

ETSI TS 136 412 V16.0.0 (2020-09)



**LTE;
Evolved Universal Terrestrial
Radio Access Network (E-UTRAN);
S1 signalling transport
(3GPP TS 36.412 version 16.0.0 Release 16)**



Reference

RTS/TSGR-0336412vg00

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 prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

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/CommitteeSupportStaff.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 2020.

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 a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

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

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables 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.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Legal Notice

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. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 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 |
| Legal Notice | 2 |
| Modal verbs terminology..... | 2 |
| Foreword..... | 4 |
| 1 Scope | 5 |
| 2 References | 5 |
| 3 Definitions and abbreviations..... | 5 |
| 3.1 Definitions | 5 |
| 3.2 Abbreviations | 5 |
| 4 S1 signalling bearer | 6 |
| 4.1 Functions and protocol stack..... | 6 |
| 5 Data link layer | 6 |
| 6 IP layer | 6 |
| 7 Transport layer | 6 |
| Annex A (informative): Change History | 8 |
| History | 9 |

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 specifies the standards for signalling transport to be used across S1 interface. S1 interface is a logical interface between the eNB and the E-UTRAN core network. The present document describes how the S1-AP signalling messages are transported over S1.

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] IETF RFC 2460 (1998-12): "Internet Protocol, Version 6 (IPv6) Specification".
- [3] IETF RFC 791(1981-09): "Internet Protocol".
- [4] IETF RFC 2474 (1998-12): "Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers".
- [5] IETF RFC 4960 (2007-09): "Stream Control Transmission Protocol".

3 Definitions 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].

S1: interface between an eNB and an EPC, providing an interconnection point between the EUTRAN and the EPC. It is also considered as a reference point.

S1-MME: Reference point for the control plane protocol between E-UTRAN and MME.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply.

| | |
|----------|--------------------------------------|
| eNB | E-UTRAN Node B |
| EPC | |
| DiffServ | Differentiated Service |
| IP | Internet Protocol |
| MME | Mobility Management Entity |
| PPP | Point to Point Protocol |
| SCTP | Stream Control Transmission Protocol |

4 S1 signalling bearer

4.1 Functions and protocol stack

S1 signalling bearer provides the following functions:

- Provision of reliable transfer of S1-AP message over S1-MME interface.
- Provision of networking and routing function
- Provision of redundancy in the signalling network
- Support for flow control and congestion control

The protocol stack for S1 signalling bearer is shown in figure 4.1 and details on each protocol are described in the following clauses.

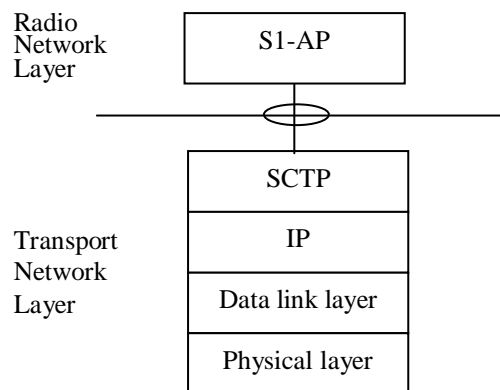


Figure 4.1: S1-MME signalling bearer protocol stack

The transport network layer is based on IP transport, comprising SCTP on top of IP.

5 Data link layer

The support of any suitable data link layer protocol, e.g. PPP, Ethernet, etc. , shall not be prevented.

6 IP layer

The eNB and MME shall support IPv6 (IETF RFC 2460 [2]) and/or IPv4 (IETF RFC 791 [3]).

The IP layer of S1-MME only supports point-to-point transmission for delivering S1-AP message.

The eNB and MME shall support the Diffserv Code Point marking as described in IETF RFC 2474 [4].

7 Transport layer

SCTP (IETF RFC 4960 [5]) shall be supported as the transport layer of S1-MME signalling bearer. The Payload Protocol Identifier (ppid) assigned by IANA to be used by SCTP for the application layer protocol S1AP is 18. The byte order of the ppid shall be big-endian.

SCTP refers to the Stream Control Transmission Protocol developed by the Sigtran working group of the IETF for the purpose of transporting various signalling protocols over IP network.

There shall be only one SCTP association established between one MME and eNB pair.

The eNB shall establish the SCTP association. The SCTP Destination Port number value assigned by IANA to be used for S1AP is 36412.

Within the SCTP association established between one MME and eNB pair:

- a single pair of stream identifiers shall be reserved for the sole use of S1AP elementary procedures that utilize non UE-associated signalling.
- At least one pair of stream identifiers shall be reserved for the sole use of S1AP elementary procedures that utilize UE-associated signalling. However a few pairs (i.e. more than one) should be reserved.
- A single UE-associated signalling shall use one SCTP stream and the stream should not be changed during the communication of the UE-associated signalling.

Transport network redundancy may be achieved by SCTP multi-homing between two end-points, of which one or both is assigned with multiple IP addresses. SCTP end-points shall support a multi-homed remote SCTP end-point. For SCTP endpoint redundancy an INIT may be sent from MME or eNB, at any time for an already established SCTP association, which shall be handled as defined in IETF RFC 4960 [5] in subclause 5.2.

The SCTP congestion control may, using an implementation specific mechanism, initiate higher layer protocols to reduce the signalling traffic at the source and prioritise certain messages.

Annex A (informative): Change History

| TSG # | TSG Doc. | CR | Rev | Subject/Comment | New |
|---------|-----------|------|-----|---|--------|
| 38 | | | | Specification approved at TSG-RAN and placed under change control | 8.0.0 |
| 39 | RP-080077 | 0001 | - | Dedication of common streams over S1-MME | 8.1.0 |
| 40 | RP-080301 | 0004 | - | SCTP flow control and overload protection | 8.2.0 |
| 40 | RP-080301 | 0005 | - | Redundancy of the SCTP endpoint | 8.2.0 |
| 41 | RP-080583 | 0007 | 1 | Correct the wording of common and dedicated procedures | 8.3.0 |
| 41 | RP-080583 | 0008 | | Enhancing the understandability of section 7 TS 36.412 | 8.3.0 |
| 41 | RP-080583 | 0009 | | Clarification of SCTP Congestion Indication over S1 | 8.3.0 |
| 42 | RP-080845 | 0010 | | Removal of chapter 8 | 8.4.0 |
| 43 | RP-090090 | 0011 | 1 | The use of the number of stream ID for a UE-associated signalling | 8.5.0 |
| 43 | RP-090085 | 0012 | 1 | Clarification of SCTP streams | 8.5.0 |
| 43 | RP-090083 | 0013 | | CR for FFS(es) on signalling bearer function | 8.5.0 |
| 43 | RP-090085 | 0015 | 1 | Clarification the overload protection function support in SCTP | 8.5.0 |
| 46 | RP-091183 | 0016 | 1 | Specification of SCTP destination port number | 8.6.0 |
| 12/2009 | | | | Creation of Rel-9 version based on v8.6.0 | 9.0.0 |
| 47 | RP-100213 | 0018 | | Specification of Payload Identifier | 9.1.0 |
| 12/2010 | | | | Creation of Rel-10 version based on v9.1.0 | 10.0.0 |
| SP-49 | SP-100629 | | | Clarification on the use of References (TS 21.801 CR#0030) | 10.0.1 |
| 52 | RP-110685 | 0020 | | Correction to the References in 36.412 | 10.1.0 |
| 09/2012 | | | | Update to Rel-11 version (MCC) | 11.0.0 |
| 09/2014 | | | | Update to Rel-12 version (MCC) | 12.0.0 |
| 12/2015 | | | | Update to Rel-13 version (MCC) | 13.0.0 |

| Change history | | | | | | | |
|----------------|---------|-----------|------|-----|-----|--|-------------|
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2017-03 | SA#75 | | | | | Promotion to Release 14 without technical change | 14.0.0 |
| 2018-06 | SA#80 | - | - | - | - | Promotion to Release 15 without technical change | 15.0.0 |
| 2020-03 | RP#87-e | RP-200425 | 0023 | | F | Rapporteur's Update for 36.412 | 16.0.0 |

History

| Document history | | |
|-------------------------|----------------|-------------|
| V16.0.0 | September 2020 | Publication |
| | | |
| | | |
| | | |
| | | |