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Technical Specification

**LTE;
Evolved Universal Terrestrial
Radio Access Network (E-UTRAN);
S1 signalling transport
(3GPP TS 36.412 version 8.4.0 Release 8)**



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Foreword

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

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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 routing function
- Provision of redundancy in the signalling network
- Support of load sharing (FFS)
- Support of dynamic S1-MME configuration (FFS)
- Support for flow control and overload protection

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

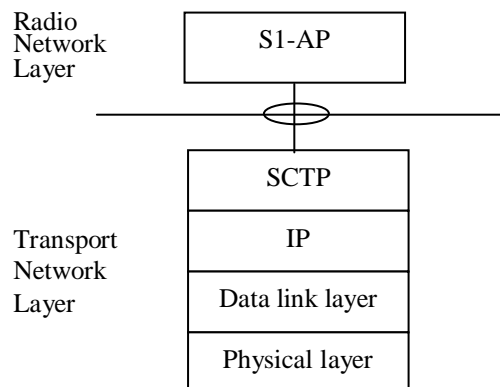


Figure 4.1: S1-MME signalling bearer protocol stack

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.

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.
- a few pairs (i.e. more than one) of stream identifiers should be reserved for the sole use of S1AP elementary procedures that utilize 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 flow 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

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2007-11	38	RP-070850			Specification presented to TSG-RAN for information and approval		1.0.0
2007-12	38				Specification approved at TSG-RAN and placed under change control	1.0.0	8.0.0
2008-03	39	RP-080077	01	-	Dedication of common streams over S1-MME	8.0.0	8.1.0
2008-06	40	RP-080301	04	-	SCTP flow control and overload protection	8.1.0	8.2.0
2008-06	40	RP-080301	05	-	Redundancy of the SCTP endpoint	8.1.0	8.2.0
2008-09	41	RP-080583	07	1	Correct the wording of common and dedicated procedures	8.2.0	8.3.0
2008-09	41	RP-080583	08		Enhancing the understandability of section 7 TS 36.412	8.2.0	8.3.0
2008-09	41	RP-080583	09		Clarification of SCTP Congestion Indication over S1	8.2.0	8.3.0
2008-12	42	RP-080845	10		Removal of chapter 8	8.3.0	8.4.0

History

Document history		
V8.2.0	November 2008	Publication
V8.3.0	November 2008	Publication
V8.4.0	January 2009	Publication