ETSI TS 138 470 V16.11.0 (2023-10)

5G;
NG-RAN;
F1 general aspects and principles
(3GPP TS 38.470 version 16.11.0 Release 16)

Reference
RTS/TSGR-0338470vgb0

Keywords
5G

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**® and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

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

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under https://webapp.etsi.org/key/queryform.asp.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights 2
Legal Notice 2
Modal verbs terminology 2
Foreword 5
1 Scope 6
2 References 6
3 Definitions and abbreviations 6
3.1 Definitions 6
3.3 Abbreviations 7
4 General aspects 7
4.1 F1 interface general principles 7
4.2 F1 interface specification objectives 8
4.3 F1 interface capabilities 8
4.4 Void 8
5 Functions of the F1 interface 8
5.1 General 8
5.2 F1-C functions 8
5.2.1 F1 interface management function 8
5.2.2 System Information management function 9
5.2.3 F1 UE context management function 9
5.2.4 RRC message transfer function 10
5.2.5 Paging function 11
5.2.6 Warning messages information transfer function 11
5.2.7 Remote Interference Management (RIM) message transfer function 11
5.2.8 Trace function 11
5.2.9 Load management function 11
5.2.10 Self-optimisation support function 11
5.2.11 Positioning function 11
5.2.12 IAB support function 12
5.3 F1-U functions 12
5.3.1 Transfer of user data 12
5.3.2 Flow control function 12
5.4 TEIDs allocation 12
6 Procedures of the F1 interface 12
6.1 Control plane procedures 12
6.1.1 Interface Management procedures 12
6.1.2 Context Management procedures 13
6.1.3 RRC Message Transfer procedures 13
6.1.3A Warning Message Transmission procedures 13
6.1.4 System Information procedures 13
6.1.5 Paging procedures 13
6.1.6 Void 13
6.1.7 Radio information transfer procedures 13
6.1.8 UE Tracing procedures 14
6.1.9 Load management procedures 14
6.1.10 Self-optimisation support procedure 14
6.1.11 Positioning procedures 14
6.1.12 IAB procedures 15
6.2 User plane procedures 15
7 F1 interface protocol structure 15
7.1 F1 Control Plane Protocol (F1-C) 15
7.2 F1 User Plane Protocol (F1-U) 15

8 Other F1 interface specifications....16
8.1 NG-RAN F1 interface: layer 1 (3GPP TS 38.471)....16
8.2 NG-RAN F1 interface: signalling transport (3GPP TS 38.472)....16
8.3 NG-RAN F1 interface: F1AP specification (3GPP TS 38.473)....16
8.4 NG-RAN F1 interface: data transport and transport signalling (3GPP TS 38.474)....16
8.5 NG-RAN F1 interface: user plane protocol (3GPP TS 38.425)....16

Annex A (informative): Change history....17

History....18

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 38.47x series of technical specifications that define the F1 interface. The F1 interface provides means for interconnecting a gNB-CU and a gNB-DU of a gNB within an NG-RAN, or for interconnecting a gNB-CU and a gNB-DU 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 38.471: "NG-RAN; F1 layer 1".

[4] 3GPP TS 38.472: "NG-RAN; F1 signalling transport".

[5] 3GPP TS 38.473: "NG-RAN; F1 Application Protocol (F1AP)".

[6] 3GPP TS 38.474: "NG-RAN; F1 data transport".

[7] 3GPP TS 38.425: "NG-RAN; Xn interface user plane protocol".

[8] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[9] 3GPP TS 37.340: "NR; Multi-connectivity; Overall description; Stage-2".

[10] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[11] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

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].

BH RLC channel: as defined in TS 38.300 [8].

en-gNB: as defined in TS 37.340 [9].

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

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

gNB: as defined in TS 38.300 [8].

IAB-MT: as defined in TS 38.300 [8].

IAB-DU: as defined in TS 38.300 [8].

IAB-node: as defined in TS 38.300 [8].

IAB-donor: as defined in TS 38.300 [8].

IAB-donor-CU: as defined in TS 38.401 [2].

IAB-donor-DU: as defined in TS 38.401 [2].

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].

BH	Backhaul
DRB	Data Radio Bearers
F1-U	F1 User plane interface
F1-C	F1 Control plane interface
F1AP	F1 Application Protocol
GTP-U	GPRS Tunnelling Protocol
IAB	Integrated Access and Backhaul
IP	Internet Protocol
NR-MIB	NR-Master Information Block
O&M	Operation and Maintenance
PA	Paging Area
PF	Paging Frame
PO	Paging Occasion
QoS	Quality of Service
RIM	Remote Interference Management
RLC	Radio Link Control
RRC	Radio Resource Control
SCTP	Stream Control Transmission Protocol
SRB	Signalling Radio Bearers
SIB1	System Information Block 1
SIB10	System Information Block 10
SIB12	System Information Block 12
SIB13	System Information Block 13
SIB14	System Information Block 14
SL	Sidelink
TNL	Transport Network Layer
V2X	Vehicle-to-Everything

4 General aspects

This clause captures the F1 interface principles and characteristics.

4.1 F1 interface general principles

The general principles for the specification of the F1 interface are as follows:

- the F1 interface is open;
- the F1 interface supports the exchange of signalling information between the endpoints, in addition the interface supports data transmission to the respective endpoints;
- from a logical standpoint, the F1 is a point-to-point interface between the endpoints.

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

- the F1 interface supports control plane and user plane separation;
- the F1 interface separates Radio Network Layer and Transport Network Layer;
- the F1 interface enables exchange of UE associated information and non-UE associated information;
- the F1 interface is designed in a future proof way to fulfil different new requirements, support new services and new functions;
- one gNB-CU and a set of gNB-DUs are visible to other logical nodes as a gNB or an en-gNB where the gNB terminates the Xn and the NG interfaces, and the en-gNB terminates the X2 and the S1-U interfaces;
- the gNB-CU may be separated in control plane (CP) and user plane (UP).

4.2 F1 interface specification objectives

The F1 interface specifications facilitate the following:

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

4.3 F1 interface capabilities

The F1 interface supports:

- procedures to establish, maintain and release radio bearers for the NG-RAN part of PDU sessions and for E-UTRAN Radio Access Bearers;
- procedures to establish, maintain and release BH RLC channels;
- the separation of each UE on the protocol level for user specific signalling management;
- the separation of each IAB-MT on the protocol level for IAB-MT specific signalling management;
- the transfer of RRC signalling messages between the UE and the gNB-CU.

4.4 Void

5 Functions of the F1 interface

5.1 General

The following clauses describe the functions supported over F1-C and F1-U.

5.2 F1-C functions

5.2.1 F1 interface management function

The error indication function is used by the gNB-DU or gNB-CU to indicate to the gNB-CU or gNB-DU 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-DU and the gNB-CU.

The F1 setup function allows to exchange application level data needed for the gNB-DU and gNB-CU to interoperate correctly on the F1 interface, and exchange the intended TDD DL-UL configuration originating from the gNB-DU or destined to the gNB-DU. The F1 setup is initiated by the gNB-DU.

The gNB-CU Configuration Update and gNB-DU Configuration Update functions allow to update application level configuration data needed between gNB-CU and gNB-DU to interoperate correctly over the F1 interface, and may activate or deactivate cells. For cross-link interference mitigation, the gNB-CU may coordinate the exchange of intended TDD DL-UL configuration by merging, forwarding and selective forwarding of intended TDD DL-UL configuration(s) between its gNB-DUs, or between its gNB-DUs and other gNBs, gNB-CUs. With the gNB-CU Configuration Update function, energy saving with cell activation/deactivation can be supported as defined in TS 38.300 [8].

The F1 setup and gNB-DU Configuration Update functions allow to inform the S-NSSAI(s), CAG ID(s) and NID(s) supported by the gNB-DU.

The F1 setup and gNB-CU Configuration Update functions allow to inform the NID(s) available at the gNB-CU.

The F1 resource coordination function is used to transfer information about frequency resource sharing between gNB-CU and gNB-DU. In case of split gNB architecture, the gNB-CU may consolidate the outgoing messages from multiple gNB-DUs and distribute the incoming messages to the involved gNB-DUs, to perform resource coordination.

The gNB-DU status indication function allows the gNB-DU to indicate overload status to gNB-CU.

The network access rate reduction function is used to indicate to the gNB-DU that the rate at which UEs are accessing the network need to be reduced.

The F1 removal function is used to remove the interface instance and all related resources between the gNB-DU and the gNB-CU in a controlled manner.

5.2.2 System Information management function

Scheduling of system broadcast information is carried out in the gNB-DU. The gNB-DU is responsible for transmitting the system information according to the scheduling parameters available.

The gNB-DU is responsible for the encoding of the NR-MIB message. In case broadcast of SIB1 and other SIBs is needed, the gNB-DU is responsible for the encoding of the SIB1 message, SIB10, SIB12, SIB13 and SIB14 and the gNB-CU is responsible for the encoding of other SIBs. The gNB-DU may re-encode SIB9. The gNB-DU is responsible for the generation of the SystemInformation message.

The gNB-CU is responsible for receiving the positioning assistance information from LMF, e.g., the positioning related SIBs. The gNB-CU transparently sends the positioning assistance information to the gNB-DU. The gNB-DU is responsible for broadcasting the positioning assistance information in Positioning SI message(s).

To support Msg3 based on-demand SI and RRC Dedicated SIB Request as described in TS 38.331 [11], the gNB-CU can confirm the received SI request from the UE by including the UE identity, and command the gNB-DU to broadcast the requested *SystemInformation* messages including the other SI.

To support UE RRC Positioning SI acquisition mechanism, as described in TS 38.331 [11], the gNB-CU can confirm the received positioning SI request from the UE by including the UE identity, and commands the gNB-DU to broadcast the requested positioning SI messages.

5.2.3 F1 UE context management function

The F1 UE context management function supports the establishment and modification of the necessary overall UE context.

The establishment of the F1 UE context is initiated by the gNB-CU and accepted or rejected by the gNB-DU based on admission control criteria (e.g., resource not available).

The modification of the F1 UE context can be initiated by either gNB-CU or gNB-DU. The receiving node can accept or reject the modification. The F1 UE context management function also supports the release of the context previously established in the gNB-DU. The release of the context is triggered by the gNB-CU either directly or following a request

received from the gNB-DU. The gNB-CU request the gNB-DU to release the UE Context when the UE enters RRC_IDLE or RRC_INACTIVE.

This function can be also used to manage DRBs, SRBs and SL DRBs, i.e., establishing, modifying and releasing DRB, SRB and SL DRB resources. The establishment and modification of DRB, or SL DRB resources are triggered by the gNB-CU and accepted/rejected by the gNB-DU based on resource reservation information and QoS information to be provided to the gNB-DU. For each DRB to be setup or modified, the S-NSSAI may be provided by gNB-CU to the gNB-DU in the UE Context Setup procedure and the UE Context Modification procedure. In case of NG-RAN sharing, the gNB-CU includes the serving PLMN ID (for SNPNs the serving SNPN ID) in the UE Context Setup procedure.

For Uu, the mapping between QoS flows and radio bearers is performed by gNB-CU and the granularity of bearer related management over F1 is radio bearer level. For NG-RAN, the gNB-CU decides an aggregated DRB QoS profile for each radio bearer based on received QoS flow profile, and provides both aggregated DRB QoS profile and QoS flow profile to the gNB-DU, and the gNB-DU either accepts the request or rejects it with appropriate cause value. With this function, gNB-DU could also notify gNB-CU whether the QoS for already established DRBs is not fulfilled any longer or it is fulfilled again. The function can be also used to inform the gNB-DU the alternative QoS Parameters Sets when available for a QoS flow. To support packet duplication for intra-gNB-DU CA as described in TS 38.300 [8], one data radio bearer should be configured with at least two GTP-U tunnels between gNB-CU and a gNB-DU.

For SL, the mapping between QoS flows and radio bearers is performed by gNB-CU and the granularity of bearer related management over F1 is radio bearer level. For NG-RAN, the gNB-CU decides an aggregated SL DRB QoS profile for each radio bearer based on received QoS flow profile, and provides both aggregated SL DRB QoS profile and QoS flow profile to the gNB-DU, and the gNB-DU either accepts the request or rejects it with appropriate cause value.

With this function, gNB-CU requests the gNB-DU to setup or change of the SpCell (as defined in TS 38.321 [10]) for the UE, and the gNB-DU either accepts or rejects the request with appropriate cause value. This function also enables the gNB-DU to inform the gNB-CU of which cell the UE has successfully accessed during conditional mobility.

With this function, the gNB-CU requests the setup of the SCell(s) at the gNB-DU side, and the gNB-DU accepts all, some or none of the SCell(s) and replies to the gNB-CU. The gNB-CU requests the removal of the SCell(s) for the UE.

With this function, the gNB-CU indicates the UL UE AMBR limit to the gNB-DU, and the gNB-DU enforces the indicated limit.

With this function, the gNB-DU indicates that a bearer, or a UE is inactive or active. The gNB-CU consolidates all the serving gNB-DUs for the UE and takes further action.

With this function, the gNB-CU indicates the gNB-DU that the UE context concerns mobility enhancement operation, and the gNB-DU takes corresponding actions.

In addition, for IAB-nodes and IAB-donors:

- The F1 UE context management function is used for managing BH RLC channels, i.e. establishing, modifying and releasing BH RLC channel resources. The establishment of BH RLC channels is triggered by the IAB-donor-CU. The establishment and modification is accepted/rejected by the IAB-node's parent, based on e.g. resource reservation information and QoS information provided to the IAB-node's parent.

- The DRB QoS profile framework is reused for BH RLC channels carrying DRBs. Prioritization of traffic on the F1-C interface is based on traffic type (e.g. UE-associated F1AP signalling, non-UE-associated F1AP signalling) and is enforced in the IAB-donor-DU and in IAB-nodes, considering that the traffic on the F1-C interface has higher priority than other traffic; in-sequence delivery over the signaling connection is always ensured.

- The IAB-donor-CU associates each BH RLC channel carrying control plane traffic with one of the signaled control plane traffic type values.

5.2.4 RRC message transfer function

This function allows to transfer RRC messages between gNB-CU and gNB-DU. RRC messages are transferred over F1-C. The gNB-CU is responsible for the encoding of the dedicated RRC message with assistance information provided by gNB-DU. This function also allows gNB-DU to report to gNB- CU if the downlink RRC message has been successfully delivered to UE or not. This function also allows the gNB-DU to duplicate the downlink RRC message according to the duplication information provided by gNB-CU.

For IAB-nodes, this function allows to transfer RRC messages for setting up and configuring the IAB-MT side of the BH RLC channel. These RRC messages are carried on F1-C between the IAB-donor-CU and the parent IAB-DU i.e. the gNB-DU side of the BH RLC channel.

5.2.5 Paging function

The gNB-DU is responsible for transmitting the paging information according to the scheduling parameters provided.

The gNB-CU provides paging information to enable the gNB-DU to calculate the exact PO and PF. The gNB-CU determines the PA. The gNB-DU consolidates all the paging records for a particular PO, PF and PA, and encodes the final RRC message and broadcasts the paging message on the respective PO, PF in the PA.

5.2.6 Warning messages information transfer function

This function allows to cooperate with the warning message transmission procedures over NG interface. The gNB-CU is responsible for encoding the warning related SI message and sending it together with other warning related information for the gNB-DU to broadcast over the radio interface.

5.2.7 Remote Interference Management (RIM) message transfer function

This function enables the transfer of Remote Interference Management (RIM) backhaul messages between the gNB-CU and the gNB-DU. RIM messages are transferred over F1-C. The gNB-CU acts as a coordinator on behalf of its affiliated gNB-DUs, by merging the RIM information received from its gNB-DUs and forwarding the merged information to the target gNBs or gNB-CUs, transparently via the core network. Similarly, a gNB-CU distributes an incoming RIM backhaul message to all its concerned gNB-DUs.

5.2.8 Trace function

The Trace function provides means to control trace sessions for a UE over F1 interface.

5.2.9 Load management function

The load management function allows an gNB-CU to request the reporting of load measurements to gNB-DU and is used by gNB-DU to report the result of measurements admitted by gNB-DU.

5.2.10 Self-optimisation support function

This function allows the gNB-CU to provide information to the gNB-DU in order to support self-optimization functionality.

5.2.11 Positioning function

This function allows to transfer location management messages between gNB-CU and gNB-DU. With this function, gNB-CU request TRP information from gNB-DU, and gNB-DU response to gNB-CU with the TRP information. With this function, gNB-CU request positioning measurements from gNB-DU, and gNB-DU response to gNB-CU with the positioning measurements.

The function allows the gNB-CU to

- transfer the positioning assistance data to gNB-DU. The gNB-DU is responsible for broadcasting the positioning assistance data according to the scheduling parameters available.
- request the gNB-DU to configure SRS transmissions for UE.

The function allows the gNB-CU to request the gNB-DU to broadcast positioning system information.

5.2.12 IAB support function

The BAP mapping configuration function allows the IAB-donor-CU to provide BAP mapping which includes the backhaul routing configuration and/or BH RLC channel mapping information for IAB-donor-DU or IAB-DU.

The gNB-DU resource configuration function is used by the IAB-donor-CU to provide cell resource configuration for an IAB-donor-DU or an IAB-DU, and/or information about the child node's cell resource configuration and other periodic configurations to a parent IAB-node or an IAB-donor-DU.

The IAB TNL address configuration function enable the IAB-donor-CU to request IP address(es) to be used for IAB-node(s) from an IAB-donor-DU, or to request from an IAB-donor-DU the removal of IP address(es) used for IAB-node(s).

The IAB UP configuration update function allows the update of BH information or the UP TNL information between the IAB-donor-CU and an IAB-DU.

5.3 F1-U functions

5.3.1 Transfer of user data

This function allows to transfer of user data between gNB-CU and gNB-DU.

5.3.2 Flow control function

This function allows to control the downlink user data flow to the gNB-DU. The detailed protocol is specified in TS 38.425 [7].

5.4 TEIDs allocation

The gNB-DU is responsible for the allocation of the F1-U DL GTP TEID for each data radio bearer.

6 Procedures of the F1 interface

6.1 Control plane procedures

6.1.1 Interface Management procedures

The F1 Interface management procedures are listed below:

- Reset procedure
- Error Indication procedure
- F1 Setup procedure
- gNB-DU Configuration Update procedure
- gNB-CU Configuration Update procedure
- gNB-DU Resource Coordination procedure
- gNB-DU Status Indication procedure
- F1 Removal procedure
- Network Access Rate Reduction procedure

6.1.2 Context Management procedures

The F1 Context management procedures are listed below:

- UE Context setup procedure
- UE Context Release Request (gNB-DU initiated) procedure
- UE Context Release (gNB-CU initiated) procedure
- UE Context Modification (gNB-CU initiated) procedure
- UE Context Modification Required (gNB-DU initiated) procedure
- UE Inactivity Notification procedure
- Notify procedure
- Access Success procedure

6.1.3 RRC Message Transfer procedures

The F1 RRC message transfer procedures are listed below:

- Initial UL RRC Message Transfer procedure
- UL RRC Message Transfer procedure
- DL RRC Message Transfer procedure
- RRC Delivery Report procedure

6.1.3A Warning Message Transmission procedures

The F1 Warning message transmission procedures are listed below:

- Write-Replace Warning procedure
- PWS Cancel procedure
- PWS Restart Indication procedure
- PWS Failure Indication procedure

6.1.4 System Information procedures

The F1 System information procedures are listed below:

- System Information Delivery procedure

6.1.5 Paging procedures

The F1 Paging procedures are listed below:

- Paging procedure

6.1.6 Void

6.1.7 Radio information transfer procedures

The F1 Radio information transfer procedures are listed below:

- DU-CU Radio Information Transfer procedure
- CU-DU Radio Information Transfer procedure

6.1.8 UE Tracing procedures

The following procedures are used to trace the UE:

- Trace Start procedure
- Deactivate Trace procedure
- Cell Traffic Trace procedure

6.1.9 Load management procedures

The load management procedures are listed as below:

- Resource Status Reporting Initiation procedure
- Resource Status Reporting procedure

6.1.10 Self-optimisation support procedure

The self-optimisation support procedure is used to transfer failure and mobility related information from the gNB-CU to the gNB-DU to enable self-optimisation

- Access and Mobility Indication procedure

6.1.11 Positioning procedures

The F1 Positioning procedures are listed below:

- Positioning Assistance Information Control procedure;
- Positioning Assistance Information Feedback procedure;
- Positioning Measurement procedure;
- Positioning Measurement Report procedure;
- Positioning Measurement Abort procedure;
- Positioning Measurement Failure Indication procedure;
- Positioning Measurement Update procedure;
- TRP Information Exchange procedure;
- Positioning Information Update;
- Positioning Information Exchange procedure;
- Positioning Activation procedure;
- Positioning Deactivation procedure;
- E-CID Measurement Initiation;
- E-CID Measurement Failure Indication procedure;
- E-CID Measurement Report procedure;
- E-CID Measurement Termination procedure;

- Positioning System Information Delivery procedure.

6.1.12 IAB procedures

The IAB procedures are listed below:

- BAP Mapping Configuration procedure
- gNB-DU Resource Configuration procedure
- IAB TNL Address Allocation procedure
- IAB UP Configuration Update procedure

6.2 User plane procedures

7 F1 interface protocol structure

7.1 F1 Control Plane Protocol (F1-C)

Figure 7.1-1 shows the protocol structure for F1-C. The TNL is based on IP transport, comprising the SCTP on top of IP. The application layer signalling protocol is referred to as F1AP (F1 Application Protocol).

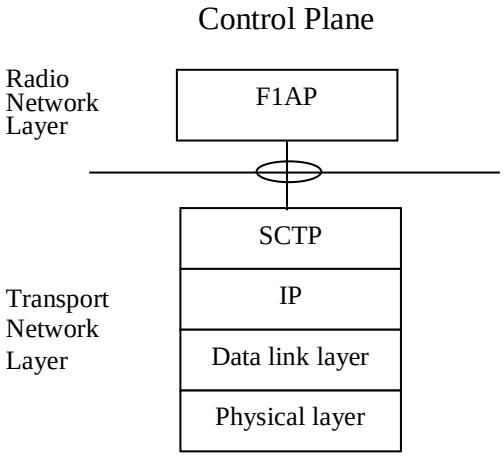

Figure 7.1-1: Interface protocol structure for F1-C

7.2 F1 User Plane Protocol (F1-U)

Figure 7.2-1 shows the protocol structure for F1-U. The TNL is based on IP transport, comprising the UDP and GTP-U on top of IP.

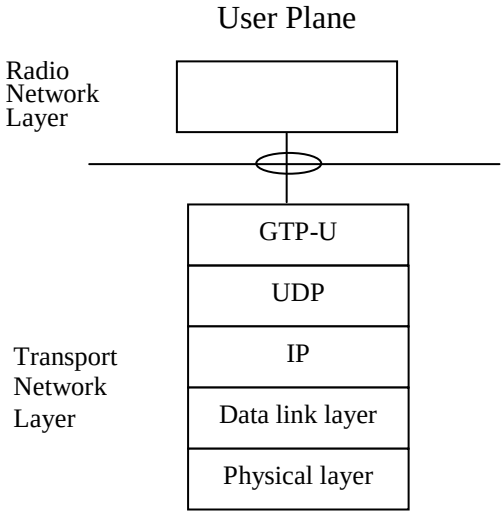

Figure 7.2-1: Interface protocol structure for F1-U

8 Other F1 interface specifications

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

8.1 NG-RAN F1 interface: layer 1 (3GPP TS 38.471)

3GPP TS 38.471 [3] specifies the physical layer technologies that may be used to support the F1 interface.

8.2 NG-RAN F1 interface: signalling transport (3GPP TS 38.472)

3GPP TS 38.472 [4] specifies the signalling bearers for the F1AP for the F1-C interface.

8.3 NG-RAN F1 interface: F1AP specification (3GPP TS 38.473)

3GPP TS 38.473 [5] specifies the F1AP protocol for radio network control plane signalling over the F1 interface.

8.4 NG-RAN F1 interface: data transport and transport signalling (3GPP TS 38.474)

3GPP TS 38.474 [6] specifies the transport bearers for the user plane of the F1-U interface.

8.5 NG-RAN F1 interface: user plane protocol (3GPP TS 38.425)

3GPP TS 38.425 [7] specifies the user plane protocol being used over the F1-U interface.

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2017-06	R3 NR#2	R3-172492	-	-	-	First version	0.1.0
2017-07	R3 NR#2	R3-172639	-	-	-	Incorporated agreed TPs from R3 NR#2 Adhoc	0.2.0
2017-08	R3#97	R3-173450	-	-	-	Incorporated agreed TPs from R3#97	0.3.0
2017-10	R3#97b	R3-174244	-	-	-	Incorporated agreed TPs from R3#97b	0.4.0
2017-10	R3#97b	R3-174259				Merged text from TS 38.401 v040	0.4.1
2017-12	R3#98	R3-175060				Incorporated agreed TPs from R3#98	0.5.0
2017-12	RAN#78	RP-172286				Submitted for approval to RAN	1.0.0
2018-01	RP-78					TS approved by RAN plenary	15.0.0
2018-03	RP-79	RP-180468	0002	-	F	UE Context Management Procedure Related with EN-DC Operation - Stage 2	15.1.0
2018-03	RP-79	RP-180468	0006	-	B	Correction of packet duplication	15.1.0
2018-03	RP-79	RP-180468	0007	1	B	SCell management	15.1.0
2018-06	RP-80	RP-181237	0003	6	B	Introduction of SA NR (38.470 Baseline CR covering RAN3 agreements)	15.2.0
2018-06	RP-80	RP-181238	0008	3	F	Adding new F1 procedure for UE Inactivity Notification	15.2.0
2018-06	RP-80	RP-181237	0010	-	B	Introduction of LTE-NR coexistence function	15.2.0
2018-09	RP-81	RP-181922	0011	3	F	NR Corrections (38.470 Baseline CR covering RAN3-101 agreements)	15.3.0
2018-12	RP-82	RP-182446	0015	1	F	F1 Load Management	15.4.0
2018-12	RP-82	RP-182446	0016	-	F	Alignment with stage3	15.4.0
2018-12	RP-82	RP-182446	0018	2	F	CR to 38.470 on the introduction of RRC Delivery Report procedure	15.4.0
2018-12	RP-82	RP-182448	0019	-	F	Rapporteur CR to 38.470	15.4.0
2019-03	RP-83	RP-190556	0023	1		Energy Saving Support over F1 Interface	15.5.0
2019-07	RP-84	RP-191396	0034	1	F	Rapporteur updates	15.6.0
2019-07	RP-84	RP-191396	0036	1	F	Encoding of SIB9 in the gNB-DU	15.6.0
2019-12	RP-86	RP-192915	0058	2	F	E-UTRA-NR Cell-level Resource Coordination	15.7.0
2019-12	RP-86	RP-192908	0035	2	B	Remote Interference Management Message Transfer Support	16.0.0
2019-12	RP-86	RP-192908	0038	1	B	Intended DL&UL configuration for TS38.470	16.0.0
2019-12	RP-86	RP-192913	0040	2	F	Trace function Support over F1 Interface	16.0.0
2020-03	RP-87-e	RP-200425	0062	-	D	Rapporteur: Editorial updates	16.1.0
2020-07	RP-88-e	RP-201077	0026	15	B	BL CR to 38.470: Support for IAB	16.2.0
2020-07	RP-88-e	RP-201080	0059	6	B	CR to TS 38.470 on support of NPN	16.2.0
2020-07	RP-88-e	RP-201075	0063	4	B	TS38.470 Stage2 Introduction of Mobility Enhancement Features	16.2.0
2020-07	RP-88-e	RP-201082	0064	3	B	BLCR to 38.470: Addition of SON feature	16.2.0
2020-07	RP-88-e	RP-201074	0065	6	B	Support of NR V2X SIB in gNB-DU	16.2.0
2020-07	RP-88-e	RP-201079	0067	2	B	PDCP duplication with more than 2 entities for F1 stage 2	16.2.0
2020-07	RP-88-e	RP-201082	0068	1	B	BLCR to 38.470: Addition of MDT feature	16.2.0
2020-09	RP-89-e	RP-201945	0061	8	B	Positioning support over F1AP	16.3.0
2020-09	RP-89-e	RP-201956	0069	-	F	Rapporteur Corrections	16.3.0
2021-03	RP-91-e	RP-210231	0070	3	F	Correction on IAB procedures	16.4.0
2021-06	RP-92-e	RP-211330	0075		F	Stage-2 CR on system information message over F1 (Rel-16)	16.5.0
2022-03	RP-95-e	RP-220276	0084		F	(Stage-2) Clarification on IAB Address Remove	16.6.0
2022-06	RP-96	RP-221154	0091	-	F	Clarification on SRB duplication for TS38.470 (R16)	16.7.0
2022-12	RP-98-e	RP-222887	0106	1	F	Correction to 38.470 on Positioning System Information	16.8.0
2023-03	RAN#99	RP-230597	0109	-	F	Stage 2 text addition on SRS configuration for positioning	16.9.0
2023-06	RAN#100	RP-231075	0112	1	F	Correction of SIType List	16.10.0
2023-09	RAN#101	RP-231900	0115	-	F	Correction on Positioning SI handling over F1	16.11.0

History

Document history		
V16.2.0	July 2020	Publication
V16.3.0	November 2020	Publication
V16.4.0	April 2021	Publication
V16.5.0	August 2021	Publication
V16.6.0	May 2022	Publication
V16.7.0	July 2022	Publication
V16.8.0	January 2023	Publication
V16.9.0	May 2023	Publication
V16.10.0	July 2023	Publication
V16.11.0	October 2023	Publication