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Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	4
1 Scope	6
2 References	6
3 Definitions of terms, symbols and abbreviations	6
3.1 Terms.....	6
3.2 Symbols.....	6
3.3 Abbreviations	7
4. W1-C signalling bearer	7
4.1 Function and protocol stack.....	7
5 Data link layer	7
6 IP layer	7
7 Transport layer	8
Annex A (informative): Change History	9
History	10

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.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the standards for Signalling Transport to be used across the W1 interface. The W1 interface provides means for interconnecting a ng-eNB-CU and a ng-eNB-DU of a ng-eNB within a NG-RAN. The present document describes how the W1AP signalling messages are transported over W1.

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 8200 (2017-07): "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".
- [6] 3GPP TS 38.300: "NR; Overall description; Stage-2".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms and definitions given in 3GPP 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 3GPP TR 21.905 [1].

ng-eNB: as defined in 3GPP TS 38.300 [6]

SCTP association: as defined in IETF RFC 4960 (2007-09) [5]

SCTP endpoint: as defined in IETF RFC 4960 (2007-09) [5]

W1: interface between a ng-eNB-CU and a ng-eNB-DU, providing an interconnection point between the ng-eNB-CU and the ng-eNB-DU.

W1-C: Reference point for the control plane protocol between ng-eNB-CU and ng-eNB-DU.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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 3GPP TR 21.905 [1].

DiffServ	Differentiated Service
IANA	Internet Assigned Number Authority
IP	Internet Protocol
PPP	Point to Point Protocol
SCTP	Stream Control Transmission Protocol

4. W1-C signalling bearer

4.1 Function and protocol stack

The W1-C signalling bearer provides the following functions:

- Provision of reliable transfer of W1AP messages over the W1-C 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 W1-C Signalling Bearer is shown in figure 4.1-1 and details on each protocol are described in the following clauses.

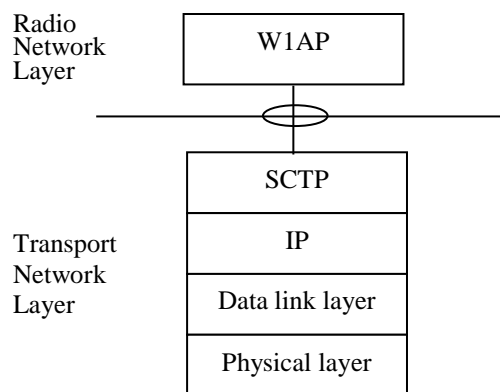


Figure 4.1-1: W1-C signalling bearer protocol stack

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 ng-eNB-CU and ng-eNB-DU shall support IPv6 (IETF RFC 8200 [2]) and/or IPv4 (IETF RFC 791 [3]).

The IP layer of W1-C only supports point-to-point transmission for delivering W1AP message.

The ng-eNB-CU and ng-eNB-DU 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 W1-C signalling bearer. The Payload Protocol Identifier assigned by IANA to be used by SCTP for the application layer protocol W1AP is 73.

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.

The ng-eNB-DU and ng-eNB-CU shall support a configuration with a single SCTP association per ng-eNB-DU/ng-eNB-CU pair.

The ng-eNB-DU shall establish the SCTP association. The SCTP Destination Port number value assigned by IANA to be used for W1AP is 37472.

Within the set of SCTP associations established between one ng-eNB-CU and ng-eNB-DU pair, a single SCTP association shall be employed for W1AP elementary procedures that utilize non-UE-associated signalling with the possibility of fail-over to a new association to enable robustness.

Between one ng-eNB-CU and ng-eNB-DU pair:

- A single pair of stream identifiers shall be reserved over an SCTP association for the sole use of W1AP elementary procedures that utilize non UE-associated signalling.
- At least one pair of stream identifiers over one or several SCTP associations shall be reserved for the sole use of W1AP elementary procedures that utilize UE-associated signalling. However, a few pairs (i.e. more than one) should be reserved.
- For a single UE-associated signalling, the ng-eNB-DU shall use one SCTP association and one SCTP stream, and the association/stream should not be changed during the communication of the UE-associated signalling unless TNL binding update is performed.

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 a ng-eNB-CU or ng-eNB-DU, at any time for an already established SCTP association, which shall be handled as defined in IETF RFC 4960[5] in sub clause 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

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2018-05	RAN3#100	R3-183554				BL TS submission for approval.	
2019-08	RAN3#105	R3-194678				Add the description of procedure for the W1 signalling transport protocol	0.1.0
2019-10	RAN3#105 -Bis	R3-196134				Add the description of References, Definitions and abbreviations.	0.1.0
2019-11	RAN3#106 -Bis	R3-197634				Change the version number to 0.2.0.	0.2.0
2019-12	RP-86	RP-192954				TS submitted to TSG RAN plenary for approval	1.3.0
2019-12	RP-86					TS approved by TSG RAN plenary	16.0.0
2020-07	RP-88-e	RP-201236	0002	-	F	SCTP Payload Protocol Identifier for W1AP	16.1.0
2020-09	RP-89-e	RP-201948	0003	-	F	SCTP port number allocated by IANA	16.2.0

History

Document history		
V16.1.0	September 2020	Publication
V16.2.0	November 2020	Publication