

ETSI TS 136 323 V14.3.0 (2017-07)



**LTE;
Evolved Universal Terrestrial Radio Access (E-UTRA);
Packet Data Convergence Protocol (PDCP) specification
(3GPP TS 36.323 version 14.3.0 Release 14)**



Reference

RTS/TSGR-0236323ve30

Keywords

LTE

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2017.

All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

3GPP™ and LTE™ are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M logo is protected for the benefit of its Members.

GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	6
1 Scope	7
2 References	7
3 Definitions and abbreviations.....	8
3.1 Definitions	8
3.2 Abbreviations	8
4 General	9
4.1 Introduction	9
4.2 PDCP architecture	9
4.2.1 PDCP structure	9
4.2.2 PDCP entities.....	10
4.3 Services	11
4.3.1 Services provided to upper layers	11
4.3.2 Services expected from lower layers	11
4.4 Functions	12
4.5 Data available for transmission	12
5 PDCP procedures	13
5.1 PDCP Data Transfer Procedures	13
5.1.1 UL Data Transfer Procedures	13
5.1.2 DL Data Transfer Procedures	14
5.1.2.1 Procedures for DRBs.....	14
5.1.2.1.1 Void.....	14
5.1.2.1.2 Procedures for DRBs mapped on RLC AM when the reordering function is not used	14
5.1.2.1.2a RN procedures for DRBs mapped on RLC AM	15
5.1.2.1.3 Procedures for DRBs mapped on RLC UM	16
5.1.2.1.3a RN procedures for DRBs mapped on RLC UM	16
5.1.2.1.4 Procedures for DRBs mapped on RLC AM and for LWA bearers when the reordering function is used.....	16
5.1.2.1.4.1 Procedures when a PDCP PDU is received from the lower layers	16
5.1.2.1.4.2 Procedures when <i>t-Reordering</i> expires	18
5.1.2.1.4.3 Procedures when the value of <i>t-Reordering</i> is reconfigured.....	18
5.1.2.2 Procedures for SRBs	18
5.1.3 SL Data Transmission Procedures	19
5.1.4 SL Data Reception Procedures	19
5.2 Re-establishment procedure	19
5.2.1 UL Data Transfer Procedures	19
5.2.1.1 Procedures for DRBs mapped on RLC AM	19
5.2.1.2 Procedures for DRBs mapped on RLC UM	20
5.2.1.3 Procedures for SRBs	20
5.2.2 DL Data Transfer Procedures	20
5.2.2.1 Procedures for DRBs mapped on RLC AM while the reordering function is not used.....	20
5.2.2.1a Procedures for DRBs mapped on RLC AM while the reordering function is used.....	20
5.2.2.2 Procedures for DRBs mapped on RLC UM	21
5.2.2.3 Procedures for SRBs	21
5.3 PDCP Status Report	21
5.3.1 Transmit operation.....	21
5.3.2 Receive operation	22
5.4 PDCP discard	22
5.5 Header Compression and Decompression.....	22
5.5.1 Supported header compression protocols and profiles.....	22

5.5.2	Configuration of header compression	23
5.5.3	Protocol parameters	23
5.5.4	Header compression.....	24
5.5.5	Header decompression.....	24
5.5.6	PDCP Control PDU for interspersed ROHC feedback packet.....	24
5.5.6.1	Transmit Operation	24
5.5.6.2	Receive Operation.....	24
5.6	Ciphering and Deciphering.....	24
5.6.0	General.....	24
5.6.1	SL Ciphering and Deciphering for one-to-many communication.....	25
5.6.2	SL Ciphering and Deciphering for one-to-one communication.....	25
5.6.3	Handling of LWA end-marker PDCP Control PDU.....	25
5.6.3.1	Transmit operation	25
5.6.3.2	Receive Operation.....	26
5.7	Integrity Protection and Verification.....	26
5.8	Handling of unknown, unforeseen and erroneous protocol data	27
5.9	PDCP Data Recovery procedure	27
5.10	Status report for LWA.....	27
5.10.1	Transmit operation.....	27
5.10.2	LWA status report.....	28
5.10.3	Receive operation	28
6	Protocol data units, formats and parameters.....	28
6.1	Protocol data units	28
6.1.1	PDCP Data PDU.....	28
6.1.2	PDCP Control PDU	29
6.2	Formats.....	29
6.2.1	General.....	29
6.2.2	Control plane PDCP Data PDU	29
6.2.3	User plane PDCP Data PDU with long PDCP SN (12 bits)	29
6.2.4	User plane PDCP Data PDU with short PDCP SN (7 bits)	30
6.2.5	PDCP Control PDU for interspersed ROHC feedback packet.....	30
6.2.6	PDCP Control PDU for PDCP status report	30
6.2.7	Void	31
6.2.8	RN user plane PDCP Data PDU with integrity protection.....	32
6.2.9	User plane PDCP Data PDU with extended PDCP SN (15 bits).....	32
6.2.10	User plane PDCP Data PDU for SLRB	32
6.2.11	User plane PDCP Data PDU with further extended PDCP SN (18 bits).....	33
6.2.12	PDCP Control PDU for LWA status report.....	34
6.2.13	PDCP Control PDU for LWA end-marker packet.....	35
6.3	Parameters	36
6.3.1	General.....	36
6.3.2	PDCP SN	36
6.3.3	Data.....	36
6.3.4	MAC-I	36
6.3.5	COUNT	36
6.3.6	R	37
6.3.7	D/C.....	37
6.3.8	PDU type	37
6.3.9	FMS	37
6.3.10	Bitmap	37
6.3.11	Interspersed ROHC feedback packet	38
6.3.12	PGK Index	38
6.3.13	PTK Identity	38
6.3.14	SDU Type	38
6.3.15	K _{D-sess} ID	38
6.3.16	NMP.....	39
6.3.17	HRW	39
6.3.18	P.....	39
6.3.19	LSN.....	39
7	Variables, constants and timers	39

7.1 State variables39
7.2 Timers40
7.3 Constants40
Annex A (informative): Change history42
History45

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

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 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 provides the description of the Packet Data Convergence Protocol (PDCP).

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 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description".
- [3] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification".
- [4] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA) Medium Access Control (MAC) protocol specification".
- [5] 3GPP TS 36.322: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Link Control (RLC) protocol specification".
- [6] 3GPP TS 33.401: "3GPP System Architecture Evolution: Security Architecture".
- [7] IETF RFC 5795: "The RObust Header Compression (ROHC) Framework".
- [8] IETF RFC 6846: "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".
- [13] 3GPP TS 33.303: "Proximity-based Services; Security Aspects".
- [14] 3GPP TS 23.303: "Proximity-based Services; Stage 2".
- [15] 3GPP TS 36.360: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE-WLAN Aggregation Adaptation Protocol (LWAAP) specification".