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3GPP – Technical Specification Group
Radio Access Network;
Evolved Universal Terrestrial Radio
Access Network (E-UTRAN);
X2 signalling transport
(Release 13)



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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 X2 interface. X2 interface is a logical interface between eNBs. The present document describes how the X2-AP signalling messages are transported over X2.

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, 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].

X2: logical interface between two eNBs.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] 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 [1].

eNB	E-UTRAN Node B
DiffServ	Differentiated Service
IANA	Internet Assigned Number Authority
IP	Internet Protocol
PPP	Point to Point Protocol
SCTP	Stream Control Transmission Protocol

4. X2 signalling bearer

4.1 Function and protocol stack

X2 signalling bearer provides the following functions:

- Provision of reliable transfer of X2-AP message over X2 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 X2 Signalling Bearer is shown in figure 4.1 and details on each protocol are described in the following sections.

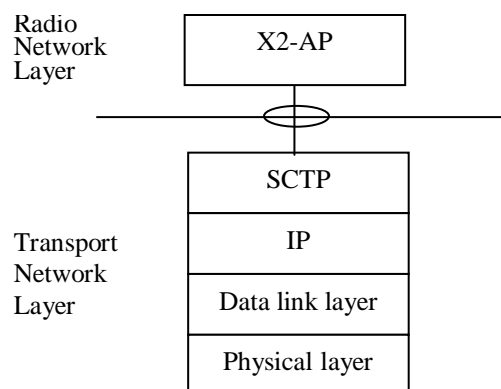


Figure 4.1: X2 signalling bearer protocol stack

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

The IP layer of X2 only supports point-to-point transmission for delivering X2-AP message.

The eNB 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 X2 signalling bearer. The Payload Protocol Identifier assigned by IANA to be used by SCTP for the application layer protocol X2AP is 27.

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 eNB pair. An eNB shall use the Destination Port Number value 36422 assigned by IANA to be used for X2AP and this value shall also be used in Source Port Number by all eNBs within a network.

NOTE: A multi-homed eNB implementation should provide the correspondent eNB with the set of IP addresses supported during SCTP association establishment unless the correspondent eNB already has this information e.g. through IP address management.

An arbitrary eNB shall be able to initiate the INIT procedure towards another eNB for establishing the SCTP association.

Within the SCTP association established between one eNB pair;

- A single pair of stream identifiers shall be reserved for the sole use of X2AP elementary procedures that utilize non UE-associated signalling.
- At least one pair of stream identifiers shall be reserved for the sole use of X2AP 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 either of the eNBs, 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				Apecification approved at TSG-RAN and placed under change control	8.0.0
39	RP-080077	0001	-	Dedication of common streams over X2	8.1.0
40	RP-080301	0003	-	SCTP flow control and overload protection	8.2.0
41	RP-080583	0005	1	Correct the wording of common and dedicated procedures	8.3.0
41	RP-080583	0006	2	SCTP restart function for X2 interface	8.3.0
41	RP-080583	0007	-	Clarification of SCTP Congestion Indication over X2	8.3.0
42	RP-080855	0008	1	Further clarification of SCTP Association handling	8.4.0
42	RP-080855	0009		Removal of chapter 8	8.4.0
43	RP-090090	0010	1	The use of the number of stream ID for a UE-associated signalling	8.5.0
43	RP-090085	0011	1	Clarification of SCTP streams	8.5.0
43	RP-090085	0012	1	Clarification the overload protection function support in SCTP	8.5.0
46	RP-091183	0014	1	Specification of SCTP destination port number	8.6.0
-	-	-	-	Created Rel-9 version based on v8.6.0	9.0.0
47	RP-100213	0016		Specification of Payload Identifier	9.1.0
50				Created Rel-10 version based on v. 9.1.0	10.0.0
SP-49	SP-100629			Clarification on the use of References (TS 21.801 CR#0030)	10.0.1
52	RP-110685	0018		Correction to the References in 36.422	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