	-	-		Upgrade to the Release 9 - no technical change	8.5.0	9.0.0
03/2010	RP-47	RP-100308	0024	1	CR to 36.306 on Optionality of Rel-9 UE features	9.0.0	9.1.0
	RP-47	RP-100308	0025	-	Introduction of power-limited device indication in UE capability.	9.0.0	9.1.0
	RP-47	RP-100308	0026	-	UE capability for enhanced 1xRTT CS fallback	9.0.0	9.1.0
	RP-47	RP-100285	0028	1	Bounds to RoHC requirements for IMS capable UEs supporting voice	9.0.0	9.1.0
	RP-47	RP-100309	0029	1	CR to 36.306 on Redirection enhancements to UTRAN	9.0.0	9.1.0
	RP-47	RP-100188	0030	1	Redirection enhancements to GERAN	9.0.0	9.1.0
06/2010	RP-48	RP-100556	0031	1	Clarification regarding / alignment of REL-9 UE capabilities	9.1.0	9.2.0
	RP-48	RP-100531	0033	-	Correction on the definition of ue-SpecificRefSigsSupported	9.1.0	9.2.0

History

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