3GPP TS 38.460 V15.4.0 (2019-07)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
NG-RAN;
E1 general aspects and principles
(Release 15)

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 is an introduction to the 3GPP TS 38.46x series of technical specifications that define the E1 interface. The E1 interface provides means for interconnecting a gNB-CU-CP and a gNB-CU-UP of a gNB-CU within an NG-RAN, or for interconnecting a gNB-CU-CP and a gNB-CU-UP of an en-gNB within an E-UTRAN.

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] 3GPP TS 38.401: "NG-RAN; Architecture Description".

[3] 3GPP TS 38.461: "NG-RAN; E1 layer 1".

[4] 3GPP TS 38.462: "NG-RAN; E1 signalling transport".

[5] 3GPP TS 38.463: "NG-RAN; E1 Application Protocol (E1AP)".

[6] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[7] 3GPP TS 37.340: "NR; Multi-connectivity; Overall description; Stage-2".

3 Definitions and abbreviations

3.1 Definitions

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].

en-gNB: as defined in TS 37.340 [7]

gNB-CU: as defined in TS 38.401 [2]

gNB-CU-CP: as defined in TS 38.401 [2]

gNB-CU-UP: as defined in TS 38.401 [2]

gNB-DU: as defined in TS 38.401 [2]

gNB: as defined in TS 38.300 [6]

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].

DL	Downlink
DRB	Data Radio Bearer
E1AP	E1 Application Protocol
IP	Internet Protocol
SCTP	Stream Control Transmission Protocol
TNL	Transport Network Layer

4 General aspects

This clause captures the E1 interface principles and characteristics.

4.1 E1 interface general principles

The general principles for the specification of the E1 interface are as follows:

- the E1 interface is open;
- the E1 interface supports the exchange of signalling information between the endpoints;
- from a logical standpoint, the E1 is a point-to-point interface between a gNB-CU-CP and a gNB-CU-UP.

NOTE 1: A point-to-point logical interface should be feasible even in the absence of a physical direct connection between the endpoints.

- the E1 interface separates Radio Network Layer and Transport Network Layer;
- the E1 interface enables exchange of UE associated information and non-UE associated information;
- the E1 interface is future proof to fulfil different new requirements, support of new services and new functions.

NOTE 2: The E1 interface is a control interface and is not used for user data forwarding.

4.2 E1 interface specification objectives

The E1 interface specifications facilitate the following:

- inter-connection of a gNB-CU-CP and a gNB-CU-UP supplied by different manufacturers.

5 Functions of the E1 interface

5.1 General

The following clauses describe the functions supported over E1.

5.1.1 E1 interface management function

The error indication function is used by the gNB-CU-UP or gNB-CU-CP to indicate to the gNB-CU-CP or gNB-CU-UP that an error has occurred.

The reset function is used to initialize the peer entity after node setup and after a failure event occurred. This procedure can be used by both the gNB-CU-UP and the gNB-CU-CP.

The E1 setup function allows to exchange application level data needed for the gNB-CU-UP and gNB-CU-CP to interoperate correctly on the E1 interface. The E1 setup is initiated by both the gNB-CU-UP and gNB-CU-CP.

The gNB-CU-UP Configuration Update and gNB-CU-CP Configuration Update functions allow to update application level configuration data needed between the gNB-CU-CP and the gNB-CU-UP to interoperate correctly over the E1 interface.

The E1 setup and gNB-CU-UP Configuration Update functions allow to inform NR CGI(s), S-NSSAI(s), PLMN-ID(s) and QoS information supported by the gNB-CU-UP.

The E1 setup and gNB-CU-UP Configuration Update functions allow the gNB-CU-UP to signal its capacity information to the gNB-CU-CP.

The E1 gNB-CU-UP Status Indication function allows to inform the overloaded or non-overloaded status over the E1 interface.

5.1.2 E1 bearer context management function

The establishment of the E1 bearer context is initiated by the gNB-CU-CP and accepted or rejected by the gNB-CU-UP based on admission control criteria (e.g., resource not available).

The modification of the E1 bearer context can be initiated by either gNB-CU-CP or gNB-CU-UP. The receiving node can accept or reject the modification. The E1 bearer context management function also supports the release of the bearer context previously established in the gNB-CU-UP. The release of the bearer context is triggered by the gNB-CU-CP either directly or following a request received from the gNB-CU-UP.

This function is used to setup and modify the QoS-flow to DRB mapping configuration. The gNB-CU-CP decides flow-to-DRB mapping and provides the generated SDAP and PDCP configuration to the gNB-CU-UP. The gNB-CU-CP also decides the Reflective QoS flow to DRB mapping. For each PDU Session Resource to be setup or modified, the S-NSSAI, shall be provided in the E1 bearer context setup procedure and may be provided in the E1 bearer context modification procedure by gNB-CU-CP to the gNB-CU-UP.

This function is used for the gNB-CU-CP to send the security information to the gNB-CU-UP.

This function is used for the gNB-CU-UP to notify the event of DL data arrival detection to the gNB-CU-CP. With this function, the gNB-CU-UP requests gNB-CU-CP to trigger paging procedure over F1 or Xn to support RRC Inactive state.

This function is used for the gNB-CU-UP to notify the gNB-CU-CP that an UL packet including a QFI value in the SDAP header not configured by the *Flow Mapping Information* IE is received for the first time at the default DRB. The gNB-CU-CP can take further action if needed.

This function is used for the gNB-CU-UP to notify the event of user inactivity to the gNB-CU-CP. With this function, the gNB-CU-UP indicates that the inactivity timer associated with a bearer, a PDU session or a UE expires, or that user data is received for the bearer, the PDU session or the UE whose inactivity timer has expired. The gNB-CU-CP consolidates all the serving gNB-CU-UPs for the UE and takes further action.

This function is used for the gNB-CU-UP to report data volume to the gNB-CU-CP.

This function is used for the gNB-CU-CP to notify the suspension and resumption of bearer contexts to the gNB-CU-UP.

This function also allows to support CA based packet duplication as described in TS 38.300 [6], i.e. one data radio bearer should be configured with two GTP-U tunnels between gNB-CU-UP and a gNB-DU.

5.2 TEIDs allocation

The gNB-CU-UP is responsible for the allocation of the F1-U UL GTP TEID for each data radio bearer.

The gNB-CU-UP is responsible for the allocation of the S1-U DL GTP TEID for each E-RAB and the NG-U DL GTP TEID for each PDU Session.

The gNB-CU-UP is responsible for the allocation of the X2-U DL/UL GTP TEID or the Xn-U DL/UL GTP TEID for each data radio bearer.

6 Procedures of the E1 interface

6.1 Interface Management procedures

The E1 interface management procedures are listed below:

- Reset procedure
- Error Indication procedure
- gNB-CU-UP E1 Setup procedure
- gNB-CU-CP E1 Setup procedure
- gNB-CU-UP Configuration Update procedure
- gNB-CU-CP Configuration Update procedure
- E1 Release procedure
- gNB-CU-UP Status Indication procedure

6.2 Bearer Context Management procedures

The E1 bearer management procedures are listed below:

- Bearer Context Setup procedure
- Bearer Context Release Request (gNB-CU-UP initiated) procedure
- Bearer Context Release (gNB-CU-CP initiated) procedure
- Bearer Context Modification (gNB-CU-CP initiated) procedure
- Bearer Context Modification Required (gNB-CU-UP initiated) procedure
- DL Data Notification procedure
- Bearer Context Inactivity Notification procedure
- Data Usage Report procedure
- MR-DC Data Usage Report procedure

7 E1 interface protocol structure

Figure 7.1-1 shows the protocol structure for E1. The TNL is based on IP transport, comprising the SCTP on top of IP. The application layer signalling protocol is referred to as E1AP (E1 Application Protocol).

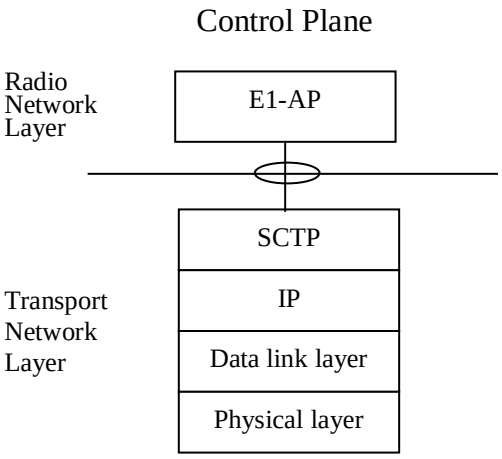

Figure 7.1-1: Interface protocol structure for E1

8 Other E1 interface specifications

This clause contains the description of the other related 3GPP specifications.

8.1 NG-RAN E1 interface: layer 1 (3GPP TS 38.461)

3GPP TS 38.461 [3] specifies the physical layer technologies that may be used to support the E1 interface.

8.2 NG-RAN E1 interface: signalling transport (3GPP TS 38.462)

3GPP TS 38.462 [4] specifies the signalling bearers for the E1AP for the E1 interface.

8.3 NG-RAN E1 interface: E1AP specification (3GPP TS 38.463)

3GPP TS 38.463 [5] specifies the E1AP protocol for radio network control plane signalling over the E1 interface.

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2018-02	R3#99	R3-181037	-	-	-	Skeleton	0.0.0
2018-02	R3#99	R3-181419	-	-	-	Editorial changes	0.1.0
2018-03	R3#99	R3-181596				Agreed text proposal R3-181425 on TEID allocation added to section 5.2; Agreed text proposal R3-181427 on Bearer Context management function and procedure added to section 5.1.2 and 6.2.	0.2.0
2018-04	R3#99bis	R3-181844	-	-	-	gNB-CU-CP / gNB-CU-UP is agreed as a formal name	0.3.0
2018-04	R3#99bis	R3-182498	-	-	-	E1 interface management function further detailed; gNB-CU-UP E1 Setup, gNB-CU-CP E1 Setup, gNB-CU-UP Configuration Update, gNB-CU-CP Configuration Update, E1 Release (FFS) introduced.	0.3.0
2018-04	R3#99bis	R3-182465	-	-	-	Bearer Context Inactivity Notification Procedure introduced.	0.3.0
2018-05	R3#100	R3-183579				E1 bearer context management function further updated by adding user inactivity notification, DL data arrival detection, data volume reporting and packet duplication.	0.4.0
2018-06	RAN#80	RP-180746				For approval	1.0.0
2018-06	RAN#80		-	-	-	Specification approved at TSG-RAN and placed under change control	15.0.0
2018-09	RAN#81	RP-181925	0001	4	F	NR Corrections (38.460 Baseline CR covering RAN3-101 agreements)	15.1.0
2018-12	RAN#82	RP-182451	0005	1	F	CR to 38.460 on capacity information transfer via E1 interface	15.2.0
2018-12	RAN#82	RP-182451	0006	1	F	CR to 38.460 on overload information indication over E1	15.2.0
2018-12	RAN#82	RP-182451	0012	1	F	CR to 38.460 on PDCP suspend indication over E1 interface	15.2.0
2018-12	RAN#82	RP-182451	0014	2	F	CR to 38.460 on notification for default DRB over E1	15.2.0
2018-12	RAN#82	RP-182447	0015	1	F	Introduction of Data Volume Reporting for MR-DC	15.2.0
2019-03	RAN#83	RP-190560	0017	1	F	CR to 38.460 on inactivity notification over E1	15.3.0
2019-07	RAN#84	RP-191399	0020	1	F	CR to 38.460 on clarifications for E1 bearer context management function and TEIDs allocation	15.4.0