# 3GPP TS 36.412 V8.6.0 (2009-12)

*Technical Specification*

**3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
Evolved Universal Terrestrial Access Network (E-UTRAN);
S1 signaling transport
(Release 8)**

Keywords
LTE, radio

**3GPP**

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

# 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

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: "Internet Protocol, Version 6 (IPv6) Specification".

[3]         IETF RFC 791(September,1981): "Internet Protocol".

[4]         IETF RFC 2474 (December 1998): "Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers".

[5]         IETF RFC 4960 (September 2007): "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 [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.

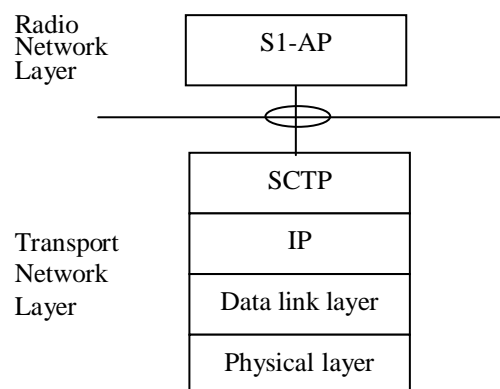| | |
|---|---|
| eNB | E-UTRAN Node B |
| EPC | |
| DiffServ | Differentiated Service |
| IP | Internet Protocol |
| MME | Mobility Management Entity |
| PPP | Point to Point Protocol |
| SCTP | Stream Control Transmission Protocol |

# 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 routeing 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 [2] and/or IPv4 [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 [4].

# 7 Transport layer

SCTP [5] shall be supported as the transport layer of S1-MME signalling bearer.

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 signallings. 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 [5] in § 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 |