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Contents

Foreword

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1 Scope

The present document specifies the 5G radio network layer signalling protocol for the E1 interface. The E1 interface provides means for interconnecting a gNB-CU-CP and a gNB-CU-UP of a gNB within an NG-RAN, or for interconnecting a gNB-CU-CP and a gNB-CU-UP of an en-gNB within an E-UTRAN. The E1 Application Protocol (E1AP) supports the functions of E1 interface by signalling procedures defined in the present document. E1AP is developed in accordance to the general principles stated in TS 38.401 [2] and TS 38.460 [3].

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 38.460: "NG-RAN; E1 general aspects and principles".

[4] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[5] 3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error".

[6] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

[7] ITU-T Recommendation X.691 (2002-07): "Information technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER)".

[8] ITU-T Recommendation X.680 (07/2002): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[9] ITU-T Recommendation X.681 (07/2002): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".

[10] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol Specificaiton”.

[11] 3GPP TS 23.401: “General Packet Radio Service (GPRS) Enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access”.

[12] 3GPP TS 23.203: “Policy and Charging Control Architecture”.

[13] 3GPP TS 33.501: “Security Architecture and Procedures for 5G System”.

[14] IETF RFC 5905: “Network Time Protocol Version 4: Protocol and Algorithms Specification”.

[15] 3GPP TS 29.281: “General Packet Radio System (GPRS) Tunnelling Protocol User Plane (GTPv1-U)”.

[16] 3GPP TS 38.414: “NG-RAN; NG Data Transport”.

[17] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".

[18] 3GPP TS 38.462: "NG-RAN; E1 Signalling Transport".

[19] 3GPP TS 37.340: "NR; Multi-connectivity; Overall description; Stage-2".

[20] 3GPP TS 23.501: "System Architecture for the 5G System".

[21] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".

[22] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

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].

Elementary Procedure**:** E1AP consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between gNB-CU-CP and gNB-CU-UP. These Elementary Procedures are defined separately and are intended to be used to build up complete sequences in a flexible manner. If the independence between some EPs is restricted, it is described under the relevant EP description. Unless otherwise stated by the restrictions, the EPs may be invoked independently of each other as standalone procedures, which can be active in parallel. The usage of several E1AP EPs together is specified in stage 2 specifications (e.g., TS 38.460 [3]).

An EP consists of an initiating message and possibly a response message. Two kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success and/or failure).
- **Class 2:** Elementary Procedures without response.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.
- On time supervision expiry (i.e., absence of expected response).

Successful and Unsuccessful:

- One signalling message reports both successful and unsuccessful outcome for the different included requests. The response message used is the one defined for successful outcome.

Class 2 EPs are considered always successful.

gNB: as defined in TS 38.300 [4].

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

gNB-DU: 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].

PDU Session Resource: as defined in TS 38.401 [2].

UE-associated signalling: When E1AP messages associated to one UE uses the UE-associated logical E1-connection for association of the message to the UE in gNB-CU-UP and gNB-CU-CP.

UE-associated logical E1-connection: The UE-associated logical E1-connection uses the identities *GNB-CU-CP UE E1AP ID* and *GNB-CU-UP UE E1AP ID* according to the definition in TS 38.401 [2]. For a received UE associated E1AP message the gNB-CU-CP identifies the associated UE based on the *GNB-CU-CP UE E1AP ID* IE and the gNB-CU-UP identifies the associated UE based on the *GNB-CU-UP UE E1AP ID* IE.

3.2 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].

5GC	5G Core Network
5QI	5G QoS Identifier
CGI	Cell Global Identifier
CN	Core Network
CP	Control Plane
DL	Downlink
EN-DC	E-UTRA-NR Dual Connectivity
EPC	Evolved Packet Core
MCG	Master Cell Group
NSSAI	Network Slice Selection Assistance Information
RANAC	RAN Area Code
SCG	Secondary Cell Group
SDAP	Service Data Adaptation Protocol
S-NSSAI	Single Network Slice Selection Assistance Information
TNLA	Transport Network Layer Association

4 General

4.1 Procedure specification principles

The principle for specifying the procedure logic is to specify the functional behaviour of the terminating node exactly and completely. Any rule that specifies the behaviour of the originating node shall be possible to be verified with information that is visible within the system.

The following specification principles have been applied for the procedure text in clause 8:

- The procedure text discriminates between:

  1) Functionality which "shall" be executed.

     The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the REQUEST message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.

  2) Functionality which "shall, if supported" be executed.

     The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included. For requirements on including *Criticality Diagnostics* IE, see clause 10.

4.2 Forwards and backwards compatibility

The forwards and backwards compatibility of the protocol is assured by mechanism where all current and future messages, and IEs or groups of related IEs, include ID and criticality fields that are coded in a standard format that will not be changed in the future. These parts can always be decoded regardless of the standard version.

4.3 Specification notations

For the purposes of the present document, the following notations apply:

Procedure	When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Handover Preparation procedure.
Message	When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. HANDOVER REQUEST message.
IE	When referring to an information element (IE) in the specification the *Information Element Name* is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. *E-RAB ID* IE.
Value of an IE	When referring to the value of an information element (IE) in the specification the "Value" is written as it is specified in the specification enclosed by quotation marks, e.g. "Value".

5 E1AP services

E1AP provides the signalling service between the gNB-CU-CP and the gNB-CU-UP that is required to fulfil the E1AP functions described in clause 7. E1AP services are divided into two groups:

Non UE-associated services:	They are related to the whole E1 interface instance between the gNB-CU-CP and gNB-CU-UP utilising a non UE-associated signalling connection.
UE-associated services:	They are related to one UE. E1AP functions that provide these services are associated with a UE-associated signalling connection that is maintained for the UE in question.

Unless explicitly indicated in the procedure specification, at any instance in time one protocol endpoint shall have a maximum of one ongoing E1AP procedure related to a certain UE.

6 Services expected from signalling transport

The signalling connection shall provide in sequence delivery of E1AP messages. E1AP shall be notified if the signalling connection breaks.

7 Functions of E1AP

The functions of E1AP are described in TS 38.460 [3].

8 E1AP procedures

8.1 List of E1AP Elementary Procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs (see subclause 3.1 for explanation of the different classes):

Table 1: Class 1 procedures

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
Reset	RESET	RESET ACKNOWLEDGE	
gNB-CU-UP E1 Setup	GNB-CU-UP E1 SETUP REQUEST	GNB-CU-UP E1 SETUP RESPONSE	GNB-CU-UP E1 SETUP FAILURE
gNB-CU-CP E1 Setup	GNB-CU-CP E1 SETUP REQUEST	GNB-CU-CP E1 SETUP RESPONSE	GNB-CU-CP E1 SETUP FAILURE
gNB-CU-UP Configuration Update	GNB-CU-UP CONFIGURATION UPDATE	GNB-CU-UP CONFIGURATION UPDATE ACKNOWLEDGE	GNB-CU-UP CONFIGURATION UPDATE FAILURE
gNB-CU-CP Configuration Update	GNB-CU-CP CONFIGURATION UPDATE	GNB-CU-CP CONFIGURATION UPDATE ACKNOWLEDGE	GNB-CU-CP CONFIGURATION UPDATE FAILURE
E1 Release	E1 RELEASE REQUEST	E1 RELEASE RESPONSE	
Bearer Context Setup	BEARER CONTEXT SETUP REQUEST	BEARER CONTEXT SETUP RESPONSE	BEARER CONTEXT SETUP FAILURE
Bearer Context Modification (gNB-CU-CP initiated)	BEARER CONTEXT MODIFICATION REQUEST	BEARER CONTEXT MODIFICATION RESPONSE	BEARER CONTEXT MODIFICATION FAILURE
Bearer Context Modification Required (gNB-CU-UP initiated)	BEARER CONTEXT MODIFICATION REQUIRED	BEARER CONTEXT MODIFICATION CONFIRM	
Bearer Context Release (gNB-CU-CP initiated)	BEARER CONTEXT RELEASE COMMAND	BEARER CONTEXT RELEASE COMPLETE	

Table 2: Class 2 procedures

Elementary Procedure	Message
Error Indication	ERROR INDICATION
Bearer Context Release Request (gNB-CU-UP initiated)	BEARER CONTEXT RELEASE REQUEST
Bearer Context Inactivity Notification	BEARER CONTEXT INACTIVITY NOTIFICATION
DL Data Notification	DL DATA NOTIFICATION
UL Data Notification	UL DATA NOTIFICATION
Data Usage Report	DATA USAGE REPORT
gNB-CU-UP Counter Check	GNB-CU-UP COUNTER CHECK
gNB-CU-UP Status Indication	GNB-CU-UP STATUS INDICATION
MR-DC Data Usage Report	MR-DC DATA USAGE REPORT

8.2 Interface Management procedures

8.2.1 Reset

8.2.1.1 General

The purpose of the Reset procedure is to initialise or re-initialise the E1AP UE-related contexts, in the event of a failure in the gNB-CU-CP or gNB-CU-UP. This procedure does not affect the application level configuration data exchanged during, e.g., the E1 Setup procedure.

The procedure uses non-UE associated signalling.

8.2.1.2 Successful Operation

8.2.1.2.1 Reset Procedure Initiated from the gNB-CU-CP

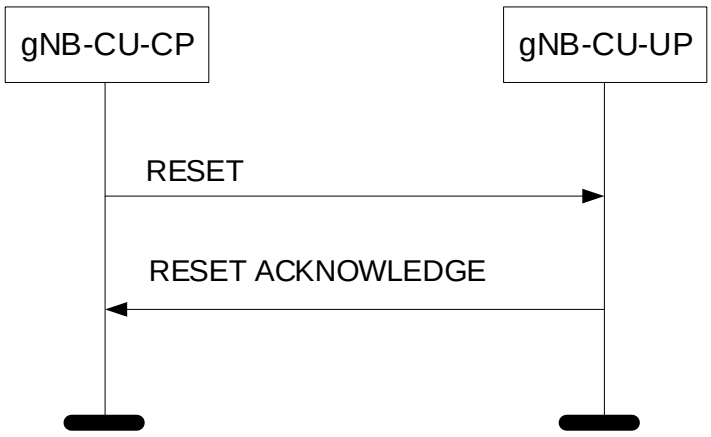

Figure 8.2.1.2.1-1: Reset procedure initiated from the gNB-CU-CP. Successful operation.

In the event of a failure at the gNB-CU-CP, which has resulted in the loss of some or all transaction reference information, a RESET message shall be sent to the gNB-CU-UP.

At reception of the RESET message the gNB-CU-UP shall release all allocated resources on E1 related to the UE association(s) indicated explicitly or implicitly in the RESET message and remove the indicated bearer contexts including E1AP ID.

After the gNB-CU-UP has released all assigned E1 resources and the UE E1AP IDs for all indicated UE associations which can be used for new UE-associated logical E1-connections over the E1 interface, the gNB-CU-UP shall respond with the RESET ACKNOWLEDGE message. The gNB-CU-UP does not need to wait for the release of bearer resources to be completed before returning the RESET ACKNOWLEDGE message.

If the RESET message contains the *UE-associated logical E1-connection list* IE, then:

- The gNB-CU-UP shall use the *gNB-CU-CP UE E1AP ID* IE and/or the *gNB-CU-UP UE E1AP ID* IE to explicitly identify the UE association(s) to be reset.

- The gNB-CU-UP shall include in the RESET ACKNOWLEDGE message, for each UE association to be reset, the *UE-associated logical E1-connection Item* IE in the *UE-associated logical E1-connection list* IE. The *UE-associated logical E1-connection Item* IEs shall be in the same order as received in the RESET message and shall include also unknown UE-associated logical E1-connections. Empty *UE-associated logical E1-connection Item* IEs, received in the RESET message, may be omitted in the RESET ACKNOWLEDGE message.

- If the *gNB-CU-CP UE E1AP ID* IE is included in the *UE-associated logical E1-connection Item* IE for a UE association, the gNB-CU-UP shall include the *gNB-CU-CP UE E1AP ID* IE in the corresponding *UE-associated logical E1-connection Item* IE in the RESET ACKNOWLEDGE message.

- If the *gNB-CU-UP UE E1AP ID* IE is included in the *UE-associated logical E1-connection Item* IE for a UE association, the gNB-CU-UP shall include the *gNB-CU-UP UE E1AP ID* IE in the corresponding *UE-associated logical E1-connection Item* IE in the RESET ACKNOWLEDGE message.

Interactions with other procedures:

If the RESET message is received, any other ongoing procedure (except for another Reset procedure) on the same E1 interface related to a UE association, indicated explicitly or implicitly in the RESET message, shall be aborted.

8.2.1.2.2 Reset Procedure Initiated from the gNB-CU-UP

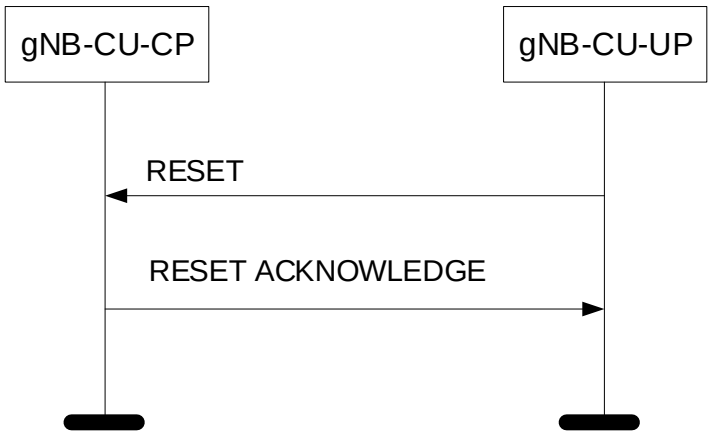

Figure 8.2.1.2.2-1: Reset procedure initiated from the gNB-CU-UP. Successful operation.

In the event of a failure at the gNB-CU-UP, which has resulted in the loss of some or all transaction reference information, a RESET message shall be sent to the gNB-CU-CP.

At reception of the RESET message the gNB-CU-CP shall release all allocated resources on E1 related to the UE association(s) indicated explicitly or implicitly in the RESET message and remove the E1AP ID for the indicated UE associations.

After the gNB-CU-CP has released all assigned E1 resources and the UE E1AP IDs for all indicated UE associations which can be used for new UE-associated logical E1-connections over the E1 interface, the gNB-CU-CP shall respond with the RESET ACKNOWLEDGE message. The gNB-CU-CP does not need to wait for the release of bearer resources to be completed before returning the RESET ACKNOWLEDGE message.

If the RESET message contains the *UE-associated logical E1-connection list* IE, then:

- The gNB-CU-CP shall use the *gNB-CU-CP UE E1AP ID* IE and/or the *gNB-CU-UP UE E1AP ID* IE to explicitly identify the UE association(s) to be reset.

- The gNB-CU-CP shall in the RESET ACKNOWLEDGE message include, for each UE association to be reset, the *UE-associated logical E1-connection* Item IE in the *UE-associated logical E1-connection list* IE. The *UE-associated logical E1-connection Item* IEs shall be in the same order as received in the RESET message and shall include also unknown UE-associated logical E1-connections. Empty *UE-associated logical E1-connection Item* IEs, received in the RESET message, may be omitted in the RESET ACKNOWLEDGE message.

- If the *gNB-CU-CP UE E1AP ID* IE is included in the *UE-associated logical E1-connection Item* IE for a UE association, the gNB-CU-CP shall include the *gNB-CU-CP UE E1AP ID* IE in the corresponding *UE-associated logical E1-connection Item* IE in the RESET ACKNOWLEDGE message.

- If the *gNB-CU-UP UE E1AP ID* IE is included in a *UE-associated logical E1-connection Item* IE for a UE association, the gNB-CU-CP shall include the *gNB-CU-UP UE E1AP ID* IE in the corresponding *UE-associated logical E1-connection Item* IE in the RESET ACKNOWLEDGE message.

Interactions with other procedures:

If the RESET message is received, any other ongoing procedure (except for another Reset procedure) on the same E1 interface related to a UE association, indicated explicitly or implicitly in the RESET message, shall be aborted.

8.2.1.3 Abnormal Conditions

Not applicable.

8.2.2 Error Indication

8.2.2.1 General

The Error Indication procedure is initiated by a node in order to report detected errors in one incoming message, provided they cannot be reported by an appropriate failure message.

If the error situation arises due to reception of a message utilising UE associated signalling, then the Error Indication procedure uses UE associated signalling. Otherwise the procedure uses non-UE associated signalling.

8.2.2.2 Successful Operation

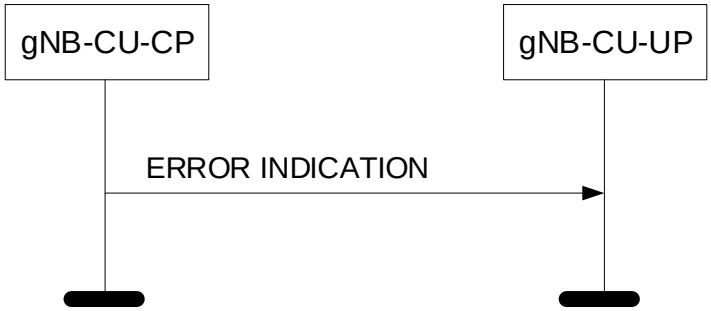

Figure 8.2.2.2-1: Error Indication procedure, gNB-CU-CP originated. Successful operation.

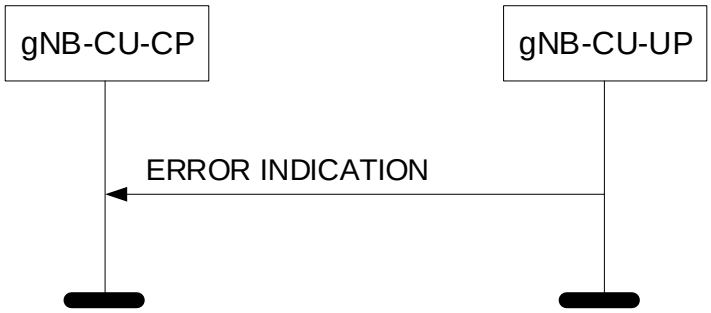

Figure 8.2.2.2-2: Error Indication procedure, gNB-CU-UP originated. Successful operation.

When the conditions defined in clause 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the receiving node.

The ERROR INDICATION message shall contain at least either the *Cause* IE or the *Criticality Diagnostics* IE. In case the Error Indication procedure is triggered by utilising UE associated signalling the *gNB-CU-CP UE E1AP ID* IE and *gNB-CU-UP UE E1AP ID* IE shall be included in the ERROR INDICATION message. If one or both of the *gNB-CU-CP UE E1AP ID* IE and the *gNB-CU-UP UE E1AP ID* IE are not correct, the cause shall be set to appropriate value, e.g., "Unknown or already allocated gNB-CU-CP UE E1AP ID", "Unknown or already allocated gNB-CU-UP UE E1AP ID" or "Unknown or inconsistent pair of UE E1AP ID".

8.2.2.3 Abnormal Conditions

Not applicable.

8.2.3 gNB-CU-UP E1 Setup

8.2.3.1 General

The purpose of the gNB-CU-UP E1 Setup procedure is to exchange application level data needed for the gNB-CU-UP and the gNB-CU-CP to correctly interoperate on the E1 interface. If the gNB-CU-UP initiates the first TNL association, it shall also initiate the gNB-CU-UP E1 Setup procedure. The procedure uses non-UE associated signalling.

This procedure erases any existing application level configuration data in the two nodes and replaces it by the one received. This procedure also re-initialises the E1AP UE-related contexts (if any) and erases all related signalling connections in the two nodes like a Reset procedure would do.

8.2.3.2 Successful Operation

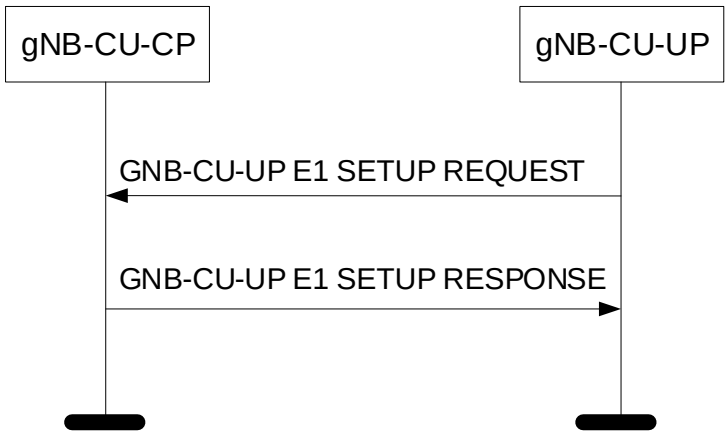

Figure 8.2.3.2-1: gNB-CU-UP E1 Setup procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending a GNB-CU-UP E1 SETUP REQUEST message including the appropriate data to the gNB-CU-CP. The gNB-CU-CP responds with a GNB-CU-UP E1 SETUP RESPONSE message including the appropriate data.

If the GNB-CU-UP E1 SETUP REQUEST message contains the *gNB-CU-UP Name* IE the gNB-CU-CP may use this IE as a human readable name of the gNB-CU-UP.

If the *Slice Support List* IE is contained in the GNB-CU-UP E1 SETUP REQUEST message, the gNB-CU-CP shall store the corresponding information and it may take it into account for bearer context establishment.

If the *NR CGI Support List* IE is contained in the GNB-CU-UP E1 SETUP REQUEST message, the gNB-CU-CP shall store the corresponding information and it may take it into account for bearer context establishment.

If the *QoS Parameters Support List* IE is contained in the GNB-CU-UP E1 SETUP REQUEST message, the gNB-CU-CP shall store the corresponding information and it may take it into account for bearer context establishment.

The exchanged data shall be stored in respective node and used as long as there is an operational TNL association. When this procedure is finished, the E1 interface is operational and other E1 messages can be exchanged.

If the *gNB-CU-UP Capacity* IE is contained in the GNB-CU-UP E1 SETUP REQUEST message, the gNB-CU-CP shall take this IE into account.

8.2.3.3 Unsuccessful Operation

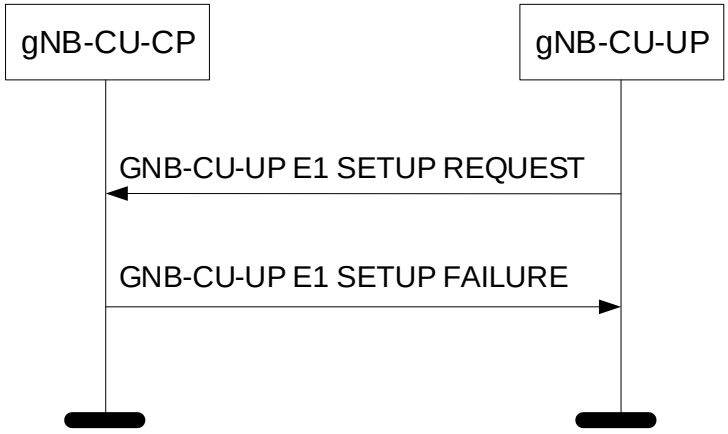

Figure 8.2.3.3-1: gNB-CU-UP E1 Setup procedure: Unsuccessful Operation.

If the gNB-CU-CP cannot accept the setup, it shall respond with a GNB-CU-UP E1 SETUP FAILURE and appropriate cause value.

If the GNB-CU-UP E1 SETUP FAILURE message includes the *Time To Wait* IE, the gNB-CU-UP shall wait at least for the indicated time before reinitiating the E1 setup towards the same gNB-CU-CP.

8.2.3.4 Abnormal Conditions

If the first message received for a specific TNL association is not a GNB-CU-CP E1 SETUP REQUEST, GNB-CU-UP E1 SETUP RESPONSE, or GNB-CU-UP E1 SETUP FAILURE message then this shall be treated as a logical error.

If the gNB-CU-UP does not receive either GNB-CU-UP E1 SETUP RESPONSE message or GNB-CU-UP E1 SETUP FAILURE message, the gNB-CU-UP may reinitiate the gNB-CU-UP E1 Setup procedure towards the same gNB-CU-CP, provided that the content of the new GNB-CU-UP E1 SETUP REQUEST message is identical to the content of the previously unacknowledged GNB-CU-UP E1 SETUP REQUEST message.

If the gNB-CU-UP receives a GNB-CU-CP E1 SETUP REQUEST message from the peer entity on the same E1 interface:

- In case the gNB-CU-UP answers with a GNB-CU-CP E1 SETUP RESPONSE message and receives a subsequent GNB-CU-UP E1 SETUP FAILURE message, the gNB-CU-UP shall consider the E1 interface as non operational and the procedure as unsuccessfully terminated according to sub clause 8.2.3.3.

- In case the gNB-CU-UP answers with a GNB-CU-CP E1 SETUP FAILURE message and receives a subsequent GNB-CU-UP E1 SETUP RESPONSE message, the gNB-CU-UP shall ignore the GNB-CU-UP E1 SETUP RESPONSE message and consider the E1 interface as non operational.

8.2.4 gNB-CU-CP E1 Setup

8.2.4.1 General

The purpose of the gNB-CU-CP E1 Setup procedure is to exchange application level data needed for the gNB-CU-CP and the gNB-CU-UP to correctly interoperate on the E1 interface. If the gNB-CU-CP initiates the first TNL association, it shall also initiate the gNB-CU-CP E1 Setup procedure.The procedure uses non-UE associated signalling.

This procedure erases any existing application level configuration data in the two nodes and replaces it by the one received. This procedure also re-initialises the E1AP UE-related contexts (if any) and erases all related signalling connections in the two nodes like a Reset procedure would do.

8.2.4.2 Successful Operation

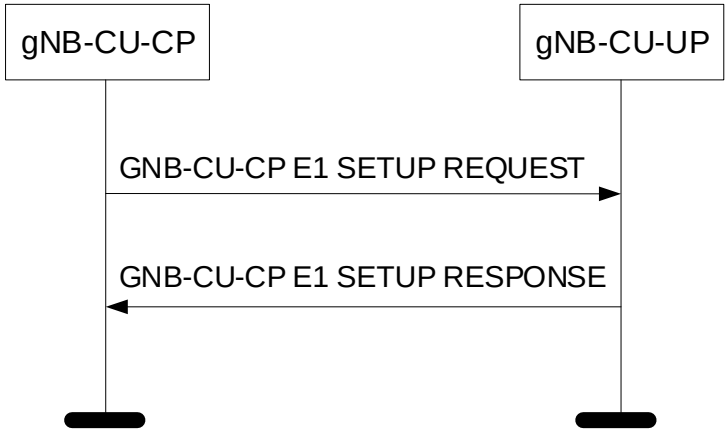

Figure 8.2.4.2-1: gNB-CU-CP E1 Setup procedure: Successful Operation.

The gNB-CU-CP initiates the procedure by sending a GNB-CU-CP E1 SETUP REQUEST message including the appropriate data to the gNB-CU-UP. The gNB-CU-UP responds with a GNB-CU-CP E1 SETUP RESPONSE message including the appropriate data.

If the GNB-CU-CP E1 SETUP REQUEST message contains the *gNB-CU-CP Name* IE the gNB-CU-UP may use this IE as a human readable name of the gNB-CU-CP.

The exchanged data shall be stored in respective node and used as long as there is an operational TNL association. When this procedure is finished, the E1 interface is operational and other E1 messages can be exchanged.

If the *gNB-CU-UP Capacity* IE is contained in the GNB-CU-CP E1 SETUP RESPONSE message, the gNB-CU-CP shall take this IE into account.

8.2.4.3 Unsuccessful Operation

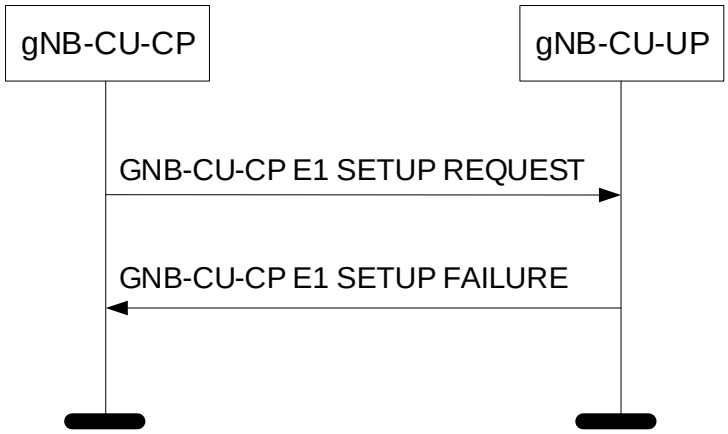

Figure 8.2.4.3-1: gNB-CU-CP E1 Setup procedure: Unsuccessful Operation.

If the gNB-CU-UP cannot accept the setup, it shall respond with a GNB-CU-CP E1 SETUP FAILURE and appropriate cause value.

If the GNB-CU-CP E1 SETUP FAILURE message includes the *Time To Wait* IE, the gNB-CU-CP shall wait at least for the indicated time before reinitiating the E1 setup towards the same gNB-CU-UP.

8.2.4.4 Abnormal Conditions

If the first message received for a specific TNL association is not a GNB-CU-UP E1 SETUP REQUEST, GNB-CU-CP E1 SETUP RESPONSE, or GNB-CU-CP E1 SETUP FAILURE message then this shall be treated as a logical error.

If the gNB-CU-CP does not receive either GNB-CU-CP E1 SETUP RESPONSE message or GNB-CU-CP E1 SETUP FAILURE message, the gNB-CU-CP may reinitiate the gNB-CU-CP E1 Setup procedure towards the same gNB-CU-UP, provided that the content of the new GNB-CU-CP E1 SETUP REQUEST message is identical to the content of the previously unacknowledged GNB-CU-CP E1 SETUP REQUEST message.

If the gNB-CU-CP receives a GNB-CU-UP E1 SETUP REQUEST message from the peer entity on the same E1 interface:

- In case the gNB-CU-CP answers with a GNB-CU-UP E1 SETUP RESPONSE message and receives a subsequent GNB-CU-CP E1 SETUP FAILURE message, the gNB-CU-CP shall consider the E1 interface as non operational and the procedure as unsuccessfully terminated according to sub clause 8.2.4.3.

- In case the gNB-CU-CP answers with a GNB-CU-UP E1 SETUP FAILURE message and receives a subsequent GNB-CU-CP E1 SETUP RESPONSE message, the gNB-CU-CP shall ignore the GNB-CU-CP E1 SETUP RESPONSE message and consider the E1 interface as non operational.

8.2.5 gNB-CU-UP Configuration Update

8.2.5.1 General

The purpose of the gNB-CU-UP Configuration Update procedure is to update application level configuration data needed for the gNB-CU-UP and the gNB-CU-CP to interoperate correctly on the E1 interface. This procedure does not affect existing UE-related contexts, if any. The procedure uses non-UE associated signalling.

8.2.5.2 Successful Operation

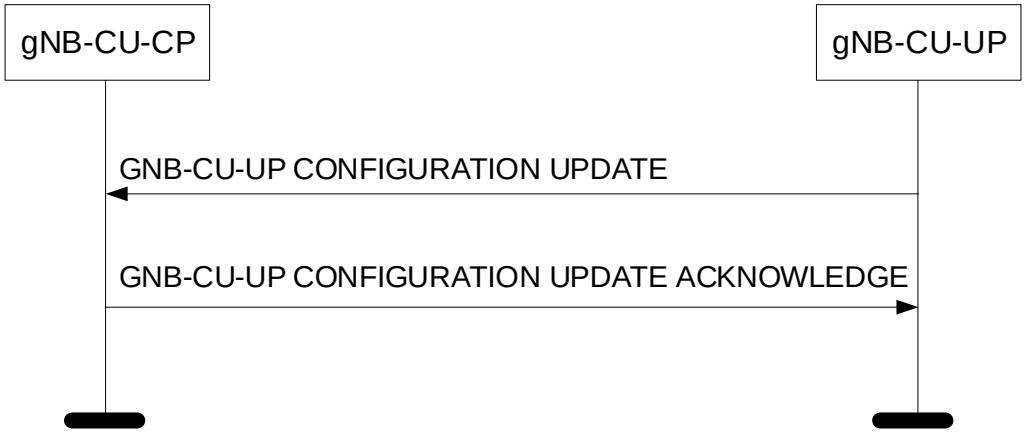

Figure 8.2.5.2-1: gNB-CU-UP Configuration Update procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending a GNB-CU-UP CONFIGURATION UPDATE message to the gNB-CU-CP including an appropriate set of updated configuration data that it has just taken into operational use. The gNB-CU-CP responds with GNB-CU-UP CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data. If an information element is not included in the GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall interpret that the corresponding configuration data is not changed and shall continue to operate with the existing related configuration data.

If the *Supported PLMNs* IE is included in the GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall overwrite the whole list of information and store the corresponding information.

- If the *Slice Support List* IE is contained in the GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall store the corresponding information and replace any existing information.

- If the *NR CGI Support List* IE is contained in the GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall store the corresponding information and replace any existing information.

- If the *QoS Parameters Support List* IE is contained in the GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall store the corresponding information and replace any existing information.

The updated configuration data shall be stored in both nodes and used as long as there is an operational TNL association or until any further update is performed.

If the *gNB-CU-UP Capacity* IE is contained in the GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall take this IE into account.

If the *gNB-CU-UP ID* IE is included in the GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall associate the TNLA to the E1 interface instance using the gNB-CU-UP ID.

If the GNB-CU-UP CONFIGURATION UPDATE message includes *gNB-CU-UP TNLA To Remove List* IE, and the *Endpoint IP address* IE and the *Port Number* IE for both TNL endpoints of the TNL association(s) are included in the *gNB-CU-UP TNLA To Remove List* IE, the gNB-CU-CP shall, if supported, consider that the TNL association(s) indicated by both received TNL endpoints will be removed by the gNB-CU-UP. If the *Endpoint IP address* IE, or the *Endpoint IP address* IE and the *Port Number* IE for one or both of the TNL endpoints is included in the *gNB-CU-UP TNLA To Remove List* IE in GNB-CU-UP CONFIGURATION UPDATE message, the gNB-CU-CP shall, if supported, consider that the TNL association(s) indicated by the received endpoint IP address(es) will be removed by the gNB-CU-UP.

8.2.5.3 Unsuccessful Operation

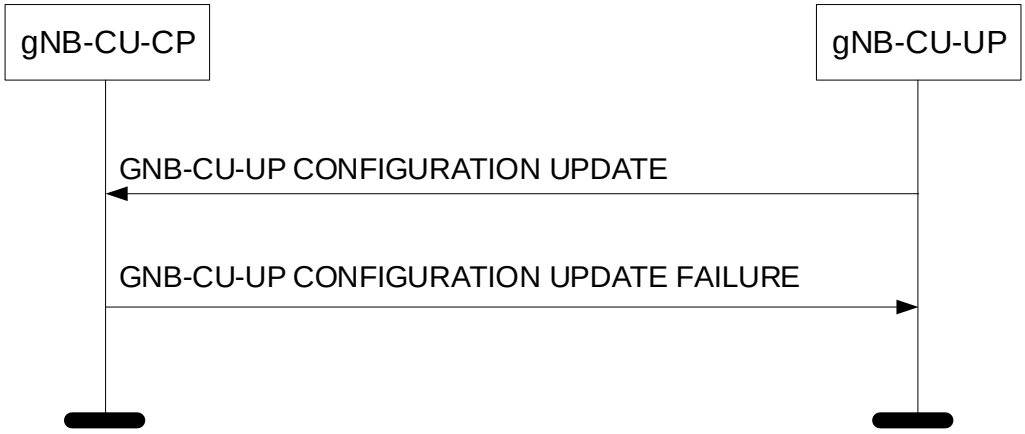

Figure 8.2.5.3-1: gNB-CU-UP Configuration Update procedure: Unsuccessful Operation.

If the gNB-CU-CP cannot accept the update, it shall respond with a GNB-CU-UP CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the GNB-CU-UP CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE, the gNB-CU-CP shall wait at least for the indicated time before reinitiating the GNB-CU-UP CONFIGURATION UPDATE message towards the same gNB-CU-CP.

8.2.5.4 Abnormal Conditions

Not applicable.

8.2.6 gNB-CU-CP Configuration Update

8.2.6.1 General

The purpose of the gNB-CU-CP Configuration Update procedure is to update application level configuration data needed for the gNB-CU-CP and the gNB-CU-UP to interoperate correctly on the E1 interface. This procedure does not affect existing UE-related contexts, if any. The procedure uses non-UE associated signalling.

8.2.6.2 Successful Operation

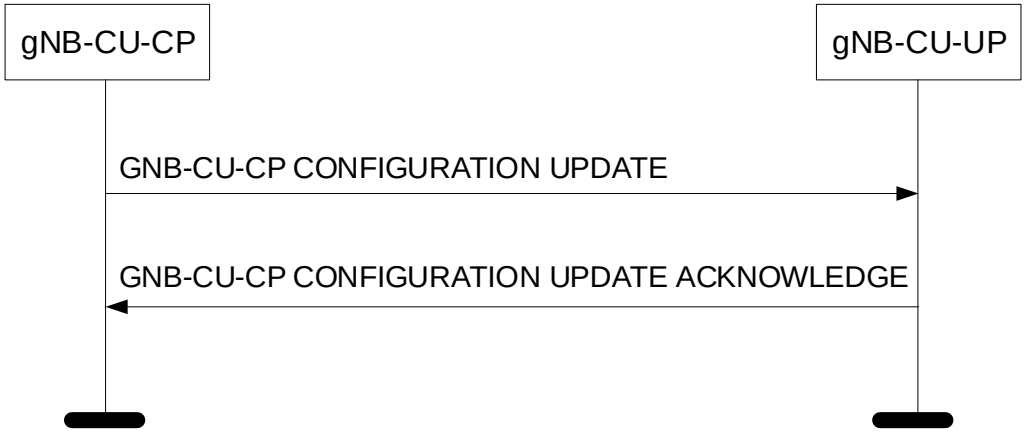

Figure 8.2.6.2-1: gNB-CU-CP Configuration Update procedure: Successful Operation.

The gNB-CU-CP initiates the procedure by sending a GNB-CU-CP CONFIGURATION UPDATE message to the gNB-CU-UP including an appropriate set of updated configuration data that it has just taken into operational use. The gNB-CU-UP responds with GNB-CU-CP CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data. If an information element is not included in the GNB-CU-CP CONFIGURATION UPDATE message, the gNB-CU-UP shall interpret that the corresponding configuration data is not changed and shall continue to operate with the existing related configuration data.

The updated configuration data shall be stored in both nodes and used as long as there is an operational TNL association or until any further update is performed.

If the *gNB-CU-CP TNLA To Add List* IE is contained in the gNB-CU-CP CONFIGURATION UPDATE message, the gNB-CU-UP shall, if supported, use it to establish the TNL association(s) with the gNB-CU-CP. The gNB-CU-UP shall report to the gNB-CU-CP, in the gNB-CU-CP CONFIGURATION UPDATE ACKNOWLEDGE message, the successful establishment of the TNL association(s) with the gNB-CU-CP as follows:

- A list of TNL address(es) with which the gNB-CU-UP successfully established the TNL association shall be included in the *gNB-CU-CP TNLA Setup List* IE;

- A list of TNL address(es) with which the gNB-CU-UP failed to establish the TNL association shall be included in the *gNB-CU-CP TNLA Failed To Setup List* IE.

If the GNB-CU-CP CONFIGURATION UPDATE message includes *gNB-CU-CP TNLA To Remove List* IE, and the *Endpoint IP address* IE and the *Port Number* IE for both TNL endpoints of the TNL association(s) are included in the *gNB-CU-CP TNLA To Remove List* IE, the gNB-CU-UP shall, if supported, initiate removal of the TNL association(s) indicated by both received TNL endpoints towards the gNB-CU-CP. If the *Endpoint IP address* IE, or the *Endpoint IP address* IE and the *Port Number* IE for one or both of the TNL endpoints is included in the *gNB-CU-CP TNLA To Remove List* IE, the gNB-CU-UP shall, if supported, initiate removal of the TNL association(s) indicated by the received endpoint IP address(es).

If the *gNB-CU-CP TNLA To Update List* IE is contained in the gNB-CU-CP CONFIGURATION UPDATE message the gNB-CU-UP shall, if supported, overwrite the previously stored information for the related TNL association.

If the *TNLA Usage* IE is included in the *gNB-CU-CP TNLA To Add List* IE or the *gNB-CU-CP TNLA To Update List* IE in the gNB-CU-CP CONFIGURATION UPDATE message, the gNB-CU-UP shall, if supported, use it as described in TS 38.462 [18].

8.2.6.3 Unsuccessful Operation

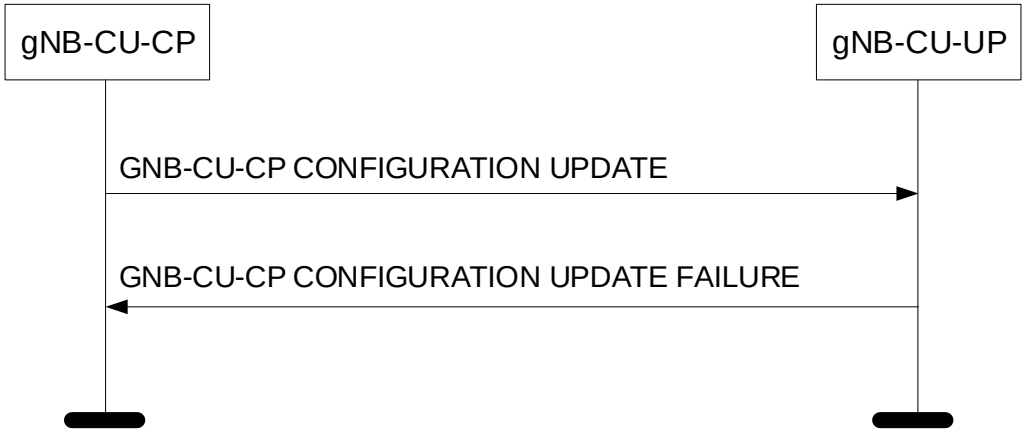

Figure 8.2.6.3-1: gNB-CU-CP Configuration Update procedure: Unsuccessful Operation.

If the gNB-CU-UP cannot accept the update, it shall respond with a GNB-CU-CP CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the GNB-CU-CP CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE, the gNB-CU-CP shall wait at least for the indicated time before reinitiating the GNB-CU-CP CONFIGURATION UPDATE message towards the same gNB-CU-UP.

8.2.6.4 Abnormal Conditions

Not applicable.

8.2.7 E1 Release

8.2.7.1 General

The purpose of the E1 Release procedure is to release all existing signalling connections and related application level data. This procedure does not affect existing UE-related contexts, if any. The procedure uses non-UE associated signalling.

8.2.7.2 Successful Operation

8.2.7.2.1 E1 Release Procedure Initiated from the gNB-CU-CP

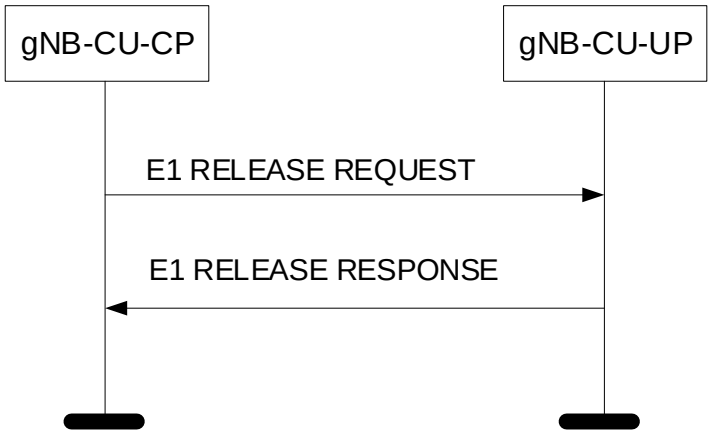

Figure 8.2.7.2.1-1: E1 Release procedure initiated from the gNB-CU-CP. Successful operation.

The gNB-CU-CP initiates the procedure by sending the E1 RELEASE REQUEST message to the gNB-CU-UP.

Upon reception of the E1 RELEASE REQUEST message, the gNB-CU-UP shall release any existing resources related to the E1 interface. The gNB-CU-UP shall respond with a E1 RELEASE RESPONSE message to confirm that it has initiated the release of the resources, if existing, and that the signalling connection for the E1AP application protocol is released.

8.2.7.2.2 E1 Release Procedure Initiated from the gNB-CU-UP

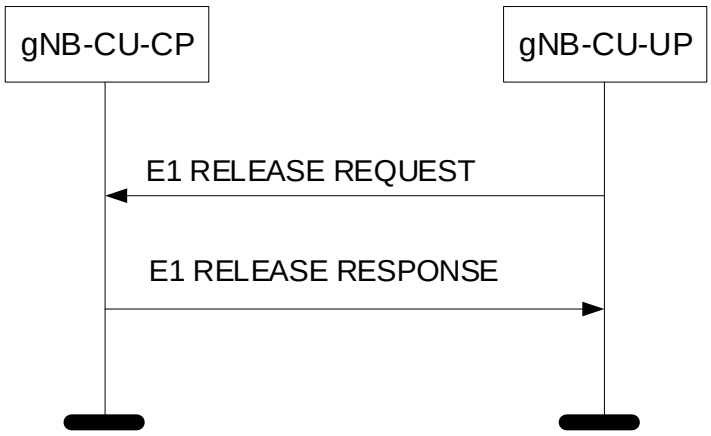

Figure 8.2.7.2.2-1: E1 Release procedure initiated from the gNB-CU-UP. Successful operation.

The gNB-CU-UP initiates the procedure by sending the E1 RELEASE REQUEST message to the gNB-CU-CP.

Upon reception of the E1 RELEASE REQUEST message, the gNB-CU-CP shall release any existing resources related to the E1 interface. The gNB-CU-CP shall respond with a E1 RELEASE RESPONSE message to confirm that it has initiated the release of the resources, if existing, and that the signalling connection for the E1AP application protocol is released.

8.2.7.3 Abnormal Conditions

Not applicable.

8.2.8 gNB-CU-UP Status Indication

8.2.8.1 General

The purpose of the gNB-CU-UP Status Indication procedure is to inform the gNB-CU-CP that the gNB-CU-UP is overloaded so that overload reduction actions can be applied. The procedure uses non-UE associated signalling.

8.2.8.2 Successful Operation

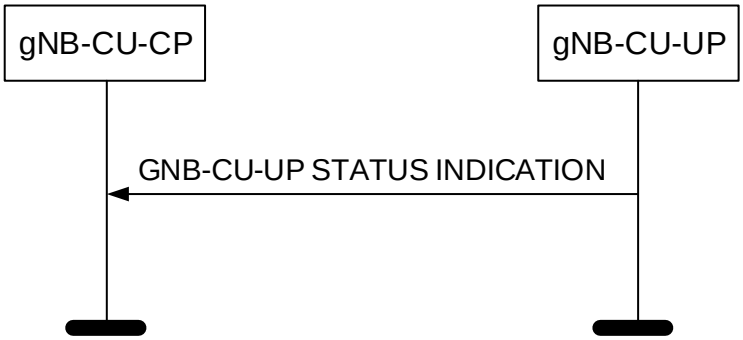

Figure 8.3.7.2-1: DL Data Notification procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the GNB-CU-UP STATUS INDICATION message to the gNB-CU-CP.

If the *gNB-CU-UP Overload Information* IE in the GNB-CU-UP STATUS INDICATION message indicates that the gNB-CU-UP is overloaded, the gNB-CU-CP shall apply overload reduction actions until informed, with a new GNB-CU-UP STATUS INDICATION message, that the overload situation has ceased.

The detailed overload reduction policy is up to gNB-CU-CP implementation.

8.2.8.3 Abnormal Conditions

Not applicable.

8.3 Bearer Context Management procedures

8.3.1 Bearer Context Setup

8.3.1.1 General

The purpose of the Bearer Context Setup procedure is to allow the gNB-CU-CP to establish a bearer context in the gNB-CU-UP. The procedure uses UE-associated signalling.

8.3.1.2 Successful Operation

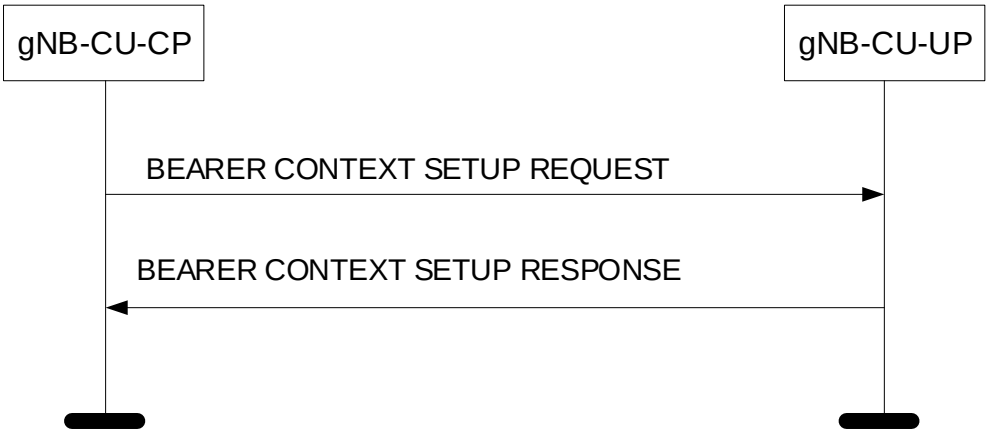

Figure 8.3.1.2-1: Bearer Context Setup procedure: Successful Operation.

The gNB-CU-CP initiates the procedure by sending the BEARER CONTEXT SETUP REQUEST message to the gNB-CU-UP. If the gNB-CU-UP succeeds to establish the requested resources, it replies to the gNB-CU-CP with the BEARER CONTEXT SETUP RESPONSE message.

The gNB-CU-UP shall report to the gNB-CU-CP, in the BEARER CONTEXT SETUP RESPONSE message, the result for all the requested resources in the following way:

For E-UTRAN:

- A list of DRBs which are successfully established shall be included in the *DRB Setup List* IE;
- A list of DRBs which failed to be established shall be included in the *DRB Failed List* IE;

For NG-RAN:

- A list of PDU Session Resources which are successfully established shall be included in the *PDU Session Resource Setup List* IE;
- A list of PDU Session Resources which failed to be established shall be included in the *PDU Session Resource Failed List* IE;
- For each established PDU Session Resource, a list of DRBs which are successfully established shall be included in the *DRB Setup List* IE;
- For each established PDU Session Resource, a list of DRBs which failed to be established shall be included in the *DRB Failed List* IE;
- For each established DRB, a list of QoS Flows which are successfully established shall be included in the *Flow Setup List* IE;
- For each established DRB, a list of QoS Flows which failed to be established shall be included in the *Flow Failed List* IE;

When the gNB-CU-UP reports the unsuccessful establishment of a PDU Session Resource, DRB or QoS Flow the cause value should be precise enough to enable the gNB-CU-CP to know the reason for the unsuccessful establishment.

If the *Existing Allocated S1 DL UP Transport Layer Information* IE or the *Existing Allocated NG DL UP Transport Layer Information* IE is contained in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP may re-use the indicated resources already allocated for this bearer context. If the gNB-CU-UP decides to re-use the indicated resources, it shall include the *S1 DL UP Unchanged* IE or the *NG DL UP Unchanged* IE in the BEARER CONTEXT SETUP RESPONSE message.

If the *PDU Session Resource DL Aggregate Maximum Bit Rate* IE is contained in the *PDU Session Resource To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall store and use the information for the down link traffic policing for the Non-GBR QoS flows for the concerned UE as specified in TS 23.501 [20].

If the *Data Forwarding Information Request* IE, *PDU Session Data Forwarding Information Request* IE or the *DRB Data Forwarding Information Request* IE are included in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall include the requested forwarding information in the *Data Forwarding Information Response* IE, *PDU Session Data Forwarding Information Response* IE or the *DRB Data Forwarding Information Response* IE in the BEARER CONTEXT SETUP RESPONSE message.

If the *DL UP Parameters* IE is contained in the *DRB To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall configure the corresponding information.

For each PDU session for which the *Security Indication* IE is included in the *PDU Session Resource To Setup List* IE of the BEARER CONTEXT SETUP REQUEST message, and the *Integrity Protection Indication* IE or *Confidentiality Protection Indication* IE is set to "preferred", then the gNB-CU-UP should, if supported, perform user plane integrity protection or ciphering, respectively, for the concerned PDU session and shall notify whether it performed the user plane integrity protection or ciphering by including the *Integrity Protection Result* IE or *Confidentiality Protection Result* IE, respectively, in the *PDU Session Resource Setup List* IE of the BEARER CONTEXT SETUP RESPONSE message.

For each PDU session for which the *Security Indication* IE is included in the *PDU Session Resource To Setup List* IE of the BEARER CONTEXT SETUP REQUEST message, and the *Integrity Protection Indication* IE or *Confidentiality Protection Indication* IE is set to "required", then the gNB-CU-UP shall perform user plane integrity protection or ciphering, respectively, for the concerned PDU Session. If the gNB-CU-UP cannot perform the user plane integrity protection or ciphering, it shall reject the setup of the PDU Session Resources with an appropriate cause value.

For each PDU session for which the *Security Indication* IE is included in the *PDU Session Resource To Setup List* IE of the BEARER CONTEXT SETUP REQUEST message:

- if the *Integrity Protection Indication* IE is set to "not needed", then the gNB-CU-UP shall not perform user plane integrity protection for the concerned PDU session;

- if the *Confidentiality Protection Indication* IE is set to "not needed", then the gNB-CU-UP shall not perform user plane ciphering for the concerned PDU session.

If the *UE DL Maximum Integrity Protected Data Rate* IE is contained in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall use this value when enforcing the maximum integrity protected data rate for the UE.

If the *Bearer Context Status Change* IE is contained in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall consider the UE RRC state and act as specified in TS 38.401 [2].

For each requested DRB, if the *PDCP Duplication* IE is included in the *PDCP Configuration* IE contained in the BEARER CONTEXT SETUP REQUEST message, and one cell group is included in *Cell Group Information* IE, then the gNB-CU-UP shall include two *UP Transport Layer Information* IEs in the BEARER CONTEXT SETUP RESPONSE message to support packet duplication for intra-gNB-DU CA. The first *UP Transport Layer Information* IE of the two *UP Transport Layer Information* IEs is for the primary path.

If the *PDCP SN Status Information* IE is contained within the *DRB To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall take it into account and act as specified in TS 38.401 [2].

If the *QoS Flow Mapping Indication* IE is contained in the *QoS Flows Information To Be Setup* IE within the *DRB To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP may take it into account that only the uplink or downlink QoS flow is mapped to the DRB.

For each PDU Session Resource, if the *Network Instance* IE is included in the *PDU Session Resource To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message and the *Common Network Instance* IE is not included, the gNB-CU-UP shall, if supported, use it when selecting transport network resource as specified in TS 23.501 [20].

For each PDU session, if the *Common Network Instance* IE is included in the *PDU Session Resource To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall, if supported, use it when selecting transport network resource as specified in TS 23.501 [20].

If *UE Inactivity Timer* IE or *PDU session Inactivity Timer* IE or *DRB Inactivity Timer* IE is contained in BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall take it into account when perform inactivity monitoring.

If the *DRB QoS* IE is contained within the *DRB To Setup List* IE in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall, if supported, take it into account as specified in TS 28.552 [22].

If the *gNB-DU-ID* IE is contained in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall store the information received.

If the *RAN UE ID* IE is contained in the BEARER CONTEXT SETUP REQUEST message, the gNB-CU-UP shall store the information received.

For each successfully established DRB, the gNB-CU-UP shall provide, in the respective *UL UP Parameters* IE of the BEARER CONTEXT SETUP RESPONSE, one UL UP Transport Layer Information Item per cell group entry contained in the respective *Cell Group Information* IE of the BEARER CONTEXT SETUP REQUEST message.

8.3.1.3 Unsuccessful Operation

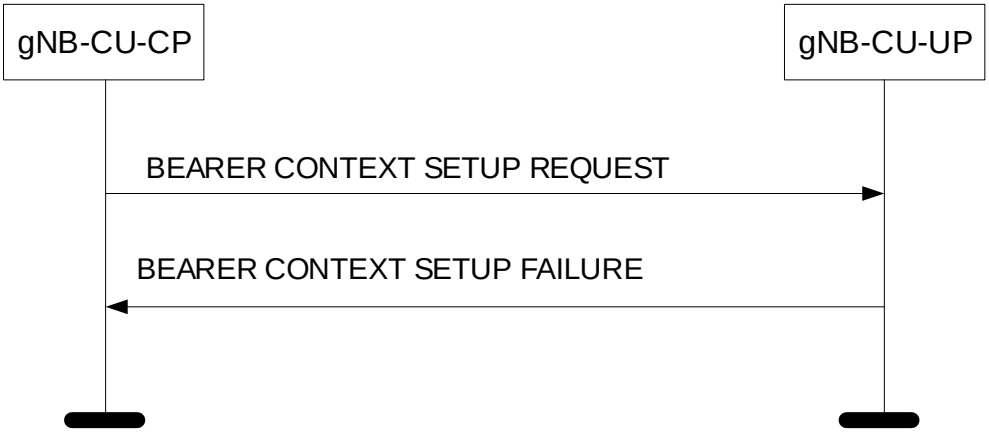

Figure 8.3.1.3-1: Bearer Context Setup procedure: Unsuccessful Operation.

If the gNB-CU-UP cannot establish the requested bearer context, or cannot even establish one bearer it shall consider the procedure as failed and respond with a BEARER CONTEXT SETUP FAILURE message and appropriate cause value.

8.3.1.4 Abnormal Conditions

If the gNB-CU-UP receives a BEARER CONTEXT SETUP REQUEST message containing a *E-UTRAN QoS* IE in the *DRB To Setup List* IE for a GBR QoS DRB but where the *GBR QoS Information* IE is not present, the gNB-CU-UP shall report the establishment of the corresponding DRB as failed in the *DRB Failed List* IE of the BEARER CONTEXT SETUP RESPONSE message with an appropriate cause value.

If the gNB-CU-UP receives a BEARER CONTEXT SETUP REQUEST message containing a *QoS Flow Level QoS Parameters* IE in the *PDU Session Resource To Setup List* IE for a GBR QoS Flow but where the *GBR QoS Flow Information* IE is not present, the gNB-CU-UP shall report the establishment of the corresponding QoS Flow as failed in the corresponding *Flow Failed List* IE of the BEARER CONTEXT SETUP RESPONSE message with an appropriate cause value.

8.3.2 Bearer Context Modification (gNB-CU-CP initiated)

8.3.2.1 General

The purpose of the Bearer Context Modification procedure is to allow the gNB-CU-CP to modify a bearer context in the gNB-CU-UP. The procedure uses UE-associated signalling.

8.3.2.2 Successful Operation

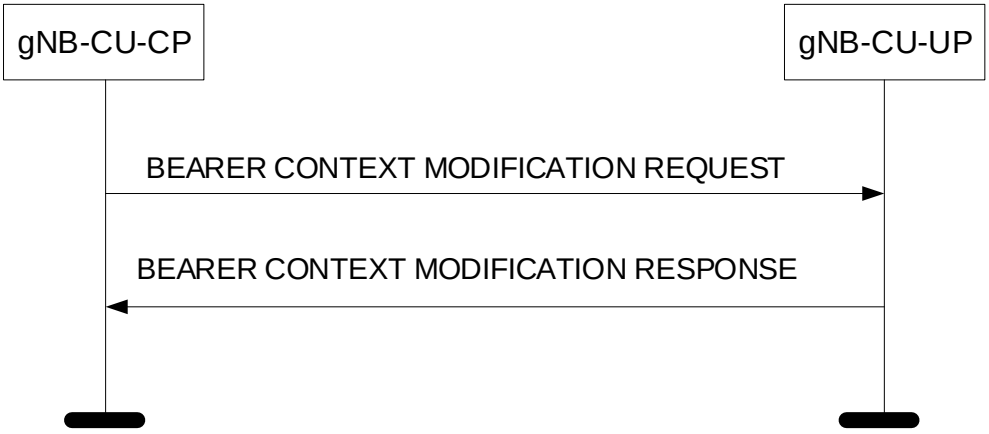

Figure 8.3.2.2-1: Bearer Context Modification procedure: Successful Operation.

The gNB-CU-CP initiates the procedure by sending the BEARER CONTEXT MODIFICATION REQUEST message to the gNB-CU-UP. If the gNB-CU-UP succeeds to modify the bearer context, it replies to the gNB-CU-CP with the BEARER CONTEXT MODIFICATION RESPONSE message.

The gNB-CU-UP shall report to the gNB-CU-CP, in the BEARER CONTEXT MODIFICATION RESPONSE message, the result for all the requested resources in the following way:

For E-UTRAN:

- A list of DRBs which are successfully established shall be included in the *DRB Setup List* IE;
- A list of DRBs which failed to be established shall be included in the *DRB Failed List* IE;
- A list of DRBs which are successfully modified shall be included in the *DRB Modified List* IE;
- A list of DRBs which failed to be modified shall be included in the *DRB Failed To Modify List* IE;

For NG-RAN:

- A list of PDU Session Resources which are successfully established shall be included in the *PDU Session Resource Setup List* IE;
- A list of PDU Session Resources which failed to be established shall be included in the *PDU Session Resource Failed List* IE;
- A list of PDU Session Resources which are successfully modified shall be included in the *PDU Session Resource Modified List* IE;
- A list of PDU Session Resources which failed to be modified shall be included in the *PDU Session Resource Failed To Modify List* IE;
- For each successfully established or modified PDU Session Resource, a list of DRBs which are successfully established shall be included in the *DRB Setup List* IE;
- For each successfully established or modified PDU Session Resource, a list of DRBs which failed to be established shall be included in the *DRB Failed List* IE;
- For each successfully modified PDU Session Resource, a list of DRBs which are successfully modified shall be included in the *DRB Modified List* IE;
- For each successfully modified PDU Session Resource, a list of DRBs which failed to be modified shall be included in the *DRB Failed To Modify List* IE;
- For each successfully established or modified DRB, a list of QoS Flows which are successfully established shall be included in the *Flow Setup List* IE;

- For each successfully established or modified DRB, a list of QoS Flows which failed to be established shall be included in the *Flow Failed List* IE;

When the gNB-CU-UP reports the unsuccessful establishment of a PDU Session Resource, DRB or QoS Flow the cause value should be precise enough to enable the gNB-CU-CP to know the reason for the unsuccessful establishment.

If the *Security Information* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

If the *UE DL Aggregate Maximum Bit Rate* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

If the *UE DL Maximum Integrity Protected Data Rate* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

If the *Bearer Context Status Change* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall consider the UE RRC state and act as specified in TS 38.401 [2].

If the *Data Forwarding Information Request* IE, *PDU Session Data Forwarding Information Request* IE or the *DRB Data Forwarding Information Request* IE are included in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall include the requested forwarding information in the *Data Forwarding Information Response* IE, *PDU Session Data Forwarding Information Response* IE or the *DRB Data Forwarding Information Response* IE in the BEARER CONTEXT MODIFICATION RESPONSE message.

If the *PDCP Configuration* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information, except for the *PDCP SN UL Size* IE, the *PDCP SN DL Size* IE and the *RLC mode* IE which shall be ignored.

If the *E-UTRAN QoS* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

If the *PDCP SN Status Request* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall include the *UL COUNT Value* IE and the *DL COUNT Value* IE in the BEARER CONTEXT MODIFICATION RESPONSE message.

If the *PDCP SN Status Information* IE is contained in the *DRB To Setup List* IE or the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall take it into account and act as specified in TS 38.401 [2].

If the *DL UP Parameters* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

If the *Cell Group To Add* IE or the *Cell Group To Modify* IE or the *Cell Group To Remove* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall add or modify or remove the corresponding cell group.

If the *PDU Session Resource DL Aggregate Maximum Bit Rate* IE is contained in the *PDU Session Resource To Setup List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall replace the information in the UE context and use it when enforcing downlink traffic policing for the non GBR QoS flows for the concerned UE, as specified in TS 23.501 [20].

If the *PDU Session Resource DL Aggregate Maximum Bit Rate* IE is contained in the *PDU Session Resource To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

If the *SDAP Configuration* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

If the *Flow Mapping Information* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall update the corresponding information.

For each requested DRB, if the *PDCP Duplication* IE is included in the *PDCP Configuration* IE contained in the BEARER CONTEXT MODIFICATION REQUEST message, and one cell group is included in *Cell Group Information* IE, then the gNB-CU-CP shall include two *UP Transport Layer Information* IEs in the BEARER CONTEXT MODIFICATION REQUEST message, and the gNB-CU-UP shall also include two *UP Transport Layer Information*

IEs in the BEARER CONTEXT MODIFICATION RESPONSE message to support packet duplication for intra-gNB-DU CA. The first *UP Transport Layer Information* IE of the two *UP Transport Layer Information* IEs is for the primary path.

For a certain DRB which was allocated with two GTP-U tunnels, if such DRB is modified and given one GTP-U tunnel via the Bearer Context Modification (gNB-CU-CP initiated) procedure, i.e. only one UP Transport Layer Information per Cell Group ID is present in *DL UP Parameters* IE for the concerned DRB, then the gNB-CU-UP shall consider that PDCP duplication is deconfigured for this DRB. If such Bearer Context Modification (gNB-CU-CP initiated) procedure occurs, the *Duplication Activation* IE shall not be included for the concerned DRB.

If the *New UL TNL Information Required* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall include the new UP Transport Layer Information in the BEARER CONTEXT MODIFICATION RESPONSE message.

For each PDU session for which the *Security Indication* IE is included in the *PDU Session Resource To Setup List* IE of the BEARER CONTEXT MODIFICATION REQUEST message, and the *Integrity Protection Indication* IE or *Confidentiality Protection Indication* IE is set to "preferred", then the gNB-CU-UP should, if supported, perform user plane integrity protection or ciphering, respectively, for the concerned PDU session and shall notify whether it performed the user plane integrity protection or ciphering by including the *Integrity Protection Result* IE or *Confidentiality Protection Result* IE, respectively, in the *PDU Session Resource Setup List* IE of the BEARER CONTEXT MODIFICATION RESPONSE message.

For each PDU session for which the *Security Indication* IE is included in the *PDU Session Resource To Setup List* IE of the BEARER CONTEXT MODIFICATION REQUEST message, and the *Integrity Protection Indication* IE or *Confidentiality Protection Indication* IE is set to "required", then the gNB-CU-UP shall perform user plane integrity protection or ciphering, respectively, for the concerned PDU Session. If the gNB-CU-UP cannot perform the user plane integrity protection or ciphering, it shall reject the setup of the PDU Session Resources with an appropriate cause value.

For each PDU session for which the Security Indication IE is included in the *PDU Session Resource To Setup List* of the BEARER CONTEXT MODIFICATION REQUEST message:

- if the *Integrity Protection Indication* IE is set to "not needed", then the gNB-CU-UP shall not perform user plane integrity protection for the concerned PDU session;

- if the *Confidentiality Protection Indication* IE is set to "not needed", then the gNB-CU-UP shall not perform user plane ciphering for the concerned PDU session.

For each PDU Session Resource, if the *Network Instance* IE is included in the *PDU Session Resource To Setup List* IE or the *PDU Session Resource To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message and the *Common Network Instance* IE is not included, the gNB-CU-UP shall, if supported, use it when selecting transport network resource as specified in TS 23.501 [20].

For each PDU session, if the *Common Network Instance* IE is included in the *PDU Session Resource To Setup List* IE or the *PDU Session Resource To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall, if supported, use it when selecting transport network resource as specified in TS 23.501 [20].

If the *QoS Flow Mapping Indication* IE is contained in the *QoS Flow QoS Parameters List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall, if supported, replace any previously received value and take it into account that only the uplink or downlink QoS flow is mapped to the DRB.

If the *Data Discard Required* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message and the value is set to “Required”, the gNB-CU-UP shall consider that a RAN Paging Failure occurred for that UE. The gNB-CU-UP shall discard the user plane data for that UE and consider that the bearer context is still suspended.

If *UE Inactivity Timer* IE or *PDU session Inactivity Timer* IE or *DRB Inactivity Timer* IE is contained in BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall take it into account when perform inactivity monitoring.

If the *S-NSSAI* IE is contained in the *PDU Session Resource To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall store the corresponding information and replace any existing information.

If the *DRB QoS* IE is contained within the *DRB To Setup List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall, if supported, take it into account for each DRB, as specified in TS 28.552 [22].

If the *DRB QoS* IE is contained within the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall, if supported, replace any previously received value and take it into account for each DRB, as specifed in TS 28.552 [22].

If the *gNB-DU-ID* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall store and replace any previous information received.

If the *RAN UE ID* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall store and replace any previous information received.

If the gNB-CU-UP receives a BEARER CONTEXT MODIFICATION REQUEST message including *Activity Notification Level* IE and its value does not match the current bearer context, the gNB-CU-UP shall ignore the *Activity Notification Level* IE and also the requested modification of inactivity timer.

For each successfully established DRB, the gNB-CU-UP shall provide, in the respective *UL UP Parameters* IE of the BEARER CONTEXT MODIFICATION RESPONSE, one UL UP Transport Layer Information Item per cell group entry contained in the respective *Cell Group Information* IE of the BEARER CONTEXT MODIFICATION REQUEST message.

If the *Old QoS Flow List - UL End Marker expected* IE is included in the *PDU Session Resource To Modify List* IE of the BEARER CONTEXT MODIFICATION REQUEST message for a DRB to be modified, the gNB-CU-UP shall consider that the source NG-RAN node has initiated QoS flow re-mapping and has not yet received SDAP end markers, as described in TS 38.300 [8]. The gNB-CU-UP shall consider that the *Old QoS Flow List - UL End Marker expected* IE only contains UL QoS flow information for QoS flows for which no SDAP end marker has been yet received on the source side.

8.3.2.3 Unsuccessful Operation

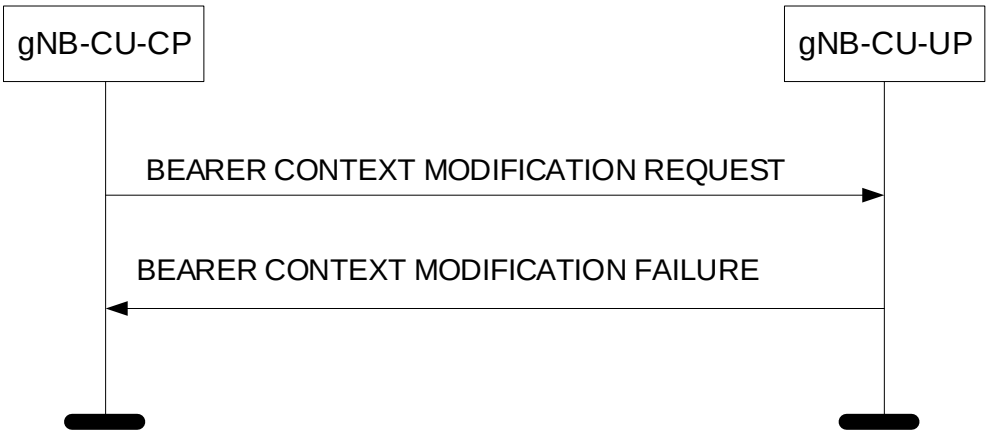

Figure 8.3.2.3-1: Bearer Context Modification procedure: Unsuccessful Operation.

If the gNB-CU-UP cannot successfully perform any of the requested bearer context modifications, it shall respond with a BEARER CONTEXT MODIFICATION FAILURE message and appropriate cause value.

8.3.2.4 Abnormal Conditions

If the gNB-CU-UP receives a BEARER CONTEXT MODIFICATION REQUEST message containing a *E-UTRAN QoS* IE in the *DRB To Setup List* or the *DRB To Modify List* IE for a GBR QoS DRB but where the *GBR QoS Information* IE is not present, the gNB-CU-UP shall report the addition or the modification of the corresponding DRB as failed in the *DRB Failed List* IE or the *DRB Failed To Modify List* IE of the BEARER CONTEXT MODIFICATION RESPONSE message with an appropriate cause value.

If the gNB-CU-UP receives a BEARER CONTEXT MODIFICATION REQUEST message containing a *QoS Flow Level QoS Parameters* IE in the *PDU Session Resource To Setup List* IE or the *PDU Session Resource To Modify List* IE for a GBR QoS Flow but where the *GBR QoS Flow Information* IE is not present, the gNB-CU-UP shall report the addition or the modification of the corresponding QoS Flow as failed in the corresponding *Flow Failed List* IE of the BEARER CONTEXT MODIFICATION RESPONSE message with an appropriate cause value.

8.3.3 Bearer Context Modification Required (gNB-CU-UP initiated)

8.3.3.1 General

The purpose of the Bearer Context Modification Required procedure is to allow the gNB-CU-UP to modify a bearer context (e.g., due to local problems) and inform the gNB-CU-CP. The procedure uses UE-associated signalling.

8.3.3.2 Successful Operation

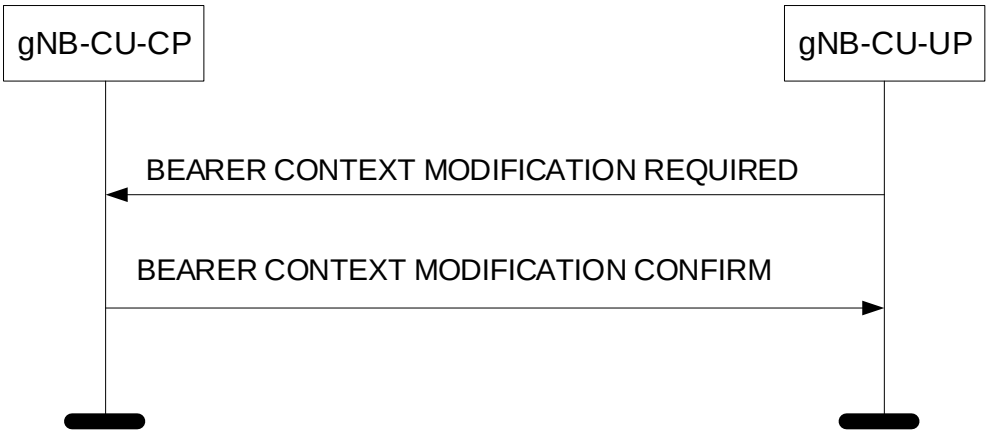

Figure 8.3.3.2-1: Bearer Context Modification Required procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the BEARER CONTEXT MODIFICATION REQUIRED message to the gNB-CU-CP. The gNB-CU-CP replies with the BEARER CONTEXT MODIFICATION CONFIRM message.

If the *S1 DL UP Transport Layer Information* IE or the *NG DL UP Transport Layer Information* IE is contained in the BEARER CONTEXT MODIFICATION REQUIRED message, the gNB-CU-CP shall update the corresponding information.

If the *gNB-CU-UP Cell Group Related Configuration* IE is contained in the *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUIRED message, the gNB-CU-CP shall try to change the cell group related configuration accordingly. If the gNB-CU-CP is not able to update the requested cell group related configuration, it shall include the *Cell Group Information* IE with the current cell group configuration in the *DRB Modified List* IE in the BEARER CONTEXT MODIFICATION CONFIRM message.

8.3.3.3 Abnormal Conditions

Not applicable.

8.3.4 Bearer Context Release (gNB-CU-CP initiated)

8.3.4.1 General

The purpose of the Bearer Context Release procedure is to allow the gNB-CU-CP to command the release of an UE-associated logical E1 connection. The procedure uses UE-associated signalling.

8.3.4.2 Successful Operation

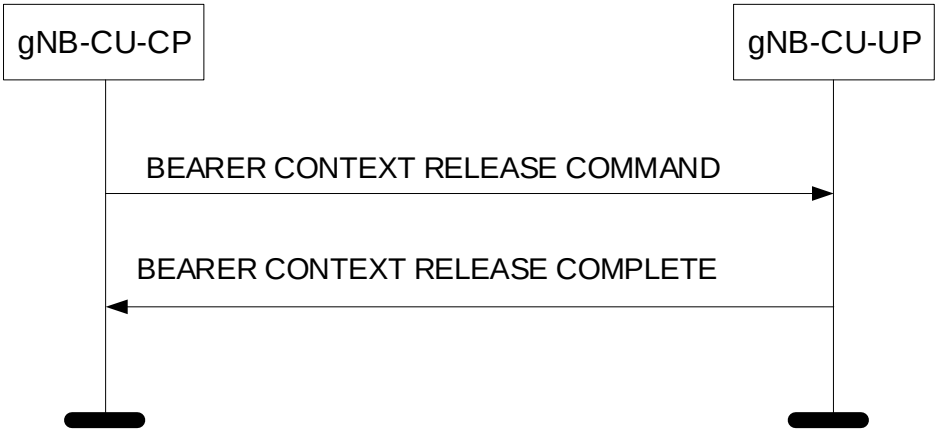

Figure 8.3.4.2-1: Bearer Context Release procedure: Successful Operation.

The gNB-CU-CP initiates the procedure by sending the BEARER CONTEXT RELEASE COMMAND message to the gNB-CU-UP. The gNB-CU-UP replies with the BEARER CONTEXT RELEASE COMPLETE message.

Upon reception of the BEARER CONTEXT RELEASE COMMAND message, the gNB-CU-UP shall release all related signalling and user data transport resources and reply with the BEARER CONTEXT RELEASE COMPLETE message.

8.3.4.3 Abnormal Conditions

Not applicable.

8.3.5 Bearer Context Release Request (gNB-CU-UP initiated)

8.3.5.1 General

The purpose of the Bearer Context Release Request procedure is to allow the gNB-CU-UP to request the gNB-CU-CP to release an UE-associated logical E1 connection. The procedure uses UE-associated signalling.

8.3.5.2 Successful Operation

Figure 8.3.5.2-1: Bearer Context Release Requset procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the BEARER CONTEXT RELEASE REQUEST message to the gNB-CU-CP.

If the *DRB Status List* IE is included in the BEARER CONTEXT RELEASE REQUEST message, the gNB-CU-CP shall act as specified in TS 38.401 [2].

Interactions with Bearer Context Release procedure:

The Bearer Context Release (gNB-CU-CP initiated) procedure may be initiated upon reception of a BEARER CONTEXT RELEASE REQUEST message.

Interaction with Bearer Context Modification (gNB-CU-CP initiated) procedure:

If applicable, as specified in TS 38.401 [2], the gNB-CU-UP may receive, after having performed the Bearer Context Release Request (gNB-CU-UP initiated) procedure, the BEARER CONTEXT MODIFICATION REQUEST message including the *Data Forwarding Information Request* IE within the *DRBs To Modify List* IE.

8.3.5.3 Abnormal Conditions

Not applicable.

8.3.6 Bearer Context Inactivity Notification

8.3.6.1 General

This procedure is initiated by the gNB-CU-UP to indicate the inactivity/resumption of activity related to the UE. The procedure uses UE-associated signalling.

8.3.6.2 Successful Operation

Figure 8.3.6.2-1: Bearer Context Inactivity Notification procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the BEARER CONTEXT INACTIVITY NOTIFICATION message to the gNB-CU-CP.

If the Activity Notification Level was set to “DRB” during the Bearer Context establishment, the gNB-CU-UP shall include the *DRB Activity List* IE in the BEARER CONTEXT INACTIVITY NOTIFICATION message.

If the Activity Notification Level was set to “PDU Session” during the Bearer Context establishment, the gNB-CU-UP shall include the *PDU Session Resource Activity List* IE in the BEARER CONTEXT INACTIVITY NOTIFICATION message.

If the Activity Notification Level was set to “UE” during the Bearer Context establishment, the gNB-CU-UP shall include the *UE Activity* IE in the BEARER CONTEXT INACTIVITY NOTIFICATION message.

8.3.6.3 Abnormal Conditions

Not applicable.

8.3.7 DL Data Notification

8.3.7.1 General

This procedure is initiated by the gNB-CU-UP to indicate the detection of DL data arrival for the UE. The procedure uses UE-associated signalling.

8.3.7.2 Successful Operation

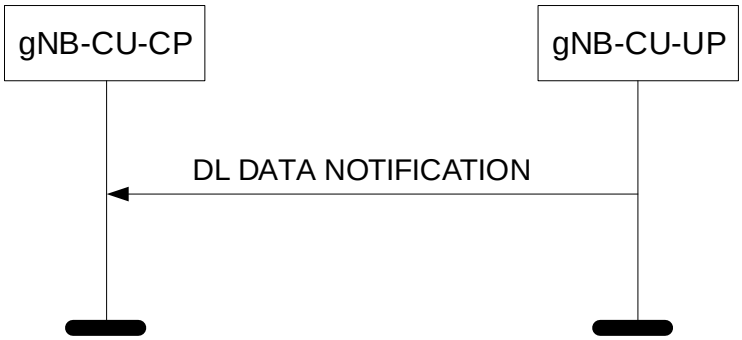

Figure 8.3.7.2-1: DL Data Notification procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the DL DATA NOTIFICATION message to the gNB-CU-CP.

If the *PPI* IE is included in the DL DATA NOTIFICATION message, the gNB-CU-CP shall use it for paging policy differentiation.

8.3.7.3 Abnormal Conditions

Not applicable.

8.3.8 Data Usage Report

8.3.8.1 General

This procedure is initiated by the gNB-CU-UP to report data volume served at the gNB-CU-UP. The procedure uses UE-associated signalling.

8.3.8.2 Successful Operation

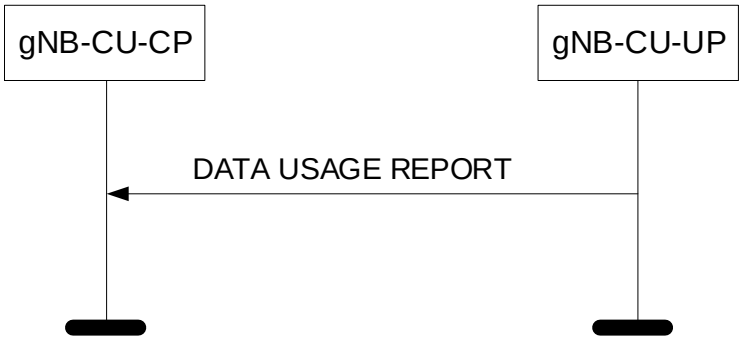

Figure 8.3.8.2-1: Data Usage Report procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the DATA USAGE REPORT message to the gNB-CU-CP.

8.3.8.3 Abnormal Conditions

Not applicable.

8.3.9 gNB-CU-UP Counter Check

8.3.9.1 General

This procedure is initiated by the gNB-CU-UP to request the gNB-CU-CP to execute a counter check procedure to verify the value of the PDCP COUNTs associated with DRBs established in the gNB-CU-UP.

The procedure uses UE-associated signalling.

8.3.9.2 Successful Operation

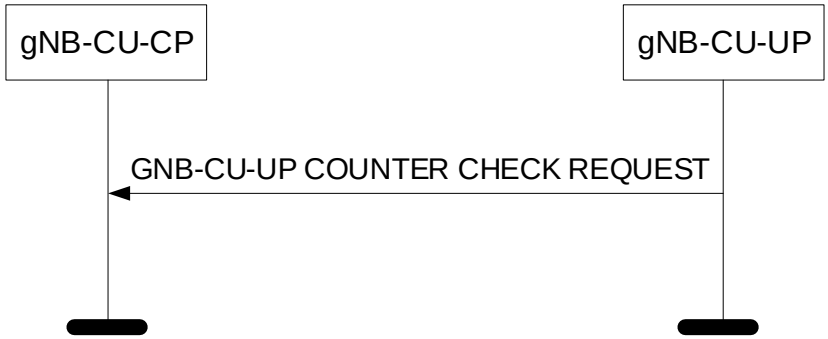

Figure 8.3.9.2-1: gNB-CU-UP Counter Check procedure, successful operation.

The gNB-CU-UP initiates the procedure by sending the gNB-CU-UP COUNTER CHECK REQUEST message to the gNB-CU-CP.

Upon reception of the gNB-CU-UP COUNTER CHECK REQUEST message, the gNB-CU-CP may perform the RRC counter check procedure as defined in TS 33.501 [13].

8.3.9.3 Unsuccessful Operation

Not applicable.

8.3.9.4 Abnormal Conditions

Not applicable.

8.3.10 UL Data Notification

8.3.10.1 General

This procedure is initiated by 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 procedure uses UE-associated signalling.

8.3.10.2 Successful Operation

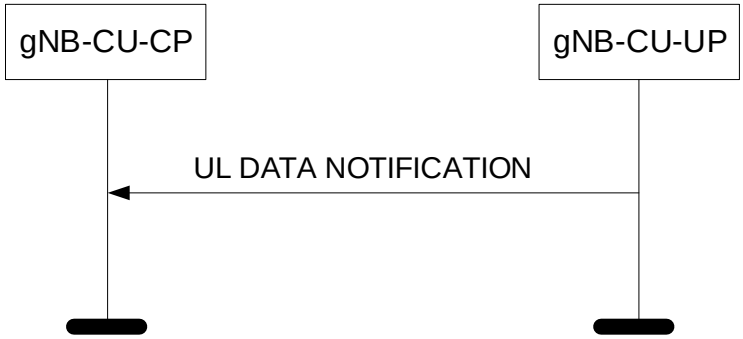

Figure 8.3.10.2-1: UL Data Notification procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the UL DATA NOTIFICATION message to the gNB-CU-CP.

8.3.10.3 Abnormal Conditions

Not applicable.

8.3.11 MR-DC Data Usage Report

8.3.11.1 General

This procedure is initiated by the gNB-CU-UP to report data volume served at the gNB-CU-UP, where the UE is connected to the 5GC. The procedure uses UE-associated signalling.

8.3.11.2 Successful Operation

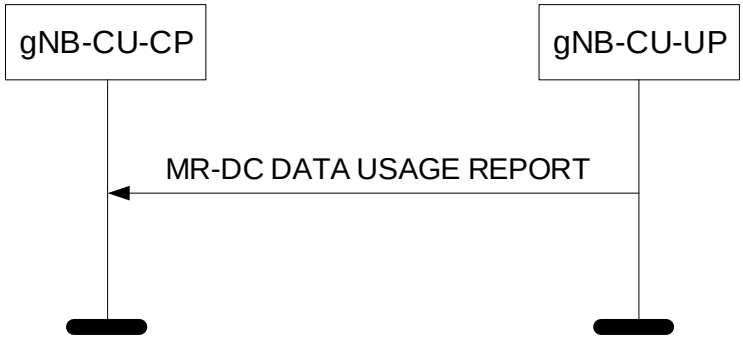

Figure 8.3.11.2-1: MR-DC Data Usage Report procedure: Successful Operation.

The gNB-CU-UP initiates the procedure by sending the MR-DC DATA USAGE REPORT message to the gNB-CU-CP.

8.3.11.3 Abnormal Conditions

Not applicable.

9 Elements for E1AP communication

9.1 General

Subclauses 9.2 and 9.3 present the E1AP message and IE definitions in tabular format. The corresponding ASN.1 definition is presented in subclause 9.4. In case there is contradiction between the tabular format and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional IEs, where the tabular format shall take precedence.

The messages have been defined in accordance to the guidelines specified in TR 25.921 [5].

When specifying IEs which are to be represented by bitstrings, if not otherwise specifically stated in the semantics description of the concerned IE or elsewhere, the following principle applies with regards to the ordering of bits:

- The first bit (leftmost bit) contains the most significant bit (MSB);
- The last bit (rightmost bit) contains the least significant bit (LSB);
- When importing bitstrings from other specifications, the first bit of the bitstring contains the first bit of the concerned information;

The following attributes are used for the tabular description of the messages and information elements: Presence, Range Criticality and Assigned Criticality. Their definition and use can be found in TS 38.413 [6].

9.2 Message Functional Definition and Content

9.2.1 Interface Management messages

9.2.1.1 RESET

This message is sent by both the gNB-CU-CP and the gNB-CU-UP and is used to request that the E1 interface, or parts of the E1 interface, to be reset.

Direction: gNB-CU-CP → gNB-CU-UP and gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
Cause	M		9.3.1.2		YES	ignore
CHOICE *Reset Type*	M				YES	reject
>E1 interface						
>>Reset All	M		ENUMERATED (Reset all,…)		-	
>Part of E1 interface						
>>UE-associated logical E1-connection list		*1*			-	
>>>UE-associated logical E1-connection Item		*1 .. <maxnoofIndividualE1ConnectionsToReset>*			EACH	reject
>>>>gNB-CU-CP UE E1AP ID	O		9.3.1.4		-	
>>>>gNB-CU-UP UE E1AP ID	O		9.3.1.5		-	

Range bound	Explanation
maxnoofIndividualE1ConnectionsToReset	Maximum no. of UE-associated logical E1-connections allowed to reset in one message. Value is 65536.

9.2.1.2 RESET ACKNOWLEDGE

This message is sent by both the gNB-CU-CP and the gNB-CU-UP as a response to a RESET message.

Direction: gNB-CU-UP → gNB-CU-CP and gNB-CU-CP → gNB-CU-UP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
UE-associated logical E1-connection list		*0..1*			YES	ignore
>UE-associated logical E1-connection Item		*1 .. <maxnoofIndividualE1ConnectionsToReset>*			EACH	ignore
>>gNB-CU-CP UE E1AP ID	O		9.3.1.4		-	
>>gNB-CU-UP UE E1AP ID	O		9.3.1.5		-	
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofIndividualE1ConnectionsToReset	Maximum no. of UE-associated logical E1-connections allowed to reset in one message. Value is 65536.

9.2.1.3 ERROR INDICATION

This message is sent by both the gNB-CU-CP and the gNB-CU-UP and is used to indicate that some error has been detected in the node.

Direction: gNB-CU-CP → gNB-CU-UP and gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	ignore
Transaction ID	M		9.3.1.53	This IE is ignored if received in UE associated signalling message.	YES	reject
gNB-CU-CP UE E1AP ID	O		9.3.1.4		YES	ignore
gNB-CU-UP UE E1AP ID	O		9.3.1.5		YES	ignore
Cause	O		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.1.4 GNB-CU-UP E1 SETUP REQUEST

This message is sent by the gNB-CU-UP to transfer information for a TNL association.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-UP ID	M		9.3.1.15		YES	reject
gNB-CU-UP Name	O		PrintableString(SIZE(1..150,…))	Human readable name of the gNB-CU-UP.	YES	ignore
CN Support	M		ENUMERATED (EPC. 5GC, both, …)		YES	reject
Supported PLMNs		*1..<maxnoofSPLMNs>*		Supported PLMNs	YES	reject
>PLMN Identity	M		9.3.1.7		-	-
>Slice Support List	O		9.3.1.8	Supported S-NSSAIs per PLMN.	-	-
>NR CGI Support List	O		9.3.1.36	Supported cells.	-	-
>QoS Parameters Support List	O		9.3.1.37	Supported QoS parameters per PLMN.	-	-
gNB-CU-UP Capacity	O		9.3.1.56		YES	ignore

Range bound	Explanation
maxnoofSPLMNs	Maximum no. of Supported PLMN Ids. Value is 12.

9.2.1.5 GNB-CU-UP E1 SETUP RESPONSE

This message is sent by the gNB-CU-CP to transfer information for a TNL association.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-CP Name	O		PrintableString (SIZE(1..150, ...))	Human readable name of the gNB-CU-CP.	YES	ignore

9.2.1.6 GNB-CU-UP E1 SETUP FAILURE

This message is sent by the gNB-CU-CP to indicate E1 Setup failure.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
Cause	M		9.3.1.2		YES	ignore
Time To wait	O		9.3.1.6		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.1.7 GNB-CU-CP E1 SETUP REQUEST

This message is sent by the gNB-CU-CP to transfer information for a TNL association.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-CP Name	O		PrintableString(SIZE(1..150,…))	Human readable name of the gNB-CU-CP.	YES	ignore

9.2.1.8 GNB-CU-CP E1 SETUP RESPONSE

This message is sent by the gNB-CU-UP to transfer information for a TNL association.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-UP ID	M		9.3.1.15		YES	reject
gNB-CU-UP Name	O		PrintableString(SIZE(1..150,…))	Human readable name of the gNB-CU-UP.	YES	ignore
CN Support	M		ENUMERATED (EPC. 5GC, both, …)		YES	reject
Supported PLMNs		*1..<maxnoofSPLMNs>*		Supported PLMNs	YES	reject
>PLMN Identity	M		9.3.1.7		-	-
>Slice Support List	O		9.3.1.8	Supported S-NSSAIs per PLMN.	-	-
>NR CGI Support List	O		9.3.1.36	Supported cells.	-	-
>QoS Parameters Support List	O		9.3.1.37	Supported QoS parameters per PLMN.	-	-
gNB-CU-UP Capacity	O		9.3.1.56		YES	ignore

Range bound	Explanation
maxnoofSPLMNs	Maximum no. of Supported PLMN Ids. Value is 12.

9.2.1.9 GNB-CU-CP E1 SETUP FAILURE

This message is sent by the gNB-CU-UP to indicate E1 Setup failure.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
Cause	M		9.3.1.2		YES	ignore
Time To wait	O		9.3.1.6		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.1.10 GNB-CU-UP CONFIGURATION UPDATE

This message is sent by the gNB-CU-UP to transfer updated information for a TNL association.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-UP ID	O		9.3.1.15		YES	reject
gNB-CU-UP Name	O		PrintableString(SIZE(1..150,…))	Human readable name of the gNB-CU-UP.	YES	ignore
Supported PLMNs		*0..<maxnoofSPLMNs>*		Supported PLMNs	YES	reject
>PLMN Identity	M		9.3.1.7		-	-
>Slice Support List	O		9.3.1.8	Supported S-NSSAIs per PLMN.	-	-
>NR CGI Support List	O		9.3.1.36	Supported cells.	-	-
>QoS Parameters Support List	O		9.3.1.37	Supported QoS parameters per PLMN.	-	-
gNB-CU-UP Capacity	O		9.3.1.56		YES	ignore
gNB-CU-UP TNLA To Remove List		*0..1*			YES	reject
>gNB-CU-UP TNLA To Remove Item IEs		*1..<maxnoofTNLAssociations>*			-	-
>>TNLA Transport Layer Address	M		CP Transport Layer Information 9.3.2.2	Transport Layer Address of the gNB-CU-UP.	-	-
>>TNLA Transport Layer Address gNB-CU-CP	O		CP Transport Layer Information 9.3.2.2	Transport Layer Address of the gNB-CU-CP.	-	-

Range bound	Explanation
maxnoofSPLMNs	Maximum no. of Supported PLMN Ids. Value is 12.
maxnoofTNLAssociations	Maximum numbers of TNL Associations between the gNB-CU-UP and the gNB-CU-CP. Value is 32.

9.2.1.11 GNB-CU-UP CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by a gNB-CU-CP to a gNB-CU-UP to acknowledge update of information for a TNL association.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.1.12 GNB-CU-UP CONFIGURATION UPDATE FAILURE

This message is sent by the gNB-CU-CP to indicate gNB-CU-UP Configuration Update failure.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
Cause	M		9.3.1.2		YES	ignore
Time To wait	O		9.3.1.6		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.1.13 GNB-CU-CP CONFIGURATION UPDATE

This message is sent by the gNB-CU-CP to transfer updated information for a TNL association.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-CP Name	O		PrintableString(SIZE(1..150,…))	Human readable name of the gNB-CU-CP	YES	ignore
gNB-CU-CP TNLA To Add List		*0..1*			YES	ignore
>gNB-CU-CP TNLA To Add Item IEs		*1..<maxnoofTNLAssociations>*			-	-
>>TNLA Transport Layer Information	M		CP Transport Layer Information 9.3.2.2	Transport Layer Address of the gNB-CU-CP.	-	-
>>TNLA Usage	M		ENUMERATED (ue, non-ue, both, …)	Indicates whether the TNLA is only used for UE-associated signalling, or non-UE-associated signalling, or both. For usage of this IE, refer to TS 38.462 [18].	-	-
gNB-CU-CP TNLA To Remove List		*0..1*			YES	ignore
>gNB-CU-CP TNLA To Remove Item IEs		*1..<maxnoofTNLAssociations>*			-	-
>>TNLA Transport Layer Address	M		CP Transport Layer Information 9.3.2.2	Transport Layer Address of the gNB-CU-CP.	-	-
>>TNLA Transport Layer Address gNB-CU-UP	O		CP Transport Layer Information 9.3.2.2	Transport Layer Address of the gNB-CU-UP.	YES	reject
gNB-CU-CP TNLA To Update List		*0..1*			YES	ignore
>gNB-CU-CP TNLA To Update Item IEs		*1..<maxnoofTNLAssociations>*			-	-
>>TNLA Transport Layer Address	M		CP Transport Layer Address 9.3.2.2	Transport Layer Address of the gNB-CU-CP.	-	-
>>TNLA Usage	O		ENUMERATED (ue, non-ue, both, …)	Indicates whether the TNLA is only used for UE-associated signalling, or non-UE-associated signalling, or both. For usage of this IE, refer to TS 38.462 [18].	-	-

Range bound	Explanation
maxnoofTNLAssociations	Maximum numbers of TNL Associations between the gNB-CU-CP and the gNB-CU-UP. Value is 32.

9.2.1.14 GNB-CU-CP CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by a gNB-CU-UP to a gNB-CU-CP to acknowledge update of information for a TNL association.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-CP TNLA Setup List		*0..1*			YES	ignore
>gNB-CU-CP TNLA Setup Item IEs		*1..<maxnoofTNLAssociations>*			-	-
>>TNLA Transport Layer Address	M		CP Transport Layer Information 9.3.2.2	Transport Layer Address of the gNB-CU-CP	-	-
gNB-CU-CP TNLA Failed to Setup List		*0..1*			YES	ignore
>gNB-CU-CP TNLA Failed To Setup Item IEs		*1..<maxnoofTNLAssociations>*			-	-
>>TNLA Transport Layer Address	M		CP Transport Layer Information 9.3.2.2	Transport Layer Address of the gNB-CU-CP	-	-
>>Cause	M		9.3.1.2			
Criticality Diagnostics	O		9.3.1.3		YES	ignore

Range bound	Explanation
maxnoofTNLAssociations	Maximum numbers of TNL Associations between the gNB-CU-CP and the gNB-CU-UP. Value is 32.

9.2.1.15 GNB-CU-CP CONFIGURATION UPDATE FAILURE

This message is sent by the gNB-CU-UP to indicate gNB-CU-CP Configuration Update failure.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
Cause	M		9.3.1.2		YES	ignore
Time To wait	O		9.3.1.6		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.1.16 E1 RELEASE REQUEST

This message is sent by both the gNB-CU-CP and the gNB-CU-UP and is used to request the release of the E1 interface.

Direction: gNB-CU-CP → gNB-CU-UP and gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
Cause	M		9.3.1.2		YES	ignore

9.2.1.17 E1 RELEASE RESPONSE

This message is sent by both the gNB-CU-CP and the gNB-CU-UP as a response to an E1 RELEASE REQUEST message.

Direction: gNB-CU-UP → gNB-CU-CP and gNB-CU-CP → gNB-CU-UP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject

9.2.1.18 GNB-CU-UP STATUS INDICATION

This message is sent by the gNB-CU-UP to indicate to the gNB-CU-CP its status of overload.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
Transaction ID	M		9.3.1.53		YES	reject
gNB-CU-UP Overload Information	M		ENUMERATED (overloaded, not-overloaded)		YES	reject

9.2.2 Bearer Context Management messages

9.2.2.1 BEARER CONTEXT SETUP REQUEST

This message is sent by the gNB-CU-CP to request the gNB-CU-UP to setup a bearer context.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
Security Information	M		9.3.1.10		YES	reject
UE DL Aggregate Maximum Bit Rate	M		Bit Rate 9.3.1.20		YES	reject
UE DL Maximum Integrity Protected Data Rate	O		Bit Rate 9.3.1.20	The Bit Rate is a portion of the UE's Maximum Integrity Protected Data Rate, and is enforced by the gNB-CU-UP node.	YES	reject
Serving PLMN	M		PLMN Identity 9.3.1.7		YES	ignore
Activity Notification Level	M		9.3.1.67		YES	reject
UE Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to UE.	-	-
Bearer Context Status Change	O		ENUMERATED (Suspend, Resume, …)	Indicates the status of the Bearer Context	YES	reject
CHOICE *System*	M				YES	reject
>E-UTRAN						
>>DRB To Setup List	M		DRB To Setup List E-UTRAN 9.3.3.1		YES	reject
>NG-RAN						
>>PDU Session Resource To Setup List	M		9.3.3.2		YES	reject
RAN UE ID	O		OCTET STRING (SIZE(8))		YES	ignore
gNB-DU ID	O		9.3.1.65	Included whenever it is known by the gNB-CU-CP	YES	ignore

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.2.2.2 BEARER CONTEXT SETUP RESPONSE

This message is sent by the gNB-CU-UP to confirm the setup of the requested bearer context.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
CHOICE *System*	M				YES	reject
>E-UTRAN						
>>DRB Setup List	M		DRB Setup List E-UTRAN 9.3.3.3		YES	reject
>>DRB Failed List	O		DRB Failed List E-UTRAN 9.3.3.4		YES	reject
>NG-RAN						
>>PDU Session Resource Setup List	M		9.3.3.5		YES	reject
>>PDU Session Resource Failed List	O		9.3.3.6		YES	reject

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.2.2.3 BEARER CONTEXT SETUP FAILURE

This message is sent by the gNB-CU-UP to indicate that the setup of the bearer context was unsuccessful.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	O		9.3.1.5		YES	ignore
Cause	M		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.2.4 BEARER CONTEXT MODIFICATION REQUEST

This message is sent by the gNB-CU-CP to request the gNB-CU-UP to modify a bearer context.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
Security Information	O		9.3.1.10		YES	reject
UE DL Aggregate Maximum Bit Rate	O		Bit Rate 9.3.1.20		YES	reject
UE DL Maximum Integrity Protected Data Rate	O		Bit Rate 9.3.1.20	The Bit Rate is a portion of the UE's Maximum Integrity Protected Data Rate, and is enforced by the gNB-CU-UP node.	YES	reject
Bearer Context Status Change	O		ENUMERATED (Suspend, Resume, …)	Indicates the status of the Bearer Context	YES	reject
New UL TNL Information Required	O		ENUMERATED (required, …)	Indicates that new UL TNL information has been requested to be provided.	YES	reject
UE Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to UE.	-	-
Data Discard Required	O		ENUMERATED (required, …)	Indicate to discard the DL user data in case of RAN paging failure.	YES	ignore
CHOICE *System*	O				YES	reject
>E-UTRAN						
>>DRB To Setup List	O		DRB To Setup Modification List E-UTRAN 9.3.3.7		YES	reject
>>DRB To Modify List	O		DRB To Modify List E-UTRAN 9.3.3.8		YES	reject
>>DRB To Remove List	O		DRB To Remove List E-UTRAN 9.3.3.9		YES	reject
>NG-RAN						
>>PDU Session Resource To Setup List	O		PDU Session Resource To Setup Modification List 9.3.3.10		YES	reject
>>PDU Session Resource To Modify List	O		9.3.3.11		YES	reject
>>PDU Session Resource To Remove List	O		9.3.3.12		YES	reject
RAN UE ID	O		OCTET STRING (SIZE(8))		YES	ignore
gNB-DU ID	O		9.3.1.65		YES	ignore
Activity Notification Level	O		9.3.1.67		YES	ignore

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.2.2.5 BEARER CONTEXT MODIFICATION RESPONSE

This message is sent by the gNB-CU-UP to confirm the modification of the requested bearer context.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
CHOICE *System*	O				YES	ignore
>E-UTRAN						
>>DRB Setup List	O		DRB Setup Modification List E-UTRAN 9.3.3.13		YES	ignore
>>DRB Failed List	O		DRB Failed Modification List E-UTRAN 9.3.3.14		YES	ignore
>>DRB Modified List	O		DRB Modified List E-UTRAN 9.3.3.15		YES	ignore
>>DRB Failed To Modify List	O		DRB Failed To Modify List E-UTRAN 9.3.3.16		YES	ignore
>NG-RAN						
>>PDU Session Resource Setup List	O		PDU Session Resource Setup Modification List 9.3.3.17		YES	ignore
>>PDU Session Resource Failed List	O		PDU Session Resource Failed Modification List 9.3.3.18		YES	ignore
>>PDU Session Resource Modified List	O		9.3.3.19		YES	ignore
>>PDU Session Resource Failed To Modify List	O		9.3.3.20		YES	ignore

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.2.2.6 BEARER CONTEXT MODIFICATION FAILURE

This message is sent by the gNB-CU-UP to indicate that the modification of the bearer context was unsuccessful.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
Cause	M		9.3.1.2		YES	ignore
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.2.7 BEARER CONTEXT MODIFICATION REQUIRED

This message is sent by the gNB-CU-UP to inform the gNB-CU-CP that a modification of a bearer context is required (e.g., due to local problems at the gNB-CU-UP).

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
CHOICE *System*	M				YES	reject
>E-UTRAN						
>>DRB To Modify List	O		DRB Required To Modify List E-UTRAN 9.3.3.21		YES	reject
>>DRB To Remove List	O		DRB Required To Remove List 9.3.3.22		YES	reject
>NG-RAN						
>>PDU Session Resource To Modify List	O		PDU Session Resource Required To Modify List 9.3.3.23		YES	reject
>>PDU Session Resource To Remove List	O		9.3.3.12		YES	reject

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.2.2.8 BEARER CONTEXT MODIFICATION CONFIRM

This message is sent by the gNB-CU-CP to confirm the modification of the requested bearer context.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
CHOICE *System*	O				YES	ignore
>E-UTRAN						
>>DRB Modified List	O		DRB Confirm Modified List E-UTRAN 9.3.3.24		YES	ignore
>NG-RAN						
>>PDU Session Resource Modified List	O		PDU Session Resource Confirm Modified List 9.3.3.25		YES	Ignore

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.2.2.9 BEARER CONTEXT RELEASE COMMAND

This message is sent by the gNB-CU-CP to command the gNB-CU-UP to release an UE-associated logical E1 connection.

Direction: gNB-CU-CP → gNB-CU-UP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
Cause	M		9.3.1.2		YES	ignore

9.2.2.10 BEARER CONTEXT RELEASE COMPLETE

This message is sent by the gNB-CU-UP to confirm the release of the UE-associated logical E1 connection.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
Criticality Diagnostics	O		9.3.1.3		YES	ignore

9.2.2.11 BEARER CONTEXT RELEASE REQUEST

This message is sent by the gNB-CU-UP to request the release of an UE-associated logical E1 connection.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
DRB Status List		*0.. 1*			YES	ignore
>DRB Status Item		*1..<maxnoofDRBs>*			-	-
>>DRB ID	M		9.3.1.16		-	-
>>PDCP DL Count	O		PDCP Count 9.3.1.35	PDCP count for next DL packet to be assigned.	-	-
>>PDCP UL Count	O		PDCP Count 9.3.1.35	PDCP count for first un-acknowledged UL packet.	-	-
Cause	M		9.3.1.2		YES	ignore

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.2.2.12 BEARER CONTEXT INACTIVITY NOTIFICATION

This message is sent by the gNB-CU-UP to provide information about the UE activity to the gNB-CU-CP.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
CHOICE Activity Information	M				YES	reject
>DRB Activity List		*1*		Used if the *Activity Notification Level* IE is set as “DRB” in BEARER CONTEXT SETUP Request message	YES	reject
>>DRB Activity Item		*1 .. <maxnoof DRBs>*			-	-
>>>DRB ID	M		9.3.1.16		-	-
>>>DRB Activity	M		ENUMERATED (Active, Not active, …)		-	-
>PDU Session Resource Activity List		*1*		Used if the *Activity Notification Level* IE is set as “PDU Session” in the BEARER CONTEXT SETUP Request message	YES	reject
>>PDU Session Resource Activity Item		*1 .. <maxnoofPDUSession Resource>*			-	-
>>>PDU Session ID	M		9.3.1.21		-	-
>>>PDU Session Resource Activity	M		ENUMERATED (Active, Not active, …)		-	-
>UE Activity	M		ENUMERATED (Active, Not active, …)	Used if the *Activity Notification Level* IE is set as “UE” in the BEARER CONTEXT SETUP Request message	YES	reject

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRB for a UE, the maximum value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.2.2.13 DL DATA NOTIFICATION

This message is sent by the gNB-CU-UP to provide information about the DL data detection to the gNB-CU-CP.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
Paging Priority Indicator (PPI)	O		9.3.1.55		YES	ignore

9.2.2.14 DATA USAGE REPORT

This message is sent by the gNB-CU-UP to report data volumes.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
Data Usage Report List	M		9.3.1.44		YES	ignore

9.2.2.15 GNB-CU-UP COUNTER CHECK REQUEST

This message is sent by the gNB-CU-UP to request the verification of the value of the PDCP COUNTs associated with the DRBs established in the gNB-CU-UP.

Direction: gNB-CU-UP → gNB-CU-CP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
CHOICE *System*	M				YES	reject
>E-UTRAN						
>>DRBs Subject to Counter Check List		*1*			YES	ignore
>>>DRBs Subject to Counter Check Item		*1 .. <maxnoof DRBs>*			-	-
>>>>DRB ID	M		9.3.1.16		-	-
>>>>PDCP UL Count	M		PDCP Count 9.3.1.35	Indicates the value of uplink COUNT associated to this DRB, as specified in TS 38.331 [8].	-	-
>>>>PDCP DL Count	M		PDCP Count 9.3.1.35	Indicates the value of downlink COUNT associated to this DRB, as specified in TS 38.331 [8].	-	-
>NG-RAN						
>>DRBs Subject to Counter Check List		*1*			YES	ignore
>>>DRBs Subject to Counter Check Item		*1 .. <maxnoof DRBs>*			-	-
>>>>PDU Session ID	M		9.3.1.21		-	-
>>>>DRB ID	M		9.3.1.16		-	-
>>>>PDCP UL Count	M		PDCP Count 9.3.1.35	Indicates the value of uplink COUNT associated to this DRB, as specified in TS 38.331 [8].	-	-
>>>>PDCP DL Count	M		PDCP Count 9.3.1.35	Indicates the value of downlink COUNT associated to this DRB, as specified in TS 38.331 [8].	-	-

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.2.2.16 UL DATA NOTIFICATION

This message is sent by the gNB-CU-UP to provide information about the UL data detection to the gNB-CU-CP.

Direction: gNB-CU-UP → gNB-CU-CP

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
PDU Session To Notify List		*1*			YES	reject
>PDU Session To Notify Item		*1..<maxnoofPDUSessionResource>*			-	-
>>PDU Session ID	M		9.3.1.21		-	-
>>QoS Flow List	M		9.3.1.12		-	-

9.2.2.17 MR-DC DATA USAGE REPORT

This message is sent by the gNB-CU-UP to report data volumes when the UE is connected to the 5GC.

Direction: gNB-CU-UP → gNB-CU-CP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.3.1.1		YES	reject
gNB-CU-CP UE E1AP ID	M		9.3.1.4		YES	reject
gNB-CU-UP UE E1AP ID	M		9.3.1.5		YES	reject
PDU Session Resource Data Usage List		*1*			YES	ignore
>PDU Session Resource Data Usage Item		*1 .. <maxnoof PDUsessions>*			–	
>>PDU Session ID	M		9.3.1.21		–	
>>MR-DC Usage Information	M		9.3.1.63		–	

Range bound	Explanation
maxnoofPDUsessions	Maximum no. of PDU sessions. Value is 256

9.3 Information Element Definitions

9.3.1 Radio Network Layer Related IEs

9.3.1.1 Message Type

The *Message Type* IE uniquely identifies the message being sent. It is mandatory for all messages.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Message Type				
>Procedure Code	M		INTEGER (0..255)	
>Type of Message	M		CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, …)	

9.3.1.2 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the E1AP protocol.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE *Cause Group*	M			
>*Radio Network Layer*				
>>Radio Network Layer Cause	M		ENUMERATED (Unspecified, Unknown or already allocated gNB-CU-CP UE E1AP ID, Unknown or already allocated gNB-CU-UP UE E1AP ID, Unknown or inconsistent pair of UE E1AP ID, Interaction with other procedure, PDCP Count Wrap Around, Not supported QCI value, Not supported 5QI value, Encryption algorithms not supported, Integrity protection algorithms not supported, UP integrity protection not possible, UP confidentiality protection not possible, Multiple PDU Session ID Instances, Unknown PDU Session ID, Multiple QoS Flow ID Instances, Unknown QoS Flow ID, Multiple DRB ID Instances, Unknown DRB ID, Invalid QoS combination, Procedure cancelled, Normal release, No radio resources available, Action desirable for radio reasons, Resources not available for the slice, PDCP configuration not supported, …, UE DL maximum integrity protected data rate reason, UP integrity protection failure, Release due to Pre-Emption)	
>*Transport Layer*				
>>Transport Layer Cause	M		ENUMERATED (Unspecified, Transport Resource Unavailable, …)	
>*Protocol*				
>>Protocol Cause	M		ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State, Semantic Error, Abstract Syntax Error (Falsely Constructed Message), Unspecified, …)	
>*Misc*				
>>Miscellaneous Cause	M		ENUMERATED (Control Processing Overload, Not enough User Plane Processing Resources, Hardware Failure, O&M Intervention, Unspecified, …)	

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the related capability is missing. On the other hand, "not available" cause values indicate that the related capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Unspecified	Sent for radio network layer cause when none of the specified cause values applies.
Unknown or already allocated gNB-CU-CP UE E1AP ID	The action failed because the gNB-CU-CP UE E1AP ID is either unknown, or (for a first message received at the gNB-CU) is known and already allocated to an existing context.
Unknown or already allocated gNB-CU-UP UE E1AP ID	The action failed because the gNB-CU-UP UE E1AP ID is either unknown, or (for a first message received at the gNB-CU-UP) is known and already allocated to an existing context.
Unknown or inconsistent pair of UE E1AP ID	The action failed because both UE E1AP IDs are unknown, or are known but do not define a single UE context.
Interaction with other procedure	The action is due to an ongoing interaction with another procedure.
PDCP COUNT wrap around	PDCP COUNT approaches the maximum value.
Not supported QCI value	The action failed because the requested QCI is not supported.
Not supported 5QI value	The action failed because the requested 5QI is not supported.
Encryption algorithms not supported	The gNB-CU-UP is unable to support the selected encryption algorithm for the UE.
Integrity protection algorithms not supported	The gNB-CU-UP is unable to support the selected integrity protection algorithm for the UE.
UP integrity protection not possible	The PDU Session cannot be accepted according to the required user plane integrity protection policy.
UP confidentiality protection not possible	The PDU Session cannot be accepted according to the required user plane confidentiality protection policy
Multiple PDU Session ID Instances	The action failed because multiple instances of the same PDU Session had been provided.
Unknown PDU Session ID	The action failed because the PDU Session ID is unknown.
Multiple QoS Flow ID Instances	The action failed because multiple instances of the same QoS flow had been provided.
Unknown QoS Flow ID	The action failed because the QoS Flow ID is unknow.
Multiple DRB ID Instances	The action failed because multiple instances of the same DRB had been provided.
Unknown DRB ID	The action failed because the DRB ID is unknow.
Invalid QoS combination	The action was failed because of invalid QoS combination
Procedure cancelled	The sending node cancelled the procedure due to other urgent actions to be performed.
Normal release	The action is due to a normal release of the UE (e.g. because of mobility) and does not indicate an error.
No radio resources available	The requested node doesn't have sufficient radio resources available.
Action desirable for radio reasons	The reason for requesting the action is radio related.
Resources not available for the slice	The requested resources are not available for the slice.
PDCP configuration not supported,	The gNB-CU-UP is unable to support the selected PDCP configuration for the UE.
UE DL maximum integrity protected data rate reason	The request is not accepted in order to comply with the maximum downlink data rate for integrity protection supported by the UE.
UP integrity protection failure	The gNB-CU-UP detects an integrity protection failure in the UL PDU.
Release due to Pre-Emption	Release is initiated due to pre-emption.

Transport Layer cause	Meaning
Unspecified	Sent when none of the above cause values applies but still the cause is Transport Network Layer related.
Transport Resource Unavailable	The required transport resources are not available.

Protocol cause	Meaning
Transfer Syntax Error	The received message included a transfer syntax error.
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerning criticality indicated "reject".
Abstract Syntax Error (Ignore And Notify)	The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify".
Message Not Compatible With Receiver State	The received message was not compatible with the receiver state.
Semantic Error	The received message included a semantic error.
Abstract Syntax Error (Falsely Constructed Message)	The received message contained IEs or IE groups in wrong order or with too many occurrences.
Unspecified	Sent when none of the above cause values applies but still the cause is Protocol related.

Miscellaneous cause	Meaning
Control Processing Overload	Control processing overload.
Not Enough User Plane Processing Resources Available	No enough resources are available related to user plane processing.
Hardware Failure	Action related to hardware failure.
O&M Intervention	The action is due to O&M intervention.
Unspecified Failure	Sent when none of the above cause values applies and the cause is not related to any of the categories Radio Network Layer, Transport Network Layer, NAS or Protocol.

9.3.1.3 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the gNB-CU-UP or the gNB-CU-CP when parts of a received message have not been comprehended or were missing, or if the message contained logical errors. When applicable, it contains information about which IEs were not comprehended or were missing. The conditions for inclusion of the *Transaction ID* IE are described in clause 10.

For further details on how to use the *Criticality Diagnostics* IE, (see clause 10).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	O		INTEGER (0..255)	Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error.
Triggering Message	O		ENUMERATED(initiating message, successful outcome, unsuccessful outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	O		ENUMERATED(reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Transaction ID	O		9.3.1.53	
Information Element Criticality Diagnostics		*0 .. <maxnoof Errors>*		
>IE Criticality	M		ENUMERATED(reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value 'ignore' is not applicable.
>IE ID	M		INTEGER (0..65535)	The IE ID of the not understood or missing IE.
>Type of Error	M		ENUMERATED(not understood, missing, …)	

Range bound	Explanation
maxnoofErrors	Maximum no. of IE errors allowed to be reported with a single message. The value for maxnoofErrors is 256.

9.3.1.4 gNB-CU-CP UE E1AP ID

The gNB-CU-CP UE E1AP ID uniquely identifies the UE association over the E1 interface within the gNB-CU-CP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-CU-CP UE E1AP ID	M		INTEGER (0 .. 2^{32} -1)	

9.3.1.5 gNB-CU-UP UE E1AP ID

The gNB-CU-UP UE E1AP ID uniquely identifies the UE association over the E1 interface within the gNB-CU-UP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-CU-UP UE E1AP ID	M		INTEGER (0 .. 2^{32} -1)	

9.3.1.6 Time To wait

This IE defines the minimum allowed waiting times.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Time To wait	M		ENUMERATED(1s, 2s, 5s, 10s, 20s, 60s)	

9.3.1.7 PLMN Identity

This information element indicates the PLMN Identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		OCTET STRING (3)	- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n -The PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC).

9.3.1.8 Slice Support List

This IE indicates the list of supported slices.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Slice Support Item IEs		*1..<maxnoofSliceItems>*			-	-
>S-NSSAI	M		9.3.1.9		-	

Range bound	Explanation
maxnoofSliceItems	Maximum no. of signalled slice support items. Value is 1024.

9.3.1.9 S-NSSAI

This IE indicates the S-NSSAI.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SST	M		OCTET STRING (SIZE(1))	
SD	O		OCTET STRING (SIZE(3))	

9.3.1.10 Security Information

This IE provides the information for configuring UP ciphering and/or integrity protection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Security Algorithm	M		9.3.1.31	
User Plane Security Keys	M		9.3.1.32	

9.3.1.11 Cell Group Information

This IE provides information about the cell group(s) (i.e., radio leg(s)) that are part of the DRB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cell Group List		*1*		
>Cell Group Item		*1..<maxnoofCellGroups>*		
>>Cell Group ID	M		INTEGER (0..3, …)	Cell group ID as defined in TS 38.331 [10] (0=MCG, 1=SCG). In this version of the specification, values “2” and “3” are not used. For E-UTRA Cell Groups, the same encoding is used as for NR Cell Groups. NOTE: There is no corresponding IE defined in TS 36.331 [21].
>>UL Configuration	O		9.3.1.33	Indicates whether the Cell Group is used for UL traffic.
>>DL TX Stop	O		ENUMERATED (stop, resume, …)	
>>RAT Type	O		ENUMERATED (E-UTRA, NR, …)	Indicates the RAT.

Range bound	Explanation
maxnoofCellGroups	Maximum no. of cell groups for a DRB. Value is 4.

9.3.1.12 QoS Flow List

This IE includes a list of QoS Flows that are identified by the QoS Flow Identifier.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
QoS Flow List		*1*			-	-
>QoS Flow Item		*1..<maxnoofQoSflows>*			-	-
>>QoS Flow Identifier	M		9.3.1.24		-	-
>>QoS Flow Mapping Indication	O		9.3.1.60	Indicates that only the uplink or downlink QoS flow is mapped to the DRB	YES	ignore

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows in a PDU Session. Value is 64.

9.3.1.13 UP Parameters

This IE provides information related to a DRB configured in the gNB-CU-UP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UP Parameters List		*1*		
>UP Parameters Item		*1..<maxnoofUPParameters>*		
>>UP Transport Layer Information	M		9.3.2.1	
>>Cell Group ID	M		INTEGER (0..3, …)	Cell group ID as defined in TS 38.331 [10] (0=MCG, 1=SCG). In this version of the specification, values "2" and "3" are not used.

Range bound	Explanation
maxnoofUPParameters	Maximum no. of UP parameters (e.g., GTP tunnels) for a DRB. Value is 8

9.3.1.14 NR CGI

The NR Cell Global Identifier (NR CGI) is used to globally identify a cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.3.1.7	
NR Cell Identity	M		BIT STRING (36)	

9.3.1.15 gNB-CU-UP ID

The gNB-CU-UP ID uniquely identifies the gNB-CU-UP at least within a gNB-CU-CP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-CU-UP ID	M		INTEGER ($0 .. 2^{36}-1$)	

9.3.1.16 DRB ID

This IE uniquely identifies a DRB for a UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB ID	M		INTEGER (1.. 32, ...)	Corresponds to the *DRB-Identity* defined in TS 38.331 [10].

9.3.1.17 E-UTRAN QoS

This IE defines the QoS to be applied to a DRB for EN-DC case.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
QCI	M		INTEGER (0..255)	QoS Class Identifier defined in TS 23.401 [11]. Logical range and coding specified in TS 23.203 [12].	–	–
E-UTRAN Allocation and Retention Priority	M		9.3.1.18	E-UTRAN Allocation and Retention Priority	–	–
GBR QoS Information	O		9.3.1.19	This IE applies to GBR bearers only and is ignored otherwise.	–	–

9.3.1.18 E-UTRAN Allocation and Retention Priority

This IE specifies the relative importance compared to other E-RABs for allocation and retention of the E-UTRAN Radio Access Bearer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		INTEGER (0..15)	**Desc.:** This IE should be understood as "priority of allocation and retention" (see TS 23.401 [11]). **Usage:** Value 15 means "no priority". Values between 1 and 14 are ordered in decreasing order of priority, i.e. 1 is the highest and 14 the lowest. Value 0 shall be treated as a logical error if received.
Pre-emption Capability	M		ENUMERATED(shall not trigger pre-emption, may trigger pre-emption)	**Desc.:** This IE indicates the pre-emption capability of the request on other E-RABs **Usage:** The E-RAB shall not pre-empt other E-RABs or, the E-RAB may pre-empt other E-RABs The Pre-emption Capability indicator applies to the allocation of resources for an E-RAB and as such it provides the trigger to the pre-emption procedures/processes of the eNB.
Pre-emption Vulnerability	M		ENUMERATED(not pre-emptable, pre-emptable)	**Desc.:** This IE indicates the vulnerability of the E-RAB to pre-emption of other E-RABs. **Usage**: The E-RAB shall not be pre-empted by other E-RABs or the E-RAB may be pre-empted by other RABs. Pre-emption Vulnerability indicator applies for the entire duration of the E-RAB, unless modified, and as such indicates whether the E-RAB is a target of the pre-emption procedures/processes of the eNB.

9.3.1.19 GBR QoS Information

This IE indicates the maximum and guaranteed bit rates of a GBR E-RAB for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-RAB Maximum Bit Rate Downlink	M		Bit Rate 9.3.1.20	Maximum Bit Rate in DL (i.e. from EPC to E-UTRAN) for the bearer. Details in TS 23.401 [11].	–	–
E-RAB Maximum Bit Rate Uplink	M		Bit Rate 9.3.1.20	Maximum Bit Rate in UL (i.e. from E-UTRAN to EPC) for the bearer. Details in TS 23.401 [11].	–	–
E-RAB Guaranteed Bit Rate Downlink	M		Bit Rate 9.3.1.20	Guaranteed Bit Rate (provided that there is data to deliver) in DL (i.e. from EPC to E-UTRAN) for the bearer. Details in TS 23.401 [11].	–	–
E-RAB Guaranteed Bit Rate Uplink	M		Bit Rate 9.3.1.20	Guaranteed Bit Rate (provided that there is data to deliver) in UL (i.e. from E-UTRAN to EPC) for the bearer. Details in TS 23.401 [11].	–	–

9.3.1.20 Bit Rate

This IE indicates the number of bits delivered by NG-RAN in UL or to NG-RAN in DL within a period of time, divided by the duration of the period. It is used, for example, to indicate the maximum or guaranteed bit rate for a GBR QoS flow, or an aggregated maximum bit rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bit Rate	M		INTEGER (0.. 4,000,000,000,000,…)	The unit is: bit/s

9.3.1.21 PDU Session ID

This IE identifies a PDU Session for a UE. The definition and use of the PDU Session ID is specified in TS 23.501 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session ID	M		INTEGER (0 ..255)	

9.3.1.22 PDU Session Type

This IE indicates the PDU Session Type as specified in TS 23.501 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Type	M		ENUMERATED (IPv4, IPv6, IPv4v6, ethernet, unstructured, ...)	

9.3.1.23 Security Indication

This IE contains the user plane integrity protection indication and confidentiality protection indication which indicates the requirements on UP integrity protection and ciphering for corresponding PDU Session Resources, respectively.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Integrity Protection Indication	M		ENUMERATED (required, preferred, not needed, …)	Indicates whether UP integrity protection shall apply, should apply or shall not apply for the concerned PDU Session Resource.
Confidentiality Protection Indication	M		ENUMERATED (required, preferred, not needed, …)	Indicates whether UP ciphering shall apply, should apply or shall not apply for the concerned PDU Session Resource.
Maximum Integrity Protected Data Rate	C-ifIntegrityProtectionrequiredorpreferred		9.3.1.57	If present, this is the value received from the CN for the overall UE capability. This IE is ignored when enforcing the maximum IP data rate.

Condition	Explanation
ifIntegrityProtectionrequiredorpreferred	This IE shall be present if the *Integrity Protection Indication* IE within the *Security Indication* IE is set to “required” or “preferred”.

9.3.1.24 QoS Flow Identifier

This IE identifies a QoS Flow within a PDU Session. Definition and use of the QoS Flow Identifier is specified in TS 23.501 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow Identifier	M		INTEGER (0 ..63)	

9.3.1.25 QoS Flow QoS Parameters List

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
QoS Flow List		*1*			-	-
>QoS Flow Item		*1..<maxnoofflows>*			-	-
>>QoS Flow Identifier	M		9.3.1.24		-	-
>>QoS Flow Level QoS Parameters	M		9.3.1.26		-	-
>>QoS Flow Mapping Indication	O		9.3.1.60	Indicates that only the uplink or downlink QoS flow is mapped to the DRB	-	-

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows in a PDU Session. Value is 64.

9.3.1.26 QoS Flow Level QoS Parameters

This IE defines the QoS parameters to be applied to a QoS Flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE *QoS Characteristics*	M			
>Non-dynamic 5QI				
>>Non Dynamic 5QI Descriptor	M		9.3.1.27	
>Dynamic 5QI				
>>Dynamic 5QI Descriptor	M		9.3.1.28	
NG-RAN Allocation and Retention Priority	M		9.3.1.29	
GBR QoS Flow Information	O		9.3.1.30	This IE shall be present for GBR QoS Flows and is ignored otherwise.
Reflective QoS Attribute	O		ENUMERATED (subject to, …)	Details in TS 23.501 [20]. This IE applies to Non-GBR flows only and is ignored otherwise.
Additional QoS Flow Information	O		ENUMERATED (more likely, …)	This IE indicates that traffic for this QoS flow is likely to appear more often than traffic for other flows established for the PDU Session.
Paging Priority Indicator (PPI)	O		9.3.1.55	
RDI	O		ENUMERATED (enabled, …)	Indicates whether Reflective QoS flow to DRB mapping should be applied.

9.3.1.27 Non Dynamic 5QI Descriptor

This IE indicates the QoS Characteristics for a standardized or pre-configured 5QI for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
5QI	M		INTEGER (0..255, …)	This IE contains the standardized or pre-configured 5QI as specified in TS 23.501 [20].
Priority Level	O		9.3.1.51	For details see TS 23.501 [20]. When included overrides standardized or pre-configured value.
Averaging Window	O		9.3.1.49	This IE applies to GBR QoS Flows only. For details see TS 23.501 [20]. When included overrides standardized or pre-configured value.
Maximum Data Burst Volume	O		9.3.1.50	For details see TS 23.501 [20]. When included overrides standardized or pre-configured value.

9.3.1.28 Dynamic 5QI Descriptor

This IE indicates the QoS Characteristics for a Non-standardised or not pre-configured 5QI for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		9.3.1.51	For details see TS 23.501 [20].
Packet Delay Budget	M		9.3.1.47	For details see TS 23.501 [20].
Packet Error Rate	M		9.3.1.48	For details see TS 23.501 [20].
5QI	O		INTEGER (0..255,…)	This IE contains the dynamically assigned 5QI as specified in TS 23.501 [20].
Delay Critical	C-ifGBRflow		ENUMERATED (delay critical, non-delay critical)	For details see TS 23.501 [20].
Averaging Window	C-ifGBRflow		9.3.1.49	For details see TS 23.501 [20].
Maximum Data Burst Volume	O		9.3.1.50	For details see TS 23.501 [20]. This IE shall be included if the *Delay Critical* IE is set to “delay critical” and is ignored otherwise.

Condition	Explanation
ifGBRflow	This IE shall be present if the *GBR QoS Flow Information* IE is present in the *QoS Flow Level QoS Parameters* IE.

9.3.1.29 NG-RAN Allocation and Retention Priority

This IE specifies the relative importance of a QoS flow compared to other QoS flows for allocation and retention of NG-RAN resources.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		INTEGER (1..15)	**Desc**.: This IE defines the relative importance of a resource request (see TS 23.501 [20]). **Usage**: Values are ordered in decreasing order of priority, i.e., with 1 as the highest priority and 15 as the lowest priority. Further usage is defined in TS 23.501 [20].
Pre-emption Capability	M		ENUMERATED (shall not trigger pre-emption, may trigger pre-emption)	**Desc.:** This IE indicates the pre-emption capability of the request on other QoS flows. **Usage**: The QoS flow shall not pre-empt other QoS flows or, the QoS flow may pre-empt other QoS flows. Specified in TS 23.501 [20] NOTE: The Pre-emption Capability indicator applies to the allocation of resources for a QoS flow and as such it provides the trigger to the pre-emption procedures/processes of the NG-RAN node.
Pre-emption Vulnerability	M		ENUMERATED (not pre-emptable, pre-emptable)	**Desc.**: This IE indicates the vulnerability of the QoS flow to pre-emption of other QoS flows. **Usage**: The QoS flow shall not be pre-empted by other QoS flows or the QoS flow may be pre-empted by other QoS flows. Specified in TS 23.501 [20] NOTE: The Pre-emption Vulnerability indicator applies for the entire duration of the QoS flow, unless modified and as such indicates whether the QoS flow is a target of the pre-emption procedures/processes of the NG-RAN node.

9.3.1.30 GBR QoS Flow Information

This IE indicates QoS parameters for a GBR QoS flow for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Flow Bit Rate Downlink	M		Bit Rate 9.3.1.20	Maximum Bit Rate in DL. Details in TS 23.501 [20].
Maximum Flow Bit Rate Uplink	M		Bit Rate 9.3.1.20	Maximum Bit Rate in UL. Details in TS 23.501 [20].
Guaranteed Flow Bit Rate Downlink	M		Bit Rate 9.3.1.20	Guaranteed Bit Rate (provided there is data to deliver) in DL. Details in TS 23.501 [20].
Guaranteed Flow Bit Rate Uplink	M		Bit Rate 9.3.1.20	Guaranteed Bit Rate (provided there is data to deliver). Details in TS 23.501 [20].
Maximum Packet Loss Rate Downlink	O		Packet Loass Rate 9.3.1.46	Indicates the maximum rate for lost packets that can be tolerated in the downlink direction. Details in TS 23.501 [20].
Maximum Packet Loss Rate Uplink	O		Packet Loss Rate 9.3.1.46	Indicates the maximum rate for lost packets that can be tolerated in the uplink direction. Details in TS 23.501 [20].

9.3.1.31 Security Algorithm

This IE defines the type of ciphering algorithm and/or integrity protection used for the DRBs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Ciphering Algorithm	M		ENUMERATED (NEA0, 128-NEA1, 128-NEA2, 128-NEA3)	As defined in TS 33.501 [13].
Integrity Protection Algorithm	O		ENUMERATED (NIA0, 128-NIA1, 128-NIA2, 128-NIA3)	As defined in TS 33.501 [13] for NG-RAN.

9.3.1.32 User Plane Security Keys

This IE contains the ciphering and/or integrity protection keys generated by the gNB-CU-CP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Encryption Key	M		OCTET STRING	As defined in TS 33.501 [13].
Integrity Protection Key	O		OCTET STRING	As defined in TS 33.501 [13] for NG-RAN.

9.3.1.33 UL Configuration

This IE includes the UL configuration for the DRB and the corresponding Cell Groups.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UL Configuration	M		ENUMERATED (no-data, shared, only, ..)	Indicates the UL configuration for a Cell Group that is part of a DRB. “no data” means that the Cell Group is not used for UL data. “shared” means that the Cell Group is used for UL data together with at least another Cell Group. “only” means that only this Cellg Group is used for UL data.

9.3.1.34 gNB-CU-UP Cell Group Related Configuration

This IE provides information related to a cell group that the gNB-CU-UP is allowed to change.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
UP Parameters List		*1*			-	-
>UP Parameters Item		*1..<maxnoofUPParameters>*			-	-
>>Cell Group ID	M		INTEGER (0..3, …)	Cell group ID as defined in TS 38.331 [10] (0=MCG, 1=SCG). Used to identify the Cell Group to modify. In this version of the specification, values “2” and “3” are not used.	-	-
>>UP Transport Layer Information	M		9.3.2.1		-	-
>>UL Configuration	O		9.3.1.33	Indicates whether the Cell Group is used for UL traffic.	-	-

Range bound	Explanation
maxnoofUPParameters	Maximum no. of UP parameters (e.g., GTP tunnels) for a DRB. Value is 8.

9.3.1.35 PDCP Count

This IE include the PDCP Count information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
>PDCP SN	M		INTEGER (0 .. ..$2^{PDCP\_SN\_Size}$-1)	The PDCP SN Size is provided in the *PDCP Configuration* IE.
>HFN	M		INTEGER (0 .. $2^{32-PDCP\_SN\_Size}$-1)	The PDCP SN Size is provided in the *PDCP Configuration* IE.

9.3.1.36 NR CGI Support List

This IE indicates the list of supported NR CGIs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR CGI Support Item IEs		*1..<maxnoofNRCGI>*		
>NR CGI	M		9.3.1.14	

Range bound	Explanation
maxnoofNRCGI	Maximum no. of supported NR CGIs. Value is 512. This range may be redefined.

9.3.1.37 QoS Parameters Support List

This IE indicates the list of supported QoS parameters.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-UTRAN QoS Support List	O			
>E-UTRAN QoS Support Item		*1..<maxnoofEUTRNQOSParameters>*		
>>E-UTRAN QoS	M		9.3.1.17	
NG-RAN QoS Support List	O			
>NG-RAN QoS Support Item		*1..<maxnoofNGRANQOSParameters>*		
>>Non Dynamic 5QI Descriptor	M		9.3.1.27	

Range bound	Explanation
maxnoofEUTRANQOSParameters	Maximum no. of supported E-UTRAN QoS parameters. Value is 256. This range may be redefined.
maxnoofNGRANQOSParameters	Maximum no. of supported NG-RAN QoS parameters. Value is 256. This range may be redefined.

9.3.1.38 PDCP Configuration

This IE carries the PDCP configuration.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDCP SN UL Size	M		PDCP SN Size 9.3.1.61	Indicates the PDCP SN UL size in bits. For more information see *PDCP-Config IE* in TS 38.331 [10]. Is ignored if received through *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message.
PDCP SN DL Size	M		PDCP SN Size 9.3.1.61	Indicates the PDCP SN DL size in bits. For more information see *PDCP-Config IE* in TS 38.331 [10]. Is ignored if received through *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message.
RLC mode	M		ENUMERATED (RLC-TM, RLC-AM, RLC-UM-Bidirectional, RLC-UM-Unidirectional-UL, RLC-UM-Unidirectional-DL, …)	Indicates the RLC mode for the DRB. For more information see *PDCP-Config IE* in TS 38.331 [10]. Is ignored if received through *DRB To Modify List* IE in the BEARER CONTEXT MODIFICATION REQUEST message.
ROHC Parameters	O		9.3.1.40	
T-Reordering Timer	O		9.3.1.41	
Discard Timer	O		9.3.1.42	
UL Data Split Threshold	O		9.3.1.43	
PDCP Duplication	O		ENUMERATED (True, …)	Indicates whether PDCP duplication is to be configured for the DRB.
PDCP Re-establishment	O		ENUMERATED (true,…)	Indicates PDCP entity re-establishment to be triggered as defined in TS 38.323 [17]
PDCP Data Recovery	O		ENUMERATED (true,…)	Indicates PDCP data recovery to be triggered as defined in TS 38.323 [17]
Duplication Activation	O		ENUMERATED (Active, Inactive, …)	Information on the initial state of DL PDCP duplication
Out Of Order Delivery	O		ENUMERATED (true,…)	Indicates whether or not outOfOrderDelivery specified in TS 38.323 [17] is configured. Out of order delivery is configured only when the radio bearer is established.

9.3.1.39 SDAP Configuration

This IE carries the SDAP configuration.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Default DRB	M		ENUMERATED (True, False, …)	Indicates whether or not this is the default DRB for the PDU Session Resource. For more information see *SDAP-Config IE* in TS 38.331 [10].
SDAP Header UL	M		ENUMERATED (Present, Absent, …)	Indicates whether or not a SDAP header is present for UL data on this DRB. For more information see *SDAP-Config IE* in TS 38.331 [10].
SDAP Header DL	M		ENUMERATED (Present, Absent, …)	Indicates whether or not a SDAP header is present for DL data on this DRB. For more information see *SDAP-Config IE* in TS 38.331 [10].

9.3.1.40 ROHC Parameters

This IE carries the ROCH parameters for header compressions.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice ROHC Parameters	M			For more information see *PDCP-Config IE* in TS 38.331 [10].
>ROHC				
>>max CID	M		INTEGER (0..16383)	See description of maxCID inTS 38.331 [10]
>>ROHC Profiles	M		INTEGER (0..511)	Bitmap with supported UE profiles, bit 0 (LSB 0) = profile0x0001, bit 1 = profile0x0002, bit 2 = profile0x0003, bit 3 = profile0x0004, bit 4 = profile0x0006, bit 5 = profile0x0101, bit 6 = profile0x0102, bit 7 = profile0x0103, bit 8 = profile0x0104. See description of supportedROHC-Profiles in PDCP-Parameters in TS 38.331 [10].
>>Continue ROHC	O		ENUMERATED (true, …)	See description of drb-ContinueROHC inTS 38.331 [10]
>uplinkOnlyROHC				
>>max CID	M		INTEGER (0..16383)	See description of maxCID inTS 38.331 [10]
>>ROHC Profiles	M		INTEGER (0..511)	Bitmap with supported UE profiles, bit 4 = profile0x0006. See description of supportedROHC-Profiles in PDCP-Parameters in TS 38.331 [10].
>>Continue ROHC	O		ENUMERATED (true, …)	See description of drb-ContinueROHC inTS 38.331 [10]

9.3.1.41 T-Reordering Timer

This IE indicates the t-Reordering timer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
T-Reordering Timer	M		ENUMERATED (0, 1, 2, 4, 5, 8, 10, 15, 20, 30, 40, 50, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 500, 750, 1000, 1250, 1500, 1750, 2000, 2250, 2500, 2750, 3000, …)	Indicates the t-Reordering UL timer. The values are expressed in *ms*. For more information see *PDCP-Config IE* in TS 38.331 [10].

9.3.1.42 Discard Timer

This IE indicates PDCP discard timer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Discard Timer			ENUMERATED (10, 20, 30, 40, 50, 60, 75, 100, 150, 200, 250, 300, 500, 750, 1500, Infinity)	Indicates the PDCP discard timer. The values are expressed in *ms*. For more information see *PDCP-Config IE* in TS 38.331 [10].

9.3.1.43 UL Data Split Threshold

This IE indicates UL data split threshold.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UL Data Spit Threshold			ENUMERATED (0, 100, 200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200, 102400, 204800, 409600, 819200, 1228800, 1638400, 2457600, 3276800, 4096000, 4915200, 5734400, 6553600, Infinity, …)	Indicates the UL data split threshold. The values are expressed in bits. For more information see *PDCP-Config IE* in TS 38.331 [10].

9.3.1.44 Data Usage Report List

This IE provides information on the data usage for the UE, e.g., secondary NR RAT in EN-DC as specified in TS 37.340 [19].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Data usage report Item		1 .. <maxnoofDRBs>			-	-
>DRB ID	M		9.3.1.16		-	-
> RAT Type	M		ENUMERATED (NR, …)		-	-
>DRB Usage Report List		1			-	-
>>DRB Usage Report Item		1.. <maxnooftimeperiods>			-	-
>>>Start timestamp	M		OCTET STRING (SIZE(4))	Encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [14]. It indicates the UTC time when the recording of the Data Volume was started.	-	-
>>>End timestamp	M		OCTET STRING (SIZE(4))	Encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [14]. It indicates the UTC time when the recording of the Data Volume was ended.	-	-
>>>Usage count UL	M		INTEGER (0..2^{64}-1)	The unit is: octets.	-	-
>>>Usage count DL	M		INTEGER (0..2^{64}-1)	The unit is: octets.	-	-

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs. Value is 32.
maxnooftimeperiods	Maximum no. of time reporting periods. Value is 2.

9.3.1.45 Flow Failed List

This IE contains a list of QoS flows with a cause value. It is used for example to indicate failed QoS flow(s) or QoS flow(s) to be released.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
QoS Flow Item IEs		*1..<maxnoofQoSFlows>*			-	-
>QoS Flow Identifier	M		9.3.1.24		-	-
>Cause	M		9.3.1.2		-	-

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows in a PDU Session. Value is 64.

9.3.1.46 Packet Loss Rate

This IE indicates the Packet Loss Rate for a QoS Flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Packet Loss Rate	M		INTEGER (0..1000, …)	Ratio of lost packets per number of packets sent, expressed in tenth of percent.

9.3.1.47 Packet Delay Budget

This IE indicates the Packet Delay Budget for a QoS Flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Packet Delay Budget	M		INTEGER (0..1023, …)	Upper bound value for the delay that a packet may experience expressed in unit of 0.5ms.

9.3.1.48 Packet Error Rate

This IE indicates the Packet Error Rate for a QoS Flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Scalar	M		INTEGER (0..9, …)	The packet error rate is expressed as Scalar x 10-k where k is the Exponent.
Exponent	M		INTEGER (0..9, …)	

9.3.1.49 Averaging Window

This IE indicates the Averaging Window for a QoS Flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Averaging Window	M		INTEGER (0..4095, …)	Unit: ms. The default value is 2000ms.

9.3.1.50 Maximum Data Burst Volume

This IE indicates the Maximum Data Burst Volume for a QoS Flow and applies to delay critical GBR QoS flows only.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum Data Burst Volume	M		INTEGER (0..4095, ...)	Unit: byte.

9.3.1.51 Priority Level

This IE indicates the Priority Level for a QoS Flow.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		INTEGER (1..127, …)	Values ordered in decreasing order of priority i.e. with 1 as the highest priority and 127 as the lowest priority.

9.3.1.52 Security Result

This IE indicates whether the security policy indicated as "preferred" in the *Security Indication* IE is performed or not.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Integrity Protection Result	M		ENUMERATED (performed, not performed, …)	Indicates whether UP integrity protection is performed or not for the concerned PDU Session Resource.
Confidentiality Protection Result	M		ENUMERATED (performed, not performed, …)	Indicates whether UP ciphering is performed or not for the concerned PDU Session Resource.

9.3.1.53 Transaction ID

The *Transaction ID* IE uniquely identifies a procedure among all ongoing parallel procedures of the same type initiated by the same protocol peer. Messages belonging to the same procedure shall use the same Transaction ID. The Transaction ID is determined by the initiating peer of a procedure.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Transaction ID	M		INTEGER (0..255, …)	

9.3.1.54 Inactivity timer

This IE indicates the inactivity timer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Inactivity Timer	M		INTEGER (1.. 7200, …)	Indicates the inactivity timer. The values are expressed in *seconds*.

9.3.1.55 Paging Priority Indicator (PPI)

The Paging Policy Indicator is used for paging policy differentiation (see details in TS 23.501 [20]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PPI	M		INTEGER (0.. 7, …)	

9.3.1.56 gNB-CU-UP Capacity

This IE indicates the relative processing capacity of an gNB-CU-UP with respect to other gNB-CU-UPs in order to load-balance among different gNB-CU-UPs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
gNB-CU-UP Capacity	M		INTEGER(0..255)		-	-

9.3.1.57 Maximum Integrity Protected Data Rate

This IE indicates the maximum aggregate data rate for integrity protected DRBs for a UE as defined in TS 38.300 [8].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Maximum IP rate	M		ENUMERATED (64kbps, max-UErate, …)	Defines the upper bound of the aggregated data rate of user plane integrity protected data. This limit applies to both UL and DL independently.

9.3.1.58 PDCP SN Status Information

This IE contains information about PDCP PDU transfer status of a DRB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP Status Transfer UL		*1*			–	
>Receive Status Of PDCP SDU	O		BIT STRING (1.. 131072)	The first bit indicates the status of the SDU after the First Missing UL PDCP SDU. The Nth bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.	–	
>UL COUNT Value	M		PDCP Count 9.3.1.35	PDCP-SN and Hyper Frame Number of the first missing UL SDU	–	
PDCP Status Transfer DL		*1*			–	
>DL COUNT Value	M		PDCP Count 9.3.1.35	PDCP-SN and Hyper Frame Number that the target NG-RAN node (handover) or the NG-RAN node to which the DRB context is transferred (dual connectivity) should assign for the next DL SDU not having an SN yet.	–	

9.3.1.59 QoS Flow Mapping List

This IE contains a list of DRBs containing information about the mapped QoS flows.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
QoS Flow Mapping Item		*1..<maxnoofQoSFlows>*			–	
>QoS Flow Identifier	M		9.3.1.24		–	
>QoS Flow Mapping Indication	O		9.3.1.60		–	

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU Session. Value is 64.

9.3.1.60 QoS Flow Mapping Indication

This IE is used to indicate whether only the uplink or only the downlink of a QoS flow is mapped to a DRB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow Mapping Indication	M		ENUMERATED (ul, dl, ...)	Indicates that only the uplink or downlink QoS flow is mapped to the DRB

9.3.1.61 PDCP SN Size

This IE carries the PDCP SN Size.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDCP SN Size	M		ENUMERATED (s-12, s-18, …)	Indicates the PDCP SN size in bits. For more information see *PDCP-Config IE* in TS 38.331 [10].

9.3.1.62 Network Instance

This IE provides the network instance to be used by the NG-RAN node when selecting a particular transport network resource as described in TS 23.501 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Network Instance	M		INTEGER (1..256, …)	

9.3.1.63 MR-DC Usage Information

This IE provides information on the data usage for the UE connected to 5GC, e.g., secondary RAT in MR-DC as specified in TS 37.340 [19].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Data Usage per PDU Session Report	O				-	
>Secondary RAT Type	M		ENUMERATED (nR, e-UTRA…)			
>PDU session Timed Report List	M		MR-DC Data Usage Report List 9.3.1.64			
Data Usage per QoS Flow List	O					
>Data Usage per QoS Flow Item		*1..<maxnoofQoSFlows>*			–	
>>QoS Flow Indicator	M		9.3.1.24		–	
>>Secondary RAT Type	M		ENUMERATED (nR, e-UTRA…)		–	
>>QoS Flow Timed Report List	M		MR-DC Data Usage Report List 9.3.1.64		–	

Range bound	Explanation
maxnoofQoSFlows	Maximum no. of QoS flows allowed within one PDU session. Value is 64.

9.3.1.64 MR-DC Data Usage Report List

This IE provides information on the data usage.

MR-DC Data Usage Report Item		*1.. <maxnooftimeperiods>*		
>Start timestamp	M		OCTET STRING (SIZE(4))	UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [14]. It indicates the start time of the collecting period of the included *Usage Count UL* IE and *Usage Count DL* IE.
>End timestamp	M		OCTET STRING (SIZE(4))	UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [14]. It indicates the end time of the collecting period of the included *Usage Count UL* IE and *Usage Count DL* IE.
>Usage count UL	M		INTEGER (0..2^{64}-1)	The unit is: octets.
>Usage count DL	M		INTEGER (0..2^{64}-1)	The unit is: octets.

Range bound	Explanation
maxnooftimeperiods	Maximum no. of time reporting periods. Value is 2.

9.3.1.65 gNB-DU ID

The gNB-DU ID uniquely identifies a gNB-DU at least within a gNB-CU.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-DU ID	M		INTEGER (0 .. 2^{36}-1)	The gNB-DU ID is independently configured from cell identifiers, i.e. no connection between gNB-DU ID and cell identifiers.

9.3.1.66 Common Network Instance

This IE provides the common network instance to be used by the NG-RAN node when selecting a particular transport network resource as described in TS 23.501 [9] in a format common with 5GC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Common Network Instance	M		OCTET STRING	

9.3.1.67 Activity Notification Level

This IE contains information on which level activity notification shall be performed..

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Activity Notification Level	M		ENUMERATED (DRB, PDU Session, UE, …)	

9.3.2 Transport Network Layer Related IEs

9.3.2.1 UP Transport Layer Information

The *UP Transport Layer Information* IE identifies an transport bearer associated to a DRB. It contains a Transport Layer Address and a GTP Tunnel Endpoint Identifier. The Transport Layer Address is an IP address to be used for the user plane transport.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE *Transport Layer Information*	M			
>GTP Tunnel				
>>Transport Layer Address	M		9.3.2.4	
>>GTP-TEID	M		9.3.2.3	

9.3.2.2 CP Transport Layer Information

This IE is used to provide the E1 control plane transport layer information associated with an gNB-CU-CP and gNB-CU-UP pair.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE *CP Transport Layer Information*						
>Endpoint-IP-address					-	-
>> Endpoint IP address	M		Transport Layer Address 9.3.2.4		-	-
>Endpoint-IP-address-and-port					YES	reject
>>Endpoint IP address	M		Transport Layer Address 9.3.2.4		-	-
>>Port Number	M		BIT STRING (16)		-	-

9.3.2.3 GTP-TEID

The *GTP-TEID* IE is the GTP Tunnel Endpoint Identifier to be used for the user plane transport.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
GTP-TEID	M		OCTET STRING (SIZE(4))	For details and range, see TS 29.281 [15].

9.3.2.4 Transport Layer Address

This *Transport Layer Address* IE is an IP address.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Transport Layer Address	M		BIT STRING (SIZE(1..160, …))	The Radio Network Layer is not supposed to interpret the address information. It should pass it to the Transport Layer for interpretation. For details, see TS 38.414 [16].

9.3.2.5 Data Forwarding Information Request

This IE offers the possibility for the gNB-CU-CP to request data forwarding addresses to the gNB-CU-UP. It also offers the possibility for the gNB-CU-CP to provide a list of QoS flows subject to PDU Session level or DRB level data forwarding to the gNB to which DRBs or QoS flows have been offloaded.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Data Forwarding Request	M		ENUMERATED (UL, DL, both, …)	
QoS Flows forwarded on the forwarding tunnel(s)	O		QoS Flow Mapping List 9.3.1.59	This IE contains information for which QoS flows forwarded data packets are sent on: - either the PDU Session forwarding tunnel (UL and DL) - or the DRB forwarding tunnel (UL and DL).

9.3.2.6 Data Forwarding Information

This IE provides the data forwarding information when performing handover or data offloading.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UL Data Forwarding	O		UP Transport Layer Information 9.3.2.1	
DL Data Forwarding	O		UP Transport Layer Information 9.3.2.1	

9.3.3 Container and List IE definitions

9.3.3.1 DRB To Setup List E-UTRAN

This IE contains DRB related information used at Bearer Context Setup Request in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB To Setup Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>PDCP Configuration	M		9.3.1.38	
>E-UTRAN QoS	M		9.3.1.17	
>S1 UL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1	
>Data Forwarding Information Request	O		9.3.2.5	Requesting forwarding info from the target gNB-CU-UP.
>Cell Group Information	M		9.3.1.11	
>DL UP Parameters	O		UP Parameters 9.3.1.13	
>DRB Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to DRB.
>Existing Allocated S1 DL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.2 PDU Session Resource To Setup List

This IE contains PDU session resource related information used at Bearer Context Setup Request

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Resource To Setup Item		*1..<maxnoof PDUSession Resource>*			-	-
>PDU Session ID	M		9.3.1.21		-	-
>PDU Session Type	M		9.3.1.22		-	-
>S-NSSAI	M		9.3.1.9		-	-
>Security Indication	M		9.3.1.23		-	-
>PDU Session Resource DL Aggregate Maximum Bit Rate	O		Bit Rate 9.3.1.20	This IE shall be present when at least one Non-GBR QoS Flows is being setup.	-	-
>NG UL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1		-	-
>PDU Session Data Forwarding Information Request	O		Data Forwarding Information Request 9.3.2.5		-	-
>PDU Session Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to PDU Session.	-	-
>Existing Allocated NG DL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1		-	-
>Network Instance	O		9.3.1.62	This IE is ignored if the *Common Network Instance* IE is included.	YES	ignore
>Common Network Instance	O		9.3.1.66		YES	ignore
>DRB To Setup List		*1*			-	-
>>DRB To Setup Item		*1..<maxnoof DRBs>*			-	-
>>>DRB ID	M		9.3.1.16		-	-
>>>SDAP Configuration	M		9.3.1.39		-	-
>>>PDCP Configuration	M		9.3.1.38		-	-
>>>Cell Group Information	M		9.3.1.11		-	-
>>>QoS Flows Information To Be Setup	M		QoS Flow QoS Parameters List 9.3.1.25		-	-
>>>DRB Data forwarding information Request	O		Data Forwarding Information Request 9.3.2.5	Requesting forwarding info from the target gNB-CU-UP.	-	-
>>>DRB Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to DRB.	-	-
>>>PDCP SN Status Information	O		9.3.1.58	Contains the PDCP SN Status at setup after Resume.	-	-

>>>DRB QoS	O		9.3.1.26	Indicates the DRB QoS when more than one QoS Flow is mapped to the DRB.	YES	ignore

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.3 DRB Setup List E-UTRAN

This IE contains setup DRB related information at Bearer Context Setup Response in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Setup Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>S1 DL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1	
>Data Forwarding Information Response	O		Data Forwarding Information 9.3.2.6	Providing forwarding info from the target gNB-CU-UP.
>UL UP Parameters	M		UP Parameters 9.3.1.13	
>S1 DL UP Unchanged	O		ENUMERATED (True, …)	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.4 DRB Failed List E-UTRAN

This IE contains failed to setup DRB related information at Bearer Context Setup Response in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Failed Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.5 PDU Session Resource Setup List

This IE contains setup PDU session resource related information used at Bearer Context Setup Response

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Setup Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>Security Result	O		9.3.1.52	
>NG DL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1	
>PDU Session Data Forwarding Information Response	O		Data Forwarding Information 9.3.2.6	Providing forwarding info from the target gNB-CU-UP.
>NG DL UP Unchanged	O		ENUMERATED (True, …)	
>DRB Setup List		*1*		
>>DRB Setup Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>DRB Data forwarding information Response	O		Data Forwarding Information 9.3.2.6	Providing forwarding info from the target gNB-CU-UP.
>>>UL UP Parameters	M		UP Parameters 9.3.1.13	
>>>Flow Setup List	M		QoS Flow List 9.3.1.12	
>>>Flow Failed List	O		Flow Failed List 9.3.1.45	
>DRB Failed List		*0.. 1*		
>>DRB Failed Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.6 PDU Session Resource Failed List

This IE contains failed PDU session resource related information used at Bearer Context Setup Response

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Failed Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.7 DRB To Setup Modification List E-UTRAN

This IE contains DRB to setup related information used at Bearer Context Modification Request in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB To Setup Modification Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>PDCP Configuration	M		9.3.1.38	
>E-UTRAN QoS	M		9.3.1.17	
>S1 UL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1	
>Data Forwarding Information Request	O		9.3.2.5	Requesting forwarding info from the target gNB-CU-UP.
>Cell Group Information	M		9.3.1.11	
>DL UP Parameters	O		UP Parameters 9.3.1.13	
>DRB Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to DRB.

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.8 DRB To Modify List E-UTRAN

This IE contains DRB to modify related information used at Bearer Context Modification Request in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB To Modify Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>PDCP Configuration	O		9.3.1.38	
>E-UTRAN QoS	O		9.3.1.17	
>S1 UL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1	
>Data Forwarding Information	O		9.3.2.6	Providing forwarding info to the source gNB-CU-UP.
>PDCP SN Status Request	O		ENUMERATED (requested, …)	The gNB-CU-CP requests the gNB-CU-UP to provide the PDCP SN Status in the response message.
>PDCP SN Status Information	O		9.3.1.58	Providing SN Status information to the target gNB-CU-UP.
>DL UP Parameters	O		UP Parameters 9.3.1.13	
>Cell Group To Add	O		Cell Group Information 9.3.1.11	
>Cell Group To Modify	O		Cell Group Information 9.3.1.11	
>Cell Group To Remove	O		Cell Group Information 9.3.1.11	
>DRB Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to DRB.

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.9 DRB To Remove List E-UTRAN

This IE contains DRB to remove related information used at Bearer Context Modification Request in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB To Remove Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.10 PDU Session Resource To Setup Modification List

This IE contains PDU session resource to setup related information used at Bearer Context Modification Request

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Resource To Setup Modification Item		*1..<maxnoof PDUSession Resource>*			-	-
>PDU Session ID	M		9.3.1.21		-	-
>PDU Session Type	M		9.3.1.22		-	-
>S-NSSAI	M		9.3.1.9		-	-
>Security Indication	M		9.3.1.23		-	-
>PDU Session Resource DL Aggregate Maximum Bit Rate	O		Bit Rate 9.3.1.20	This IE shall be present when Non-GBR QoS Flows are setting up.	-	-
>NG UL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1		-	-
>PDU Session Data Forwarding Information Request	O		Data Forwarding Information Request 9.3.2.5	Requesting forwarding info from the target gNB-CU-UP.	-	-
>PDU Session Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to PDU Session.	-	-
>Network Instance	O		9.3.1.62		-	-
>Common Network Instance	O		9.3.1.66		YES	ignore
>DRB To Setup List		*1*			-	-
>>DRB To Setup Item		*1..<maxnoof DRBs>*			-	-
>>>DRB ID	M		9.3.1.16		-	-
>>>SDAP Configuration	M		9.3.1.39		-	-
>>>PDCP Configuration	M		9.3.1.38		-	-
>>>Cell Group Information	M		9.3.1.11		-	-
>>>QoS Flows Information To Be Setup	M		QoS Flow QoS Parameters List 9.3.1.25		-	-
>>>DRB Data forwarding information Request	O		Data Forwarding Information Request 9.3.2.5	Requesting forwarding info from the target gNB-CU-UP.	-	-
>>>DRB Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to DRB.	-	-
>>>PDCP SN Status Information	O		9.3.1.58	Provides the PDCP SN Status at setup after Resume to the target gNB-CU-UP.	-	-
>>>DRB QoS	O		9.3.1.26	Indicates the DRB QoS when more than one QoS Flow is mapped to the DRB	YES	ignore

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.11 PDU Session Resource To Modify List

This IE contains PDU session resource to modify related information used at Bearer Context Modification Request

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Resource To Modify Item		*1..<maxnoof PDUSession Resource>*			-	-
>PDU Session ID	M		9.3.1.21		-	-
>Security Indication	O		9.3.1.23	This IE is not used in this release.	-	-
>PDU Session Resource DL Aggregate Maximum Bit Rate	O		Bit Rate 9.3.1.20		-	-
>NG UL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1		-	-
>PDU Session Data Forwarding Information Request	O		Data Forwarding Information Request 9.3.2.5	Requesting forwarding information from the target gNB-CU-UP.	-	-
>PDU Session Data Forwarding Information	O		Data Forwarding Information 9.3.2.6	Providing forwarding information to the source gNB-CU-UP.	-	-
>PDU Session Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to PDU Session.	-	-
>Network Instance	O		9.3.1.62	This IE is ignored if the *Common Network Instance* IE is included.	YES	ignore
>Common Network Instance	O		9.3.1.66		YES	ignore
>DRB To Setup List		*0..1*			-	-
>>DRB To Setup Item		*1..<maxnoof DRBs>*			-	-
>>>DRB ID	M		9.3.1.16		-	-
>>>SDAP Configuration	M		9.3.1.39		-	-
>>>PDCP Configuration	M		9.3.1.38		-	-
>>>Cell Group Information	M		9.3.1.11		-	-
>>>Flow Mapping Information	M		QoS Flow QoS Parameters List 9.3.1.25		-	-
>>>DRB Data Forwarding Information Request	O		Data Forwarding Information Request 9.3.2.5	Requesting forwarding information from the target gNB-CU-UP.	-	-
>>>DRB Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to DRB.	-	-
>>>PDCP SN Status Information	O		9.3.1.58	Provides the PDCP SN Status at setup after Resume to the target gNB-CU-UP.	-	-

>>>DRB QoS	O		9.3.1.26	Indicates the DRB QoS when more than one QoS Flow is mapped to the DRB	YES	ignore
>DRB To Modify List		*0.. 1*			-	-
>>DRB To Modify Item		*1..<maxnoof DRBs>*			-	-
>>>DRB ID	M		9.3.1.16		-	-
>>>SDAP Configuration	O		9.3.1.39		-	-
>>>PDCP Configuration	O		9.3.1.38		-	-
>>>DRB Data forwarding information	O		Data Forwarding Information 9.3.2.6	Providing forwarding information to the source gNB-CU-UP.	-	-
>>>PDCP SN Status Request	O		ENUMERATED (requested, …)	The gNB-CU-CP requests the gNB-CU-UP to provide the PDCP SN Status in the response message.	-	-
>>>PDCP SN Status Information	O		9.3.1.58	Provides the PDCP SN Status to the target gNB-CU-UP.	-	-
>>>DL UP Parameters	O		UP Parameters 9.3.1.13		-	-
>>>Cell Group To Add	O		Cell Group Information 9.3.1.11		-	-
>>>Cell Group To Modify	O		Cell Group Information 9.3.1.11		-	-
>>>Cell Group To Remove	O		Cell Group Information 9.3.1.11		-	-
>>>Flow Mapping Information	O		QoS Flow QoS Parameters List 9.3.1.25	Overrides previous mapping information.	-	-
>>>DRB Inactivity Timer	O		Inactivity Timer 9.3.1.54	Included if the Activity Notification Level is set to DRB.	-	-
>>>Old QoS Flow List - UL End Marker expected	O		QoS Flow List 9.3.1.12	Indicates that the source NG-RAN node has initiated QoS flow re-mapping and has not yet received SDAP end markers, as described in TS 38.300 [8].	YES	reject
>>>DRB QoS	O		9.3.1.26	Indicates the DRB QoS when more than one QoS Flow is mapped to the DRB	YES	ignore
>DRB To Remove List		*0.. 1*			-	-
>>DRB To Remove Item		*1..<maxnoof DRBs>*			-	-

>>>DRB ID	M		9.3.1.16		-	-
>S-NSSAI	O		9.3.1.9		YES	reject

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.12 PDU Session Resource To Remove List

This IE contains PDU session resource to remove related information

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDU Session Resource To Remove Item		*1..<maxnoof PDUSession Resource>*			-	-
>PDU Session ID	M		9.3.1.21		-	-
>Cause	O		9.3.1.2		YES	ignore

Range bound	Explanation
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.13 DRB Setup Modification List E-UTRAN

This IE contains setup DRB related information at Bearer Context Modification Response in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Setup Modification Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>S1 DL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1	
>Data Forwarding Information Response	O		9.3.2.6	Provides forwarding information from the target gNB-CU-UP.
>UL UP Parameters	M		UP Parameters 9.3.1.13	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.14 DRB Failed Modification List E-UTRAN

This IE contains failed to setup DRB related information at Bearer Context Modification Response in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Failed Modification Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.15 DRB Modified List E-UTRAN

This IE contains modified DRB related information at Bearer Context Modification Response in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Modified Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>S1 DL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1	
>PDCP SN Status Information	O		9.3.1.58	Provides the PDCP SN Status from the source gNB-CU-UP.
>UL UP Parameters	O		UP Parameters 9.3.1.13	Carries the UL UP parameters.

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.16 DRB Failed To Modify List E-UTRAN

This IE contains failed to modify DRB related information at Bearer Context Modification Response in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Failed To Modify Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.17 PDU Session Resource Setup Modification List

This IE contains setup PDU session resource related information used at Bearer Context Modification Response

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Setup Modification Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>Security Result	O		9.3.1.52	
>NG DL UP Transport Layer Information	M		UP Transport Layer Information 9.3.2.1	
>PDU Session Data Forwarding Information Response	O		Data Forwarding Information 9.3.2.6	Provides forwarding information from the target gNB-CU-UP.
>DRB Setup List		*1*		
>>DRB Setup Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>DRB Data forwarding information Response	O		Data Forwarding Information 9.3.2.6	Provides forwarding information from the target gNB-CU-UP.
>>>UL UP Parameters	M		UP Parameters 9.3.1.13	
>>>Flow Setup List	M		QoS Flow List 9.3.1.12	
>>>Flow Failed List	O		Flow Failed List 9.3.1.45	
>DRB Failed List		*0.. 1*		
>>DRB Failed Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.18 PDU Session Resource Failed Modification List

This IE contains failed to setup PDU session resource related information used at Bearer Context Modification Response

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Failed Modification Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.19 PDU Session Resource Modified List

This IE contains modified PDU session resource related information used at Bearer Context Modification Response

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Modified Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>NG DL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1	
>Security Result	O		9.3.1.52	
>PDU Session Data Forwarding Information Response	O		Data Forwarding Information 9.3.2.6	
>DRB Setup List		*0.. 1*		
>>DRB Setup Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>DRB Data forwarding information Response	O		Data Forwarding Information 9.3.2.6	
>>>UL UP Parameters	M		UP Parameters 9.3.1.13	
>>>Flow Setup List	M		QoS Flow List 9.3.1.12	
>>>Flow Failed List	O		Flow Failed List 9.3.1.45	
>DRB Failed List		*0.. 1*		
>>DRB Failed Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>Cause	M		9.3.1.2	
>DRB Modified List		*0.. 1*		
>>DRB Modified Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>UL UP Parameters	O		UP Parameters 9.3.1.13	Carries the UL UP parameters.
>>>PDCP SN Status Information	O		9.3.1.58	Provides PDCP SN Status to the target gNB-CU-UP.
>>>Flow Setup List	O		QoS Flow List 9.3.1.12	
>>>Flow Failed List	O		Flow Failed List 9.3.1.45	
>DRB Failed To Modify List		*0.. 1*		
>>DRB Failed To Modify Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.20 PDU Session Resource Failed To Modify List

This IE contains failed to modify PDU session resource related information used at Bearer Context Modification Response

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Failed To Modify Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.21 DRB Required To Modify List E-UTRAN

This IE contains DRB to modify related information used at Bearer Context Modification Required in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Required To Modify Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>S1 DL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1	
>gNB-CU-UP Cell Group Related Configuration	O		9.3.1.34	
>Cause	O		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.22 DRB Required To Remove List E-UTRAN

This IE contains DRB to remove related information used at Bearer Context Modification Required in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Required To Remove Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.23 PDU Session Resource Required To Modify List

This IE contains PDU session resource to modify related information used at Bearer Context Modification Required

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Required To Modify Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>NG DL UP Transport Layer Information	O		UP Transport Layer Information 9.3.2.1	
>DRB To Modify List		*0.. 1*		
>>DRB To Modify Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>gNB-CU-UP Cell Group Related Configuration	O		9.3.1.34	
>>>Flow To Remove	O		QoS Flow List 9.3.1.12	
>>>Cause	O		9.3.1.2	
>DRB To Remove List		*0.. 1*		
>>DRB To Remove Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>Cause	M		9.3.1.2	

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.3.3.24 DRB Confirm Modified List E-UTRAN

This IE contains modified DRB related information at Bearer Context Modification Confirm in E-UTRAN

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DRB Confirm Modified Item E-UTRAN		*1..<maxnoof DRBs>*		
>DRB ID	M		9.3.1.16	
>Cell Group Information	O		9.3.1.11	Included if the gNB-CU-CP was unable to change cell group related information as requested in the *gNB-CU-UP Cell Group Related Configuration* IE (e.g., UL Configuration).

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.

9.3.3.25 PDU Session Resource Confirm Modified List

This IE contains modified PDU session resource related information used at Bearer Context Modification Confirm

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PDU Session Resource Modified Item		*1..<maxnoof PDUSession Resource>*		
>PDU Session ID	M		9.3.1.21	
>DRB Modified List		*0.. 1*		
>>DRB Modified Item		*1..<maxnoof DRBs>*		
>>>DRB ID	M		9.3.1.16	
>>>Cell Group Information	O		9.3.1.11	Included if the gNB-CU-CP was unable to change cell group related information as requested in the *gNB-CU-UP Cell Group Related Configuration* IE (e.g., UL Configuration).

Range bound	Explanation
maxnoofDRBs	Maximum no. of DRBs for a UE. Value is 32.
maxnoofPDUSessionResource	Maximum no. of PDU Sessions for a UE. Value is 256.

9.4 Message and Information Element Abstract Syntax (with ASN.1)

9.4.1 General

E1AP ASN.1 definition conforms to ITU-T Rec. X.691 [7], ITU-T Rec. X.680 [8] and ITU-T Rec. X.681 [9].

The ASN.1 definition specifies the structure and content of E1AP messages. E1AP messages can contain any IEs specified in the object set definitions for that message without the order or number of occurrence being restricted by ASN.1. However, for this version of the standard, a sending entity shall construct an E1AP message according to the PDU definitions module and with the following additional rules:

- IEs shall be ordered (in an IE container) in the order they appear in object set definitions.
- Object set definitions specify how many times IEs may appear. An IE shall appear exactly once if the presence field in an object has value "mandatory". An IE may appear at most once if the presence field in an object has value "optional" or "conditional". If in a tabular format there is multiplicity specified for an IE (i.e., an IE list) then in the corresponding ASN.1 definition the list definition is separated into two parts. The first part defines an IE container list where the list elements reside. The second part defines list elements. The IE container list appears as an IE of its own. For this version of the standard an IE container list may contain only one kind of list elements.

NOTE: In the above “IE” means an IE in the object set with an explicit ID. If one IE needs to appear more than once in one object set, then the different occurrences will have different IE IDs.

If an E1AP message that is not constructed as defined above is received, this shall be considered as Abstract Syntax Error, and the message shall be handled as defined for Abstract Syntax Error in clause 10.

9.4.2 Usage of private message mechanism for non-standard use

The private message mechanism for non-standard use may be used:

- for special operator- (and/or vendor) specific features considered not to be part of the basic functionality, i.e., the functionality required for a complete and high-quality specification in order to guarantee multivendor interoperability;
- by vendors for research purposes, e.g., to implement and evaluate new algorithms/features before such features are proposed for standardisation.

The private message mechanism shall not be used for basic functionality. Such functionality shall be standardised.

9.4.3 Elementary Procedure Definitions

```
-- ASN1START
-- **************************************************************
--
-- Elementary Procedure definitions
--
-- **************************************************************

E1AP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) e1ap (5) version1 (1) e1ap-PDU-Descriptions (0) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- IE parameter types from other modules
--
-- **************************************************************

IMPORTS
    Criticality,
    ProcedureCode

FROM E1AP-CommonDataTypes
    Reset,
    ResetAcknowledge,
    ErrorIndication,
    GNB-CU-UP-E1SetupRequest,
    GNB-CU-UP-E1SetupResponse,
    GNB-CU-UP-E1SetupFailure,
    GNB-CU-CP-E1SetupRequest,
    GNB-CU-CP-E1SetupResponse,
    GNB-CU-CP-E1SetupFailure,
    GNB-CU-UP-ConfigurationUpdate,
    GNB-CU-UP-ConfigurationUpdateAcknowledge,
    GNB-CU-UP-ConfigurationUpdateFailure,
    GNB-CU-CP-ConfigurationUpdate,
    GNB-CU-CP-ConfigurationUpdateAcknowledge,
    GNB-CU-CP-ConfigurationUpdateFailure,
    BearerContextSetupRequest,
    BearerContextSetupResponse,
    BearerContextSetupFailure,
    BearerContextModificationRequest,
    BearerContextModificationResponse,
    BearerContextModificationFailure,
    BearerContextModificationRequired,
    BearerContextModificationConfirm,
```

```
    BearerContextReleaseCommand,
    BearerContextReleaseComplete,
    BearerContextReleaseRequest,
    BearerContextInactivityNotification,
    DLDataNotification,
    ULDataNotification,
    DataUsageReport,
    E1ReleaseRequest,
    E1ReleaseResponse,
    GNB-CU-UP-CounterCheckRequest,
    GNB-CU-UP-StatusIndication,
    MRDC-DataUsageReport,
    PrivateMessage

FROM E1AP-PDU-Contents
    id-reset,
    id-errorIndication,
    id-gNB-CU-UP-E1Setup,
    id-gNB-CU-CP-E1Setup,
    id-gNB-CU-UP-ConfigurationUpdate,
    id-gNB-CU-CP-ConfigurationUpdate,
    id-e1Release,
    id-bearerContextSetup,
    id-bearerContextModification,
    id-bearerContextModificationRequired,
    id-bearerContextRelease,
    id-bearerContextReleaseRequest,
    id-bearerContextInactivityNotification,
    id-dLDataNotification,
    id-uLDataNotification,
    id-dataUsageReport,
    id-gNB-CU-UP-CounterCheck,
    id-gNB-CU-UP-StatusIndication,
    id-mRDC-DataUsageReport,
    id-privateMessage

FROM E1AP-Constants;

-- ************************************************************
--
-- Interface Elementary Procedure Class
--
-- ************************************************************

E1AP-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage              ,
    &SuccessfulOutcome                          OPTIONAL,

&UnsuccessfulOutcome                        OPTIONAL,
    &procedureCode              ProcedureCode   UNIQUE,
    &criticality                Criticality     DEFAULT ignore
}
WITH SYNTAX {
    INITIATING MESSAGE          &InitiatingMessage
```

```
    [SUCCESSFUL OUTCOME         &SuccessfulOutcome]
    [UNSUCCESSFUL OUTCOME       &UnsuccessfulOutcome]
    PROCEDURE CODE              &procedureCode
    [CRITICALITY                &criticality]
}

-- **************************************************************
--
-- Interface PDU Definition
--
-- **************************************************************

E1AP-PDU ::= CHOICE {
    initiatingMessage       InitiatingMessage,
    successfulOutcome       SuccessfulOutcome,
    unsuccessfulOutcome     UnsuccessfulOutcome,
    ...
}

InitiatingMessage ::= SEQUENCE {
    procedureCode           E1AP-ELEMENTARY-PROCEDURE.&procedureCode        ({E1AP-ELEMENTARY-PROCEDURES}),
    criticality             E1AP-ELEMENTARY-PROCEDURE.&criticality          ({E1AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
    value                   E1AP-ELEMENTARY-PROCEDURE.&InitiatingMessage    ({E1AP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

SuccessfulOutcome ::= SEQUENCE {
    procedureCode           E1AP-ELEMENTARY-PROCEDURE.&procedureCode        ({E1AP-ELEMENTARY-PROCEDURES}),
    criticality             E1AP-ELEMENTARY-PROCEDURE.&criticality          ({E1AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
    value                   E1AP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome    ({E1AP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

UnsuccessfulOutcome ::= SEQUENCE {
    procedureCode           E1AP-ELEMENTARY-PROCEDURE.&procedureCode        ({E1AP-ELEMENTARY-PROCEDURES}),
    criticality             E1AP-ELEMENTARY-PROCEDURE.&criticality          ({E1AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
    value                   E1AP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome  ({E1AP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

-- **************************************************************
--
-- Interface Elementary Procedure List
--
-- **************************************************************

E1AP-ELEMENTARY-PROCEDURES E1AP-ELEMENTARY-PROCEDURE ::= {
    E1AP-ELEMENTARY-PROCEDURES-CLASS-1          |
    E1AP-ELEMENTARY-PROCEDURES-CLASS-2          ,

    ...
}

E1AP-ELEMENTARY-PROCEDURES-CLASS-1 E1AP-ELEMENTARY-PROCEDURE ::= {
    reset                                       |
    gNB-CU-UP-E1Setup                           |
    gNB-CU-CP-E1Setup                           |
```

```
    gNB-CU-UP-ConfigurationUpdate              |
    gNB-CU-CP-ConfigurationUpdate              |
    e1Release                                  |
    bearerContextSetup                         |
    bearerContextModification                  |
    bearerContextModificationRequired          |
    bearerContextRelease                       ,
    ...
}

E1AP-ELEMENTARY-PROCEDURES-CLASS-2 E1AP-ELEMENTARY-PROCEDURE ::= {
    errorIndication                            |
    bearerContextReleaseRequest                |
    bearerContextInactivityNotification        |
    dLDataNotification                         |
    uLDataNotification                         |
    dataUsageReport                            |
    gNB-CU-UP-CounterCheck                     |
    gNB-CU-UP-StatusIndication                 |
    mRDC-DataUsageReport                       |
    privateMessage                             ,
    ...
}

-- **************************************************************
--
-- Interface Elementary Procedures
--
-- **************************************************************

reset E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      Reset
    SUCCESSFUL OUTCOME      ResetAcknowledge
    PROCEDURE CODE          id-reset
    CRITICALITY             reject
}

errorIndication E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ErrorIndication
    PROCEDURE CODE          id-errorIndication
    CRITICALITY             ignore
}

gNB-CU-UP-E1Setup E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      GNB-CU-UP-E1SetupRequest
    SUCCESSFUL OUTCOME      GNB-CU-UP-E1SetupResponse
    UNSUCCESSFUL OUTCOME    GNB-CU-UP-E1SetupFailure
    PROCEDURE CODE          id-gNB-CU-UP-E1Setup
    CRITICALITY             reject
}

gNB-CU-CP-E1Setup E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      GNB-CU-CP-E1SetupRequest
    SUCCESSFUL OUTCOME      GNB-CU-CP-E1SetupResponse
```

```
    UNSUCCESSFUL OUTCOME    GNB-CU-CP-E1SetupFailure
    PROCEDURE CODE          id-gNB-CU-CP-E1Setup
    CRITICALITY             reject
}

gNB-CU-UP-ConfigurationUpdate E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      GNB-CU-UP-ConfigurationUpdate
    SUCCESSFUL OUTCOME      GNB-CU-UP-ConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME    GNB-CU-UP-ConfigurationUpdateFailure
    PROCEDURE CODE          id-gNB-CU-UP-ConfigurationUpdate
    CRITICALITY             reject
}

gNB-CU-CP-ConfigurationUpdate E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      GNB-CU-CP-ConfigurationUpdate
    SUCCESSFUL OUTCOME      GNB-CU-CP-ConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME    GNB-CU-CP-ConfigurationUpdateFailure
    PROCEDURE CODE          id-gNB-CU-CP-ConfigurationUpdate
    CRITICALITY             reject
}

e1Release E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      E1ReleaseRequest
    SUCCESSFUL OUTCOME      E1ReleaseResponse
    PROCEDURE CODE          id-e1Release
    CRITICALITY             reject
}

bearerContextSetup E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      BearerContextSetupRequest
    SUCCESSFUL OUTCOME      BearerContextSetupResponse
    UNSUCCESSFUL OUTCOME    BearerContextSetupFailure
    PROCEDURE CODE          id-bearerContextSetup
    CRITICALITY             reject
}

bearerContextModification E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      BearerContextModificationRequest
    SUCCESSFUL OUTCOME      BearerContextModificationResponse
    UNSUCCESSFUL OUTCOME    BearerContextModificationFailure
    PROCEDURE CODE          id-bearerContextModification
    CRITICALITY             reject
}

bearerContextModificationRequired E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      BearerContextModificationRequired
    SUCCESSFUL OUTCOME      BearerContextModificationConfirm
    PROCEDURE CODE          id-bearerContextModificationRequired
    CRITICALITY             reject
}

bearerContextRelease E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      BearerContextReleaseCommand
    SUCCESSFUL OUTCOME      BearerContextReleaseComplete
```

```
    PROCEDURE CODE          id-bearerContextRelease
    CRITICALITY             reject
}

bearerContextReleaseRequest E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      BearerContextReleaseRequest
    PROCEDURE CODE          id-bearerContextReleaseRequest
    CRITICALITY             ignore
}

bearerContextInactivityNotification E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      BearerContextInactivityNotification
    PROCEDURE CODE          id-bearerContextInactivityNotification
    CRITICALITY             ignore
}

dLDataNotification E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      DLDataNotification
    PROCEDURE CODE          id-dLDataNotification
    CRITICALITY             ignore
}

uLDataNotification E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ULDataNotification
    PROCEDURE CODE          id-uLDataNotification
    CRITICALITY             ignore
}

dataUsageReport E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      DataUsageReport
    PROCEDURE CODE          id-dataUsageReport
    CRITICALITY             ignore
}

gNB-CU-UP-CounterCheck E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      GNB-CU-UP-CounterCheckRequest
    PROCEDURE CODE          id-gNB-CU-UP-CounterCheck
    CRITICALITY             ignore
}

gNB-CU-UP-StatusIndication  E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      GNB-CU-UP-StatusIndication
    PROCEDURE CODE          id-gNB-CU-UP-StatusIndication
    CRITICALITY         ignore
}

privateMessage E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PrivateMessage
    PROCEDURE CODE          id-privateMessage
    CRITICALITY             ignore
}

mRDC-DataUsageReport    E1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      MRDC-DataUsageReport
```

```
    PROCEDURE CODE          id-mRDC-DataUsageReport
    CRITICALITY             ignore
}

END
-- ASN1STOP
```

9.4.4 PDU Definitions

```
-- ASN1START
-- **************************************************************
--
-- PDU definitions for E1AP
--
-- **************************************************************

E1AP-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) e1ap (5) version1 (1) e1ap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- IE parameter types from other modules
--
-- **************************************************************

IMPORTS

    Cause,
    CriticalityDiagnostics,
    GNB-CU-CP-UE-E1AP-ID,
    GNB-CU-UP-UE-E1AP-ID,
    UE-associatedLogicalE1-ConnectionItem,
    GNB-CU-UP-ID,
    GNB-CU-UP-Name,
    GNB-CU-CP-Name,
    CNSupport,
    PLMN-Identity,
    Slice-Support-List,
    NR-CGI-Support-List,
    QoS-Parameters-Support-List,
    SecurityInformation,
    BitRate,
    BearerContextStatusChange,
    DRB-To-Setup-List-EUTRAN,
    DRB-Setup-List-EUTRAN,
    DRB-Failed-List-EUTRAN,
    DRB-To-Modify-List-EUTRAN,
    DRB-Modified-List-EUTRAN,
```

```
    DRB-Failed-To-Modify-List-EUTRAN,
    DRB-To-Remove-List-EUTRAN,
    DRB-Required-To-Remove-List-EUTRAN,
    DRB-Required-To-Modify-List-EUTRAN,
    DRB-Confirm-Modified-List-EUTRAN,
    DRB-To-Setup-Mod-List-EUTRAN,
    DRB-Setup-Mod-List-EUTRAN,
    DRB-Failed-Mod-List-EUTRAN,
    PDU-Session-Resource-To-Setup-List,
    PDU-Session-Resource-Setup-List,
    PDU-Session-Resource-Failed-List,
    PDU-Session-Resource-To-Modify-List,
    PDU-Session-Resource-Modified-List,
    PDU-Session-Resource-Failed-To-Modify-List,
    PDU-Session-Resource-To-Remove-List,
    PDU-Session-Resource-Required-To-Modify-List,
    PDU-Session-Resource-Confirm-Modified-List,
    PDU-Session-Resource-To-Setup-Mod-List,
    PDU-Session-Resource-Setup-Mod-List,
    PDU-Session-Resource-Failed-Mod-List,
    PDU-Session-To-Notify-List,
    DRB-Status-Item,
    DRB-Activity-Item,
    Data-Usage-Report-List,
    TimeToWait,
    ActivityNotificationLevel,
    ActivityInformation,
    New-UL-TNL-Information-Required,
    GNB-CU-CP-TNLA-Setup-Item,
    GNB-CU-CP-TNLA-Failed-To-Setup-Item,
    GNB-CU-CP-TNLA-To-Add-Item,
    GNB-CU-CP-TNLA-To-Remove-Item,
    GNB-CU-CP-TNLA-To-Update-Item,
    GNB-CU-UP-TNLA-To-Remove-Item,
    TransactionID,
    Inactivity-Timer,
    DRBs-Subject-To-Counter-Check-List-EUTRAN,
    DRBs-Subject-To-Counter-Check-List-NG-RAN,
    PPI,
    GNB-CU-UP-Capacity,
    GNB-CU-UP-OverloadInformation,
    DataDiscardRequired,
    PDU-Session-Resource-Data-Usage-List,
    RANUEID,
    GNB-DU-ID


FROM E1AP-IEs

    PrivateIE-Container{},
    ProtocolExtensionContainer{},
    ProtocolIE-Container{},
    ProtocolIE-ContainerList{},
    ProtocolIE-SingleContainer{},
```

```
    E1AP-PRIVATE-IES,
    E1AP-PROTOCOL-EXTENSION,
    E1AP-PROTOCOL-IES


FROM E1AP-Containers

    id-Cause,
    id-CriticalityDiagnostics,
    id-gNB-CU-CP-UE-E1AP-ID,
    id-gNB-CU-UP-UE-E1AP-ID,
    id-ResetType,
    id-UE-associatedLogicalE1-ConnectionItem,
    id-UE-associatedLogicalE1-ConnectionListResAck,
    id-gNB-CU-UP-ID,
    id-gNB-CU-UP-Name,
    id-gNB-CU-CP-Name,
    id-CNSupport,
    id-SupportedPLMNs,
    id-SecurityInformation,
    id-UEDLAggregateMaximumBitRate,
    id-BearerContextStatusChange,
    id-System-BearerContextSetupRequest,
    id-System-BearerContextSetupResponse,
    id-System-BearerContextModificationRequest,
    id-System-BearerContextModificationResponse,
    id-System-BearerContextModificationConfirm,
    id-System-BearerContextModificationRequired,
    id-DRB-Status-List,
    id-Data-Usage-Report-List,
    id-TimeToWait,
    id-ActivityNotificationLevel,
    id-ActivityInformation,
    id-New-UL-TNL-Information-Required,
    id-GNB-CU-CP-TNLA-Setup-List,
    id-GNB-CU-CP-TNLA-Failed-To-Setup-List,
    id-GNB-CU-CP-TNLA-To-Add-List,
    id-GNB-CU-CP-TNLA-To-Remove-List,
    id-GNB-CU-CP-TNLA-To-Update-List,
    id-GNB-CU-UP-TNLA-To-Remove-List,
    id-DRB-To-Setup-List-EUTRAN,
    id-DRB-To-Modify-List-EUTRAN,
    id-DRB-To-Remove-List-EUTRAN,
    id-DRB-Required-To-Modify-List-EUTRAN,
    id-DRB-Required-To-Remove-List-EUTRAN,
    id-DRB-Setup-List-EUTRAN,
    id-DRB-Failed-List-EUTRAN,
    id-DRB-Modified-List-EUTRAN,
    id-DRB-Failed-To-Modify-List-EUTRAN,
    id-DRB-Confirm-Modified-List-EUTRAN,
    id-DRB-To-Setup-Mod-List-EUTRAN,
    id-DRB-Setup-Mod-List-EUTRAN,
    id-DRB-Failed-Mod-List-EUTRAN,
    id-PDU-Session-Resource-To-Setup-List,
```

```
    id-PDU-Session-Resource-To-Modify-List,
    id-PDU-Session-Resource-To-Remove-List,
    id-PDU-Session-Resource-Required-To-Modify-List,
    id-PDU-Session-Resource-Setup-List,
    id-PDU-Session-Resource-Failed-List,
    id-PDU-Session-Resource-Modified-List,
    id-PDU-Session-Resource-Failed-To-Modify-List,
    id-PDU-Session-Resource-Confirm-Modified-List,
    id-PDU-Session-Resource-Setup-Mod-List,
    id-PDU-Session-Resource-Failed-Mod-List,
    id-PDU-Session-Resource-To-Setup-Mod-List,
    id-PDU-Session-To-Notify-List,
    id-TransactionID,
    id-Serving-PLMN,
    id-UE-Inactivity-Timer,
    id-System-GNB-CU-UP-CounterCheckRequest,
    id-DRBs-Subject-To-Counter-Check-List-EUTRAN,
    id-DRBs-Subject-To-Counter-Check-List-NG-RAN,
    id-PPI,
    id-gNB-CU-UP-Capacity,
    id-GNB-CU-UP-OverloadInformation,
    id-UEDLMaximumIntegrityProtectedDataRate,
    id-DataDiscardRequired,
    id-PDU-Session-Resource-Data-Usage-List,
    id-RANUEID,
    id-GNB-DU-ID,

    maxnoofErrors,
    maxnoofSPLMNs,
    maxnoofDRBs,
    maxnoofTNLAssociations,
    maxnoofIndividualE1ConnectionsToReset


FROM E1AP-Constants;

-- **************************************************************
--
-- RESET
--
-- **************************************************************

-- **************************************************************
--
-- Reset
--
-- **************************************************************

Reset ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {ResetIEs} },
    ...
}

ResetIEs E1AP-PROTOCOL-IES ::= {
```

```
    { ID id-TransactionID              CRITICALITY reject  TYPE TransactionID             PRESENCE mandatory  }|
    { ID id-Cause                      CRITICALITY ignore  TYPE Cause                     PRESENCE mandatory  }|
    { ID id-ResetType                  CRITICALITY reject  TYPE ResetType                 PRESENCE mandatory  },
    ...
}

ResetType ::= CHOICE {
    e1-Interface                   ResetAll,
    partOfE1-Interface             UE-associatedLogicalE1-ConnectionListRes,
    choice-extension               ProtocolIE-SingleContainer  {{ResetType-ExtIEs}}
}

ResetType-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

ResetAll ::= ENUMERATED {
    reset-all,
    ...
}

UE-associatedLogicalE1-ConnectionListRes ::= SEQUENCE (SIZE(1.. maxnoofIndividualE1ConnectionsToReset)) OF ProtocolIE-SingleContainer { { UE-
associatedLogicalE1-ConnectionItemRes } }

UE-associatedLogicalE1-ConnectionItemRes E1AP-PROTOCOL-IES ::= {

    { ID id-UE-associatedLogicalE1-ConnectionItem   CRITICALITY reject  TYPE UE-associatedLogicalE1-ConnectionItem  PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- Reset Acknowledge
--
-- **************************************************************

ResetAcknowledge ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {ResetAcknowledgeIEs} },
    ...
}

ResetAcknowledgeIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                                CRITICALITY reject  TYPE TransactionID           PRESENCE mandatory   }|
    { ID id-UE-associatedLogicalE1-ConnectionListResAck     CRITICALITY ignore  TYPE UE-associatedLogicalE1-ConnectionListResAck        PRESENCE
optional    }|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics         PRESENCE optional  },
    ...
}

UE-associatedLogicalE1-ConnectionListResAck ::= SEQUENCE (SIZE(1.. maxnoofIndividualE1ConnectionsToReset)) OF ProtocolIE-SingleContainer { { UE-
associatedLogicalE1-ConnectionItemResAck } }

UE-associatedLogicalE1-ConnectionItemResAck     E1AP-PROTOCOL-IES ::= {
    { ID id-UE-associatedLogicalE1-ConnectionItem    CRITICALITY ignore     TYPE UE-associatedLogicalE1-ConnectionItem   PRESENCE mandatory },
```

```
    ...
}


-- **************************************************************
--
-- ERROR INDICATION
--
-- **************************************************************

ErrorIndication ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container    {{ErrorIndication-IEs}},
    ...
}

ErrorIndication-IEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                   CRITICALITY reject  TYPE TransactionID             PRESENCE mandatory }|
    { ID id-gNB-CU-CP-UE-E1AP-ID            CRITICALITY ignore  TYPE GNB-CU-CP-UE-E1AP-ID      PRESENCE optional}|
    { ID id-gNB-CU-UP-UE-E1AP-ID            CRITICALITY ignore  TYPE GNB-CU-UP-UE-E1AP-ID      PRESENCE optional}|
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                     PRESENCE optional}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics    PRESENCE optional},
    ...
}

-- **************************************************************
--
-- GNB-CU-UP E1 SETUP
--
-- **************************************************************

-- **************************************************************
--
-- GNB-CU-UP E1 Setup Request
--
-- **************************************************************

GNB-CU-UP-E1SetupRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-UP-E1SetupRequestIEs} },
    ...
}

GNB-CU-UP-E1SetupRequestIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                       CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory  }|
    { ID id-gNB-CU-UP-ID                        CRITICALITY reject  TYPE GNB-CU-UP-ID               PRESENCE mandatory  }|
    { ID id-gNB-CU-UP-Name                      CRITICALITY ignore  TYPE GNB-CU-UP-Name             PRESENCE optional }|
    { ID id-CNSupport                           CRITICALITY reject  TYPE CNSupport                  PRESENCE mandatory  }|
    { ID id-SupportedPLMNs                      CRITICALITY reject  TYPE SupportedPLMNs-List        PRESENCE mandatory  }|
    { ID id-gNB-CU-UP-Capacity                  CRITICALITY ignore  TYPE GNB-CU-UP-Capacity         PRESENCE optional },
    ...
}

SupportedPLMNs-List ::= SEQUENCE (SIZE (1..maxnoofSPLMNs)) OF SupportedPLMNs-Item

SupportedPLMNs-Item ::= SEQUENCE {
```

```
    pLMN-Identity                   PLMN-Identity,
    slice-Support-List              Slice-Support-List                                      OPTIONAL,
    nR-CGI-Support-List             NR-CGI-Support-List                                     OPTIONAL,
    qoS-Parameters-Support-List     QoS-Parameters-Support-List                             OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { SupportedPLMNs-ExtIEs } }     OPTIONAL,
    ...
}

SupportedPLMNs-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- GNB-CU-UP E1 Setup Response
--
-- **************************************************************

GNB-CU-UP-E1SetupResponse ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-UP-E1SetupResponseIEs} },
    ...
}

GNB-CU-UP-E1SetupResponseIEs
 E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                       CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory   }|
    { ID id-gNB-CU-CP-Name                      CRITICALITY ignore  TYPE GNB-CU-CP-Name             PRESENCE optional },
    ...
}

-- **************************************************************
--
-- GNB-CU-UP E1 Setup Failure
--
-- **************************************************************

GNB-CU-UP-E1SetupFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-UP-E1SetupFailureIEs} },
    ...
}

GNB-CU-UP-E1SetupFailureIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID               CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory   }|
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory   }|
    { ID id-TimeToWait                  CRITICALITY ignore  TYPE TimeToWait                 PRESENCE optional}|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional },
    ...
}

-- **************************************************************
--
-- GNB-CU-CP E1 SETUP
--
-- **************************************************************
```

```
-- **************************************************************
--
-- GNB-CU-CP E1 Setup Request
--
-- **************************************************************

GNB-CU-CP-E1SetupRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-CP-E1SetupRequestIEs} },
    ...
}

GNB-CU-CP-E1SetupRequestIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                       CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory   }|
    { ID id-gNB-CU-CP-Name                      CRITICALITY ignore  TYPE GNB-CU-CP-Name             PRESENCE optional },
    ...
}

-- **************************************************************
--
-- GNB-CU-CP E1 Setup Response
--
-- **************************************************************

GNB-CU-CP-E1SetupResponse ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-CP-E1SetupResponseIEs} },
    ...
}

GNB-CU-CP-E1SetupResponseIEs
 E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                       CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory   }|
    { ID id-gNB-CU-UP-ID                        CRITICALITY reject  TYPE GNB-CU-UP-ID               PRESENCE mandatory   }|
    { ID id-gNB-CU-UP-Name                      CRITICALITY ignore  TYPE GNB-CU-UP-Name             PRESENCE optional }|
    { ID id-CNSupport                           CRITICALITY reject  TYPE CNSupport                  PRESENCE mandatory   }|
    { ID id-SupportedPLMNs                      CRITICALITY reject  TYPE SupportedPLMNs-List        PRESENCE mandatory   }|
    { ID id-gNB-CU-UP-Capacity                  CRITICALITY ignore  TYPE GNB-CU-UP-Capacity         PRESENCE optional },
    ...
}

-- **************************************************************
--
-- GNB-CU-CP E1 Setup Failure
--
-- **************************************************************

GNB-CU-CP-E1SetupFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-CP-E1SetupFailureIEs} },
    ...
}

GNB-CU-CP-E1SetupFailureIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID               CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory  }|
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory  }|
```

```
    { ID id-TimeToWait                  CRITICALITY ignore  TYPE TimeToWait                 PRESENCE optional }|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional },
    ...
}

-- **************************************************************
--
-- GNB-CU-UP CONFIGURATION UPDATE
--
-- **************************************************************

-- **************************************************************
--
-- GNB-CU-UP Configuration Update
--
-- **************************************************************

GNB-CU-UP-ConfigurationUpdate ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-UP-ConfigurationUpdateIEs} },
    ...
}

GNB-CU-UP-ConfigurationUpdateIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                       CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory   }|
    { ID id-gNB-CU-UP-ID                        CRITICALITY reject  TYPE GNB-CU-UP-ID               PRESENCE mandatory }|
    { ID id-gNB-CU-UP-Name                      CRITICALITY ignore  TYPE GNB-CU-UP-Name             PRESENCE optional }|
    { ID id-SupportedPLMNs                      CRITICALITY reject  TYPE SupportedPLMNs-List        PRESENCE optional }|
    { ID id-gNB-CU-UP-Capacity                  CRITICALITY ignore  TYPE GNB-CU-UP-Capacity         PRESENCE optional }|
    { ID id-GNB-CU-UP-TNLA-To-Remove-List       CRITICALITY reject  TYPE GNB-CU-UP-TNLA-To-Remove-List  PRESENCE optional },
    ...
}

GNB-CU-UP-TNLA-To-Remove-List   ::= SEQUENCE (SIZE(1.. maxnoofTNLAssociations)) OF GNB-CU-UP-TNLA-To-Remove-Item

-- **************************************************************
--
-- GNB-CU-UP Configuration Update Acknowledge
--
-- **************************************************************

GNB-CU-UP-ConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-UP-ConfigurationUpdateAcknowledgeIEs} },
    ...
}

GNB-CU-UP-ConfigurationUpdateAcknowledgeIEs
 E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                   CRITICALITY reject  TYPE TransactionID                  PRESENCE mandatory   }|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics         PRESENCE optional },
    ...
}

-- **************************************************************
--
```

```
-- GNB-CU-UP Configuration Update Failure
--
-- **************************************************************

GNB-CU-UP-ConfigurationUpdateFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-UP-ConfigurationUpdateFailureIEs} },
    ...
}

GNB-CU-UP-ConfigurationUpdateFailureIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID               CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory  }|
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory  }|
    { ID id-TimeToWait                  CRITICALITY ignore  TYPE TimeToWait                 PRESENCE optional}|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional},
    ...
}

-- **************************************************************
--
-- GNB-CU-CP CONFIGURATION UPDATE
--
-- **************************************************************

-- **************************************************************
--
-- GNB-CU-CP Configuration Update
--
-- **************************************************************

GNB-CU-CP-ConfigurationUpdate ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-CP-ConfigurationUpdateIEs} },
    ...
}

GNB-CU-CP-ConfigurationUpdateIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID               CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory  }|
    { ID id-gNB-CU-CP-Name                      CRITICALITY ignore  TYPE GNB-CU-UP-Name                PRESENCE optional}|
    { ID id-GNB-CU-CP-TNLA-To-Add-List          CRITICALITY ignore  TYPE GNB-CU-CP-TNLA-To-Add-List    PRESENCE optional}|
    { ID id-GNB-CU-CP-TNLA-To-Remove-List       CRITICALITY ignore  TYPE GNB-CU-CP-TNLA-To-Remove-List PRESENCE optional}|
    { ID id-GNB-CU-CP-TNLA-To-Update-List       CRITICALITY ignore  TYPE GNB-CU-CP-TNLA-To-Update-List PRESENCE optional},
    ...
}

GNB-CU-CP-TNLA-To-Add-List       ::= SEQUENCE (SIZE(1.. maxnoofTNLAssociations))    OF GNB-CU-CP-TNLA-To-Add-Item
GNB-CU-CP-TNLA-To-Remove-List   ::= SEQUENCE (SIZE(1.. maxnoofTNLAssociations)) OF GNB-CU-CP-TNLA-To-Remove-Item
GNB-CU-CP-TNLA-To-Update-List       ::= SEQUENCE (SIZE(1.. maxnoofTNLAssociations)) OF GNB-CU-CP-TNLA-To-Update-Item

-- **************************************************************
--
-- GNB-CU-CP Configuration Update Acknowledge
--
-- **************************************************************

GNB-CU-CP-ConfigurationUpdateAcknowledge ::= SEQUENCE {
```

```
    protocolIEs         ProtocolIE-Container       { {GNB-CU-CP-ConfigurationUpdateAcknowledgeIEs} },
    ...
}

GNB-CU-CP-ConfigurationUpdateAcknowledgeIEs
 E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                       CRITICALITY reject  TYPE TransactionID                          PRESENCE mandatory   }|
    { ID id-CriticalityDiagnostics              CRITICALITY ignore  TYPE CriticalityDiagnostics                  PRESENCE optional }|
    { ID id-GNB-CU-CP-TNLA-Setup-List           CRITICALITY ignore  TYPE GNB-CU-CP-TNLA-Setup-List               PRESENCE optional }|
    { ID id-GNB-CU-CP-TNLA-Failed-To-Setup-List CRITICALITY ignore  TYPE GNB-CU-CP-TNLA-Failed-To-Setup-List     PRESENCE optional },
    ...
}

GNB-CU-CP-TNLA-Setup-List               ::= SEQUENCE (SIZE(1.. maxnoofTNLAssociations)) OF GNB-CU-CP-TNLA-Setup-Item
GNB-CU-CP-TNLA-Failed-To-Setup-List ::= SEQUENCE (SIZE(1.. maxnoofTNLAssociations)) OF GNB-CU-CP-TNLA-Failed-To-Setup-Item


-- **************************************************************
--
-- GNB-CU-CP Configuration Update Failure
--
-- **************************************************************

GNB-CU-CP-ConfigurationUpdateFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {GNB-CU-CP-ConfigurationUpdateFailureIEs} },
    ...
}

GNB-CU-CP-ConfigurationUpdateFailureIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID               CRITICALITY reject  TYPE TransactionID              PRESENCE mandatory   }|
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory   }|
    { ID id-TimeToWait                  CRITICALITY ignore  TYPE TimeToWait                 PRESENCE optional }|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional },
    ...
}

-- **************************************************************
--
-- E1 RELEASE
--
-- **************************************************************

-- **************************************************************
--
-- E1 Release Request
--
-- **************************************************************

E1ReleaseRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {E1ReleaseRequestIEs} },
    ...
}

E1ReleaseRequestIEs E1AP-PROTOCOL-IES ::= {
```

```
    { ID id-TransactionID              CRITICALITY reject  TYPE TransactionID             PRESENCE mandatory  }|
    { ID id-Cause                      CRITICALITY ignore  TYPE Cause                     PRESENCE mandatory  },
    ...
}

-- **************************************************************
--
-- E1 Release Response
--
-- **************************************************************

E1ReleaseResponse ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {E1ReleaseResponseIEs} },
    ...
}

E1ReleaseResponseIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID              CRITICALITY reject  TYPE TransactionID             PRESENCE mandatory  },
    ...
}

-- **************************************************************
--
-- BEARER CONTEXT SETUP
--
-- **************************************************************

-- **************************************************************
--
-- Bearer Context Setup Request
--
-- **************************************************************

BearerContextSetupRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextSetupRequestIEs} },
    ...
}

BearerContextSetupRequestIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID               CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID                 PRESENCE mandatory }|
    { ID id-SecurityInformation                CRITICALITY reject  TYPE SecurityInformation                  PRESENCE mandatory }|
    { ID id-UEDLAggregateMaximumBitRate        CRITICALITY reject  TYPE BitRate                              PRESENCE mandatory }|
    { ID id-UEDLMaximumIntegrityProtectedDataRate   CRITICALITY reject      TYPE BitRate                      PRESENCE optional  }|
    { ID id-Serving-PLMN                       CRITICALITY ignore  TYPE PLMN-Identity                        PRESENCE mandatory }|
    { ID id-ActivityNotificationLevel          CRITICALITY reject  TYPE ActivityNotificationLevel            PRESENCE mandatory }|
    { ID id-UE-Inactivity-Timer                CRITICALITY reject  TYPE Inactivity-Timer                     PRESENCE optional  }|
    { ID id-BearerContextStatusChange          CRITICALITY reject  TYPE BearerContextStatusChange            PRESENCE optional  }|
    { ID id-System-BearerContextSetupRequest   CRITICALITY reject  TYPE System-BearerContextSetupRequest        PRESENCE mandatory }|
    { ID id-RANUEID                            CRITICALITY ignore  TYPE RANUEID                              PRESENCE optional }|
    { ID id-GNB-DU-ID                          CRITICALITY ignore  TYPE GNB-DU-ID                            PRESENCE optional },
    ...
}

System-BearerContextSetupRequest    ::= CHOICE {
```

```
    e-UTRAN-BearerContextSetupRequest       ProtocolIE-Container           {{EUTRAN-BearerContextSetupRequest}},
    nG-RAN-BearerContextSetupRequest        ProtocolIE-Container           {{NG-RAN-BearerContextSetupRequest}},
    choice-extension                        ProtocolIE-SingleContainer     {{System-BearerContextSetupRequest-ExtIEs}}
}

System-BearerContextSetupRequest-ExtIEs E1AP-PROTOCOL-IES::= {
    ...
}


EUTRAN-BearerContextSetupRequest E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-To-Setup-List-EUTRAN        CRITICALITY reject   TYPE DRB-To-Setup-List-EUTRAN    PRESENCE mandatory },
    ...
}

NG-RAN-BearerContextSetupRequest E1AP-PROTOCOL-IES ::= {
    { ID id-PDU-Session-Resource-To-Setup-List      CRITICALITY reject   TYPE PDU-Session-Resource-To-Setup-List   PRESENCE mandatory },
    ...
}


-- ************************************************************
--
-- Bearer Context Setup Response
--
-- ************************************************************

BearerContextSetupResponse ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextSetupResponseIEs} },
    ...
}


BearerContextSetupResponseIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID                CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID                   PRESENCE mandatory   }|
    { ID id-gNB-CU-UP-UE-E1AP-ID                CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID                   PRESENCE mandatory   }|
    { ID id-System-BearerContextSetupResponse   CRITICALITY ignore  TYPE System-BearerContextSetupResponse         PRESENCE mandatory  },
    ...
}

System-BearerContextSetupResponse::=    CHOICE {
    e-UTRAN-BearerContextSetupResponse      ProtocolIE-Container           {{EUTRAN-BearerContextSetupResponse}},
    nG-RAN-BearerContextSetupResponse       ProtocolIE-Container           {{NG-RAN-BearerContextSetupResponse}},
    choice-extension                        ProtocolIE-SingleContainer     {{System-BearerContextSetupResponse-ExtIEs}}
}

System-BearerContextSetupResponse-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

EUTRAN-BearerContextSetupResponse E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-Setup-List-EUTRAN       CRITICALITY ignore   TYPE DRB-Setup-List-EUTRAN         PRESENCE mandatory }|
    { ID id-DRB-Failed-List-EUTRAN      CRITICALITY ignore   TYPE DRB-Failed-List-EUTRAN        PRESENCE optional  },
    ...
```

```
}

NG-RAN-BearerContextSetupResponse E1AP-PROTOCOL-IES ::= {
    { ID id-PDU-Session-Resource-Setup-List     CRITICALITY ignore   TYPE PDU-Session-Resource-Setup-List    PRESENCE mandatory }|
    { ID id-PDU-Session-Resource-Failed-List    CRITICALITY ignore   TYPE PDU-Session-Resource-Failed-List   PRESENCE optional  },
    ...
}


-- **************************************************************
--
-- Bearer Context Setup Failure
--
-- **************************************************************

BearerContextSetupFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextSetupFailureIEs} },
    ...
}

BearerContextSetupFailureIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID        CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID        CRITICALITY ignore  TYPE GNB-CU-UP-UE-E1AP-ID          PRESENCE optional  }|
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                         PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics        PRESENCE optional  },
    ...
}

-- **************************************************************
--
-- BEARER CONTEXT MODIFICATION
--
-- **************************************************************

-- **************************************************************
--
-- Bearer Context Modification Request
--
-- **************************************************************

BearerContextModificationRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextModificationRequestIEs} },
    ...
}

BearerContextModificationRequestIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID                    CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID                      PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID                    CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID                      PRESENCE mandatory }|
    { ID id-SecurityInformation                     CRITICALITY reject  TYPE SecurityInformation                       PRESENCE optional  }|
    { ID id-UEDLAggregateMaximumBitRate             CRITICALITY reject  TYPE BitRate                                   PRESENCE optional  }|
    { ID id-UEDLMaximumIntegrityProtectedDataRate       CRITICALITY reject  TYPE BitRate                               PRESENCE optional  }|
    { ID id-BearerContextStatusChange               CRITICALITY reject  TYPE BearerContextStatusChange                 PRESENCE optional  }|
    { ID id-New-UL-TNL-Information-Required         CRITICALITY reject  TYPE New-UL-TNL-Information-Required           PRESENCE optional  }|
    { ID id-UE-Inactivity-Timer                     CRITICALITY reject  TYPE Inactivity-Timer                          PRESENCE optional  }|
```

```
    { ID id-DataDiscardRequired                CRITICALITY ignore  TYPE DataDiscardRequired                              PRESENCE optional  }|
    { ID id-System-BearerContextModificationRequest CRITICALITY reject  TYPE System-BearerContextModificationRequest     PRESENCE optional  }|
    { ID id-RANUEID                                 CRITICALITY ignore  TYPE RANUEID                                      PRESENCE optional }|
    { ID id-GNB-DU-ID                               CRITICALITY ignore  TYPE GNB-DU-ID                                    PRESENCE optional }|
    { ID id-ActivityNotificationLevel               CRITICALITY ignore  TYPE ActivityNotificationLevel                    PRESENCE optional },
    ...
}

System-BearerContextModificationRequest ::= CHOICE {
    e-UTRAN-BearerContextModificationRequest       ProtocolIE-Container           {{EUTRAN-BearerContextModificationRequest}},
    nG-RAN-BearerContextModificationRequest        ProtocolIE-Container           {{NG-RAN-BearerContextModificationRequest}},
    choice-extension                               ProtocolIE-SingleContainer     {{System-BearerContextModificationRequest-ExtIEs}}
}

System-BearerContextModificationRequest-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

EUTRAN-BearerContextModificationRequest E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-To-Setup-Mod-List-EUTRAN       CRITICALITY reject   TYPE DRB-To-Setup-Mod-List-EUTRAN    PRESENCE optional }|
    { ID id-DRB-To-Modify-List-EUTRAN          CRITICALITY reject   TYPE DRB-To-Modify-List-EUTRAN       PRESENCE optional }|
    { ID id-DRB-To-Remove-List-EUTRAN          CRITICALITY reject   TYPE DRB-To-Remove-List-EUTRAN       PRESENCE optional },
    ...
}

NG-RAN-BearerContextModificationRequest E1AP-PROTOCOL-IES ::= {
    { ID id-PDU-Session-Resource-To-Setup-Mod-List  CRITICALITY reject   TYPE PDU-Session-Resource-To-Setup-Mod-List  PRESENCE optional }|
    { ID id-PDU-Session-Resource-To-Modify-List     CRITICALITY reject   TYPE PDU-Session-Resource-To-Modify-List     PRESENCE optional }|
    { ID id-PDU-Session-Resource-To-Remove-List     CRITICALITY reject   TYPE PDU-Session-Resource-To-Remove-List     PRESENCE optional },
    ...
}


-- ************************************************************
--
-- Bearer Context Modification Response
--
-- ************************************************************

BearerContextModificationResponse ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextModificationResponseIEs} },
    ...
}


BearerContextModificationResponseIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID                    CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID                    PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID                    CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID                    PRESENCE mandatory }|
    { ID id-System-BearerContextModificationResponse    CRITICALITY ignore  TYPE System-BearerContextModificationResponse   PRESENCE optional  },
    ...
}

System-BearerContextModificationResponse    ::= CHOICE {
    e-UTRAN-BearerContextModificationResponse          ProtocolIE-Container {{EUTRAN-BearerContextModificationResponse}},
```

```
    nG-RAN-BearerContextModificationResponse           ProtocolIE-Container {{NG-RAN-BearerContextModificationResponse}},
    choice-extension                                   ProtocolIE-SingleContainer {{System-BearerContextModificationResponse-ExtIEs}}
}

System-BearerContextModificationResponse-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

EUTRAN-BearerContextModificationResponse E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-Setup-Mod-List-EUTRAN              CRITICALITY ignore  TYPE DRB-Setup-Mod-List-EUTRAN            PRESENCE optional }|
    { ID id-DRB-Failed-Mod-List-EUTRAN             CRITICALITY ignore  TYPE DRB-Failed-Mod-List-EUTRAN         PRESENCE optional }|
    { ID id-DRB-Modified-List-EUTRAN               CRITICALITY ignore  TYPE DRB-Modified-List-EUTRAN           PRESENCE optional }|
    { ID id-DRB-Failed-To-Modify-List-EUTRAN       CRITICALITY ignore  TYPE DRB-Failed-To-Modify-List-EUTRAN   PRESENCE optional },
    ...
}

NG-RAN-BearerContextModificationResponse E1AP-PROTOCOL-IES ::= {
    { ID id-PDU-Session-Resource-Setup-Mod-List         CRITICALITY reject  TYPE PDU-Session-Resource-Setup-Mod-List          PRESENCE optional }|
    { ID id-PDU-Session-Resource-Failed-Mod-List        CRITICALITY reject  TYPE PDU-Session-Resource-Failed-Mod-List         PRESENCE optional }|
    { ID id-PDU-Session-Resource-Modified-List          CRITICALITY reject  TYPE PDU-Session-Resource-Modified-List         PRESENCE optional }|
    { ID id-PDU-Session-Resource-Failed-To-Modify-List  CRITICALITY reject  TYPE PDU-Session-Resource-Failed-To-Modify-List  PRESENCE optional },
    ...
}


-- **************************************************************
--
-- Bearer Context Modification Failure
--
-- **************************************************************

BearerContextModificationFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextModificationFailureIEs} },
    ...
}

BearerContextModificationFailureIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID        CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID        CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                         PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics        PRESENCE optional  },
    ...
}

-- **************************************************************
--
-- BEARER CONTEXT MODIFICATION REQUIRED
--
-- **************************************************************

-- **************************************************************
--
-- Bearer Context Modification Required
--
```

```
-- **************************************************************

BearerContextModificationRequired ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextModificationRequiredIEs} },
    ...
}

BearerContextModificationRequiredIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID                      CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID                      PRESENCE mandatory
}|
    { ID id-gNB-CU-UP-UE-E1AP-ID                      CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID                      PRESENCE mandatory
}|
    { ID id-System-BearerContextModificationRequired  CRITICALITY reject  TYPE System-BearerContextModificationRequired   PRESENCE mandatory
},
    ...
}

System-BearerContextModificationRequired    ::= CHOICE {
    e-UTRAN-BearerContextModificationRequired       ProtocolIE-Container {{EUTRAN-BearerContextModificationRequired}},
    nG-RAN-BearerContextModificationRequired        ProtocolIE-Container {{NG-RAN-BearerContextModificationRequired}},
    choice-extension                                ProtocolIE-SingleContainer {{System-BearerContextModificationRequired-ExtIEs}}
}

System-BearerContextModificationRequired-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

EUTRAN-BearerContextModificationRequired E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-Required-To-Modify-List-EUTRAN  CRITICALITY reject  TYPE DRB-Required-To-Modify-List-EUTRAN   PRESENCE optional }|
    { ID id-DRB-Required-To-Remove-List-EUTRAN  CRITICALITY reject  TYPE DRB-Required-To-Remove-List-EUTRAN   PRESENCE optional },
    ...
}

NG-RAN-BearerContextModificationRequired E1AP-PROTOCOL-IES ::= {
    { ID id-PDU-Session-Resource-Required-To-Modify-List    CRITICALITY reject  TYPE PDU-Session-Resource-Required-To-Modify-List PRESENCE
optional }|
    { ID id-PDU-Session-Resource-To-Remove-List CRITICALITY reject   TYPE PDU-Session-Resource-To-Remove-List PRESENCE optional },
    ...
}


-- **************************************************************
--
-- Bearer Context Modification Confirm
--
-- **************************************************************

BearerContextModificationConfirm ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextModificationConfirmIEs} },
    ...
}


BearerContextModificationConfirmIEs E1AP-PROTOCOL-IES ::= {
```

```
    { ID id-gNB-CU-CP-UE-E1AP-ID                    CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID                   PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID                    CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID                   PRESENCE mandatory }|
    { ID id-System-BearerContextModificationConfirm     CRITICALITY ignore  TYPE System-BearerContextModificationConfirm    PRESENCE optional  },
    ...
}

System-BearerContextModificationConfirm ::= CHOICE {
    e-UTRAN-BearerContextModificationConfirm        ProtocolIE-Container {{EUTRAN-BearerContextModificationConfirm}},
    nG-RAN-BearerContextModificationConfirm         ProtocolIE-Container {{NG-RAN-BearerContextModificationConfirm}},
    choice-extension                                ProtocolIE-SingleContainer {{System-BearerContextModificationConfirm-ExtIEs}}
}

System-BearerContextModificationConfirm-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

EUTRAN-BearerContextModificationConfirm E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-Confirm-Modified-List-EUTRAN    CRITICALITY ignore   TYPE DRB-Confirm-Modified-List-EUTRAN PRESENCE optional },
    ...
}

NG-RAN-BearerContextModificationConfirm E1AP-PROTOCOL-IES ::= {
    { ID id-PDU-Session-Resource-Confirm-Modified-List  CRITICALITY ignore   TYPE PDU-Session-Resource-Confirm-Modified-List PRESENCE optional },
    ...
}


-- **************************************************************
--
-- BEARER CONTEXT RELEASE
--
-- **************************************************************

-- **************************************************************
--
-- Bearer Context Release Command
--
-- **************************************************************

BearerContextReleaseCommand ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextReleaseCommandIEs} },
    ...
}

BearerContextReleaseCommandIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID            CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID            CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                       PRESENCE mandatory },
    ...
}

-- **************************************************************
--
-- Bearer Context Release Complete
```

```
--
-- **************************************************************

BearerContextReleaseComplete ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextReleaseCompleteIEs} },
    ...
}


BearerContextReleaseCompleteIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID        CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID        CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID          PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics        PRESENCE optional  },
    ...
}

-- **************************************************************
--
-- BEARER CONTEXT RELEASE REQUEST
--
-- **************************************************************

-- **************************************************************
--
-- Bearer Context Release Request
--
-- **************************************************************

BearerContextReleaseRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextReleaseRequestIEs} },
    ...
}

BearerContextReleaseRequestIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID           CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID           CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-DRB-Status-List                CRITICALITY ignore  TYPE DRB-Status-List             PRESENCE optional  }|
    { ID id-Cause                          CRITICALITY ignore  TYPE Cause                       PRESENCE mandatory },
    ...
}

DRB-Status-List ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DRB-Status-Item


-- **************************************************************
--
-- BEARER CONTEXT INACTIVITY NOTIFICATION
--
-- **************************************************************

-- **************************************************************
--
-- Bearer Context Inactivity Notification
--
```

```
-- **************************************************************

BearerContextInactivityNotification ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { BearerContextInactivityNotificationIEs } },
    ...
}

BearerContextInactivityNotificationIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID            CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID            CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-ActivityInformation             CRITICALITY reject  TYPE ActivityInformation         PRESENCE mandatory },
    ...
}


-- **************************************************************
--
-- DL DATA NOTIFICATION
--
-- **************************************************************

-- **************************************************************
--
-- DL Data Notification
--
-- **************************************************************

DLDataNotification ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { DLDataNotificationIEs } },
    ...
}

DLDataNotificationIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID            CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID            CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-PPI                         CRITICALITY ignore  TYPE PPI                         PRESENCE optional },
    ...
}

-- **************************************************************

-- **************************************************************
--
-- UL Data Notification
--
-- **************************************************************

ULDataNotification ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { ULDataNotificationIEs } },
    ...
}

ULDataNotificationIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID            CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID        PRESENCE mandatory }|
```

```
    { ID id-gNB-CU-UP-UE-E1AP-ID           CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-PDU-Session-To-Notify-List     CRITICALITY reject   TYPE PDU-Session-To-Notify-List  PRESENCE mandatory },
    ...
}

-- **************************************************************
--
-- DATA USAGE REPORT
--
-- **************************************************************

-- **************************************************************
--
-- Data Usage Report
--
-- **************************************************************

DataUsageReport ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { DataUsageReportIEs } },
    ...
}

DataUsageReportIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID           CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID           CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID        PRESENCE mandatory }|
    { ID id-Data-Usage-Report-List         CRITICALITY ignore  TYPE Data-Usage-Report-List      PRESENCE mandatory },
    ...
}


-- **************************************************************
--
-- GNB-CU-UP COUNTER CHECK
--
-- **************************************************************

-- **************************************************************
--
-- gNB-CU-UP Counter Check Request
--
-- **************************************************************

GNB-CU-UP-CounterCheckRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { GNB-CU-UP-CounterCheckRequestIEs } },
    ...
}

GNB-CU-UP-CounterCheckRequestIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID                  CRITICALITY reject  TYPE GNB-CU-CP-UE-E1AP-ID                 PRESENCE mandatory }|
    { ID id-gNB-CU-UP-UE-E1AP-ID                  CRITICALITY reject  TYPE GNB-CU-UP-UE-E1AP-ID                 PRESENCE mandatory }|
    { ID id-System-GNB-CU-UP-CounterCheckRequest  CRITICALITY reject  TYPE System-GNB-CU-UP-CounterCheckRequest  PRESENCE mandatory },
    ...
}
```

```
System-GNB-CU-UP-CounterCheckRequest    ::= CHOICE {
    e-UTRAN-GNB-CU-UP-CounterCheckRequest       ProtocolIE-Container        {{EUTRAN-GNB-CU-UP-CounterCheckRequest}},
    nG-RAN-GNB-CU-UP-CounterCheckRequest        ProtocolIE-Container        {{NG-RAN-GNB-CU-UP-CounterCheckRequest}},
    choice-extension                            ProtocolIE-SingleContainer  {{System-GNB-CU-UP-CounterCheckRequest-ExtIEs}}
}

System-GNB-CU-UP-CounterCheckRequest-ExtIEs E1AP-PROTOCOL-IES::= {
    ...
}

EUTRAN-GNB-CU-UP-CounterCheckRequest E1AP-PROTOCOL-IES ::= {
    { ID id-DRBs-Subject-To-Counter-Check-List-EUTRAN   CRITICALITY ignore   TYPE DRBs-Subject-To-Counter-Check-List-EUTRAN PRESENCE mandatory },
    ...
}

NG-RAN-GNB-CU-UP-CounterCheckRequest E1AP-PROTOCOL-IES ::= {
    { ID id-DRBs-Subject-To-Counter-Check-List-NG-RAN   CRITICALITY ignore   TYPE DRBs-Subject-To-Counter-Check-List-NG-RAN PRESENCE mandatory },
    ...
}


-- **************************************************************
--
-- gNB-CU-UP STATUS INDICATION ELEMENTARY PROCEDURE
--
-- **************************************************************

-- **************************************************************
--
-- gNB-CU-UP Status Indication
--
-- **************************************************************


GNB-CU-UP-StatusIndication ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { { GNB-CU-UP-StatusIndicationIEs} },
    ...
}


GNB-CU-UP-StatusIndicationIEs E1AP-PROTOCOL-IES ::= {
    { ID id-TransactionID                       CRITICALITY reject  TYPE TransactionID                    PRESENCE mandatory   }|
    { ID id-GNB-CU-UP-OverloadInformation   CRITICALITY reject  TYPE GNB-CU-UP-OverloadInformation     PRESENCE mandatory   },
    ...
}

-- **************************************************************
--
-- MR-DC DATA USAGE REPORT
--
-- **************************************************************

MRDC-DataUsageReport ::= SEQUENCE {
    protocolIEs     ProtocolIE-Container        { { MRDC-DataUsageReportIEs } },
```

```
    ...
}

MRDC-DataUsageReportIEs E1AP-PROTOCOL-IES ::= {
    { ID id-gNB-CU-CP-UE-E1AP-ID                    CRITICALITY reject      TYPE GNB-CU-CP-UE-E1AP-ID                    PRESENCE mandatory}|
    { ID id-gNB-CU-UP-UE-E1AP-ID                    CRITICALITY reject      TYPE GNB-CU-UP-UE-E1AP-ID                    PRESENCE mandatory}|
    { ID id-PDU-Session-Resource-Data-Usage-List    CRITICALITY ignore      TYPE PDU-Session-Resource-Data-Usage-List  PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- PRIVATE MESSAGE
--
-- **************************************************************


PrivateMessage ::= SEQUENCE {
    privateIEs      PrivateIE-Container {{PrivateMessage-IEs}},
    ...
}

PrivateMessage-IEs E1AP-PRIVATE-IES ::= {
    ...
}

END
-- ASN1STOP
```

9.4.5 Information Element Definitions

```
-- ASN1START
-- **************************************************************
--
-- Information Element Definitions
--
-- **************************************************************

E1AP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) e1ap (5) version1 (1) e1ap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    id-CommonNetworkInstance,
    id-SNSSAI,
    id-OldQoSFlowMap-ULendmarkerexpected,
    id-DRB-QoS,
    id-endpoint-IP-Address-and-Port,
```

```
    id-NetworkInstance,
    id-QoSFlowMappingIndication,
    id-TNLAssociationTransportLayerAddressgNBCUUP,
    id-Cause,
    maxnoofErrors,
    maxnoofSliceItems,
    maxnoofEUTRANQOSParameters,
    maxnoofNGRANQOSParameters,
    maxnoofDRBs,
    maxnoofPDUSessionResource,
    maxnoofQoSFlows,
    maxnoofUPParameters,
    maxnoofCellGroups,
    maxnooftimeperiods,
    maxnoofNRCGI

FROM E1AP-Constants

    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
    TriggeringMessage

FROM E1AP-CommonDataTypes

    ProtocolExtensionContainer{},
    ProtocolIE-SingleContainer{},
    E1AP-PROTOCOL-EXTENSION,
    E1AP-PROTOCOL-IES


FROM E1AP-Containers;

-- A

ActivityInformation ::= CHOICE  {
    dRB-Activity-List                       DRB-Activity-List,
    pDU-Session-Resource-Activity-List      PDU-Session-Resource-Activity-List,
    uE-Activity                             UE-Activity,
    choice-extension                        ProtocolIE-SingleContainer  {{ActivityInformation-ExtIEs}}
}

ActivityInformation-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

ActivityNotificationLevel   ::= ENUMERATED  {
    drb,
    pdu-session,
    ue,
    ...
}

AveragingWindow  ::= INTEGER (0..4095, ...)
```

```
-- B

BearerContextStatusChange   ::=     ENUMERATED {
    suspend,
    resume,
    ...
}

BitRate ::= INTEGER (0..4000000000000,...)

-- C

Cause ::= CHOICE {
    radioNetwork        CauseRadioNetwork,
    transport           CauseTransport,
    protocol            CauseProtocol,
    misc                CauseMisc,
    choice-extension    ProtocolIE-SingleContainer  {{Cause-ExtIEs}}
}

Cause-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

CauseMisc ::= ENUMERATED {
    control-processing-overload,
    not-enough-user-plane-processing-resources,
    hardware-failure,
    om-intervention,
    unspecified,
    ...
}

CauseProtocol ::= ENUMERATED {
    transfer-syntax-error,
    abstract-syntax-error-reject,
    abstract-syntax-error-ignore-and-notify,
    message-not-compatible-with-receiver-state,
    semantic-error,
    abstract-syntax-error-falsely-constructed-message,
    unspecified,
    ...
}

CauseRadioNetwork ::= ENUMERATED {
    unspecified,
    unknown-or-already-allocated-gnb-cu-cp-ue-e1ap-id,
    unknown-or-already-allocated-gnb-cu-up-ue-e1ap-id,
    unknown-or-inconsistent-pair-of-ue-e1ap-id,
    interaction-with-other-procedure,
    pPDCP-Count-wrap-around,
    not-supported-QCI-value,
    not-supported-5QI-value,
```

```
    encryption-algorithms-not-supported,
    integrity-protection-algorithms-not-supported,
    uP-integrity-protection-not-possible,
    uP-confidentiality-protection-not-possible,
    multiple-PDU-Session-ID-Instances,
    unknown-PDU-Session-ID,
    multiple-QoS-Flow-ID-Instances,
    unknown-QoS-Flow-ID,
    multiple-DRB-ID-Instances,
    unknown-DRB-ID,
    invalid-QoS-combination,
    procedure-cancelled,
    normal-release,
    no-radio-resources-available,
    action-desirable-for-radio-reasons,
    resources-not-available-for-the-slice,
    pDCP-configuration-not-supported,
    ...,
    ue-dl-max-IP-data-rate-reason,
    uP-integrity-protection-failure,
    release-due-to-pre-emption
}

CauseTransport ::= ENUMERATED {
    unspecified,
    transport-resource-unavailable,
    ...
}

Cell-Group-Information  ::= SEQUENCE (SIZE(1.. maxnoofCellGroups)) OF Cell-Group-Information-Item

Cell-Group-Information-Item ::= SEQUENCE {
    cell-Group-ID                           Cell-Group-ID,
    uL-Configuration                        UL-Configuration        OPTIONAL,
    dL-TX-Stop                              DL-TX-Stop              OPTIONAL,
    rAT-Type                                RAT-Type                OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { Cell-Group-Information-Item-ExtIEs } }  OPTIONAL,
    ...
}

Cell-Group-Information-Item-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}


Cell-Group-ID   ::=     INTEGER (0..3, ...)

CipheringAlgorithm  ::= ENUMERATED {
    nEA0,
    c-128-NEA1,
    c-128-NEA2,
    c-128-NEA3,
    ...
}
```

```
CNSupport ::= ENUMERATED {
    c-epc,
    c-5gc,
    both,
    ...
}

CommonNetworkInstance ::= OCTET STRING

ConfidentialityProtectionIndication ::= ENUMERATED {
    required,
    preferred,
    not-needed,
    ...
}


ConfidentialityProtectionResult ::= ENUMERATED {
    performed,
    not-performed,
    ...
}


CP-TNL-Information      ::=     CHOICE {
    endpoint-IP-Address     TransportLayerAddress,
    choice-extension        ProtocolIE-SingleContainer  {{CP-TNL-Information-ExtIEs}}
}

CP-TNL-Information-ExtIEs E1AP-PROTOCOL-IES ::= {
    { ID id-endpoint-IP-Address-and-Port    CRITICALITY reject  TYPE Endpoint-IP-address-and-port    PRESENCE mandatory},
    ...
}


CriticalityDiagnostics ::= SEQUENCE {
    procedureCode                   ProcedureCode                   OPTIONAL,
    triggeringMessage               TriggeringMessage               OPTIONAL,
    procedureCriticality            Criticality                     OPTIONAL,
    transactionID                   TransactionID                   OPTIONAL,
    iEsCriticalityDiagnostics       CriticalityDiagnostics-IE-List  OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} }   OPTIONAL,
    ...
}


CriticalityDiagnostics-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxnoofErrors)) OF
    SEQUENCE {
        iECriticality           Criticality,
```

```
        iE-ID                   ProtocolIE-ID,
        typeOfError             TypeOfError,
        iE-Extensions           ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
}

CriticalityDiagnostics-IE-List-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- D

Data-Forwarding-Information-Request ::= SEQUENCE {
    data-Forwarding-Request                 Data-Forwarding-Request,
    qoS-Flows-Forwarded-On-Fwd-Tunnels  QoS-Flow-Mapping-List           OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { Data-Forwarding-Information-Request-ExtIEs } }OPTIONAL,
    ...
}

Data-Forwarding-Information-Request-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Data-Forwarding-Information ::= SEQUENCE {
    uL-Data-Forwarding                      UP-TNL-Information      OPTIONAL,
    dL-Data-Forwarding                      UP-TNL-Information      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { Data-Forwarding-Information-ExtIEs } }   OPTIONAL,
    ...
}

Data-Forwarding-Information-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Data-Forwarding-Request ::= ENUMERATED  {
    uL,
    dL,
    both,
    ...
}

Data-Usage-per-PDU-Session-Report ::= SEQUENCE {
    secondaryRATType            ENUMERATED {nR, e-UTRA, ...},
    pDU-session-Timed-Report-List           SEQUENCE (SIZE(1..maxnooftimeperiods)) OF MRDC-Data-Usage-Report-Item,
    iE-Extensions               ProtocolExtensionContainer { { Data-Usage-per-PDU-Session-Report-ExtIEs} } OPTIONAL,
...
}

Data-Usage-per-PDU-Session-Report-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Data-Usage-per-QoS-Flow-List    ::= SEQUENCE (SIZE(1..maxnoofQoSFlows)) OF Data-Usage-per-QoS-Flow-Item
```

```
Data-Usage-per-QoS-Flow-Item ::= SEQUENCE {
    qoS-Flow-Identifier     QoS-Flow-Identifier,
    secondaryRATType            ENUMERATED {nR, e-UTRA, ...},
    qoS-Flow-Timed-Report-List          SEQUENCE (SIZE(1..maxnooftimeperiods)) OF MRDC-Data-Usage-Report-Item,
    iE-Extensions               ProtocolExtensionContainer { { Data-Usage-per-QoS-Flow-Item-ExtIEs} } OPTIONAL,
...
}

Data-Usage-per-QoS-Flow-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Data-Usage-Report-List  ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF Data-Usage-Report-Item

Data-Usage-Report-Item  ::= SEQUENCE {
    dRB-ID                      DRB-ID,
    rAT-Type                    RAT-Type,
    dRB-Usage-Report-List       DRB-Usage-Report-List,
    iE-Extensions   ProtocolExtensionContainer { { Data-Usage-Report-ItemExtIEs } } OPTIONAL,
    ...
}

Data-Usage-Report-ItemExtIEs    E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DefaultDRB  ::= ENUMERATED  {
    true,
    false,
    ...
}

DiscardTimer    ::= ENUMERATED {ms10, ms20, ms30, ms40, ms50, ms60, ms75, ms100, ms150, ms200, ms250, ms300, ms500, ms750, ms1500, infinity}

DL-TX-Stop  ::= ENUMERATED  {
    stop,
    resume,
    ...
}

DRB-Activity    ::= ENUMERATED {
    active,
    not-active,
    ...
}

DRB-Activity-List ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF DRB-Activity-Item

DRB-Activity-Item   ::= SEQUENCE {
    dRB-ID                      DRB-ID,
    dRB-Activity                DRB-Activity,
    iE-Extensions   ProtocolExtensionContainer { { DRB-Activity-ItemExtIEs } }  OPTIONAL,
    ...
}
```

```
DRB-Activity-ItemExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Confirm-Modified-List-EUTRAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Confirm-Modified-Item-EUTRAN

DRB-Confirm-Modified-Item-EUTRAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    cell-Group-Information                  Cell-Group-Information  OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Confirm-Modified-Item-EUTRAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Confirm-Modified-Item-EUTRAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Confirm-Modified-List-NG-RAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Confirm-Modified-Item-NG-RAN

DRB-Confirm-Modified-Item-NG-RAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    cell-Group-Information                  Cell-Group-Information  OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Confirm-Modified-Item-NG-RAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Confirm-Modified-Item-NG-RAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Failed-List-EUTRAN  ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Failed-Item-EUTRAN

DRB-Failed-Item-EUTRAN  ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Failed-Item-EUTRAN-ExtIEs } }  OPTIONAL,
    ...
}

DRB-Failed-Item-EUTRAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Failed-Mod-List-EUTRAN  ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Failed-Mod-Item-EUTRAN

DRB-Failed-Mod-Item-EUTRAN  ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Failed-Mod-Item-EUTRAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Failed-Mod-Item-EUTRAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

DRB-Failed-List-NG-RAN  ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Failed-Item-NG-RAN

DRB-Failed-Item-NG-RAN  ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    cause                               Cause,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-Failed-Item-NG-RAN-ExtIEs } }  OPTIONAL,
    ...
}

DRB-Failed-Item-NG-RAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Failed-Mod-List-NG-RAN  ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Failed-Mod-Item-NG-RAN

DRB-Failed-Mod-Item-NG-RAN  ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    cause                               Cause,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-Failed-Mod-Item-NG-RAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Failed-Mod-Item-NG-RAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Failed-To-Modify-List-EUTRAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Failed-To-Modify-Item-EUTRAN

DRB-Failed-To-Modify-Item-EUTRAN    ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    cause                               Cause,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-Failed-To-Modify-Item-EUTRAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Failed-To-Modify-Item-EUTRAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Failed-To-Modify-List-NG-RAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Failed-To-Modify-Item-NG-RAN

DRB-Failed-To-Modify-Item-NG-RAN    ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    cause                               Cause,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-Failed-To-Modify-Item-NG-RAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Failed-To-Modify-Item-NG-RAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
DRB-ID  ::= INTEGER (1..32, ...)

DRB-Modified-List-EUTRAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Modified-Item-EUTRAN

DRB-Modified-Item-EUTRAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    s1-DL-UP-TNL-Information                UP-TNL-Information                      OPTIONAL,
    pDCP-SN-Status-Information              PDCP-SN-Status-Information              OPTIONAL,
    uL-UP-Transport-Parameters              UP-Parameters                           OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Modified-Item-EUTRAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-Modified-Item-EUTRAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Modified-List-NG-RAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Modified-Item-NG-RAN

DRB-Modified-Item-NG-RAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    uL-UP-Transport-Parameters              UP-Parameters                           OPTIONAL,
    pDCP-SN-Status-Information              PDCP-SN-Status-Information              OPTIONAL,
    flow-Setup-List                         QoS-Flow-List                           OPTIONAL,
    flow-Failed-List                        QoS-Flow-Failed-List                    OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Modified-Item-NG-RAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-Modified-Item-NG-RAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Required-To-Modify-List-EUTRAN ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Required-To-Modify-Item-EUTRAN

DRB-Required-To-Modify-Item-EUTRAN  ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    s1-DL-UP-TNL-Information                UP-TNL-Information                      OPTIONAL,
    gNB-CU-UP-CellGroupRelatedConfiguration GNB-CU-UP-CellGroupRelatedConfiguration     OPTIONAL,
    cause                                   Cause       OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Required-To-Modify-Item-EUTRAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Required-To-Modify-Item-EUTRAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Required-To-Modify-List-NG-RAN ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Required-To-Modify-Item-NG-RAN

DRB-Required-To-Modify-Item-NG-RAN  ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    gNB-CU-UP-CellGroupRelatedConfiguration GNB-CU-UP-CellGroupRelatedConfiguration     OPTIONAL,
```

```
    flow-To-Remove                          QoS-Flow-List                               OPTIONAL,
    cause                                   Cause       OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Required-To-Modify-Item-NG-RAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Required-To-Modify-Item-NG-RAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}


DRB-Setup-List-EUTRAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Setup-Item-EUTRAN

DRB-Setup-Item-EUTRAN   ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    s1-DL-UP-TNL-Information                UP-TNL-Information,
    data-Forwarding-Information-Response    Data-Forwarding-Information     OPTIONAL,
    uL-UP-Transport-Parameters              UP-Parameters,
    s1-DL-UP-Unchanged                      ENUMERATED {true, ...}      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Setup-Item-EUTRAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-Setup-Item-EUTRAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Setup-Mod-List-EUTRAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Setup-Mod-Item-EUTRAN

DRB-Setup-Mod-Item-EUTRAN   ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    s1-DL-UP-TNL-Information                UP-TNL-Information,
    data-Forwarding-Information-Response    Data-Forwarding-Information     OPTIONAL,
    uL-UP-Transport-Parameters              UP-Parameters,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Setup-Mod-Item-EUTRAN-ExtIEs } }  OPTIONAL,
    ...
}

DRB-Setup-Mod-Item-EUTRAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Setup-List-NG-RAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Setup-Item-NG-RAN

DRB-Setup-Item-NG-RAN   ::= SEQUENCE {
    dRB-ID                                      DRB-ID,
    dRB-data-Forwarding-Information-Response    Data-Forwarding-Information     OPTIONAL,
    uL-UP-Transport-Parameters                  UP-Parameters,
    flow-Setup-List                             QoS-Flow-List,
    flow-Failed-List                            QoS-Flow-Failed-List    OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { { DRB-Setup-Item-NG-RAN-ExtIEs } }  OPTIONAL,
    ...
}
```

```
DRB-Setup-Item-NG-RAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Setup-Mod-List-NG-RAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Setup-Mod-Item-NG-RAN

DRB-Setup-Mod-Item-NG-RAN   ::= SEQUENCE {
    dRB-ID                                      DRB-ID,
    dRB-data-Forwarding-Information-Response    Data-Forwarding-Information     OPTIONAL,
    uL-UP-Transport-Parameters                  UP-Parameters,
    flow-Setup-List                             QoS-Flow-List,
    flow-Failed-List                            QoS-Flow-Failed-List    OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { { DRB-Setup-Mod-Item-NG-RAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Setup-Mod-Item-NG-RAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Status-Item ::= SEQUENCE {
    dRB-ID                      DRB-ID,
    pDCP-DL-Count               PDCP-Count      OPTIONAL,
    pDCP-UL-Count               PDCP-Count      OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { { DRB-Status-ItemExtIEs } }    OPTIONAL,
    ...
}

DRB-Status-ItemExtIEs   E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBs-Subject-To-Counter-Check-List-EUTRAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRBs-Subject-To-Counter-Check-Item-EUTRAN

DRBs-Subject-To-Counter-Check-Item-EUTRAN   ::= SEQUENCE {
    dRB-ID                      DRB-ID,
    pDCP-UL-Count               PDCP-Count,
    pDCP-DL-Count               PDCP-Count,
    iE-Extensions       ProtocolExtensionContainer { { DRBs-Subject-To-Counter-Check-Item-EUTRAN-ExtIEs } }   OPTIONAL,
    ...
}

DRBs-Subject-To-Counter-Check-Item-EUTRAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBs-Subject-To-Counter-Check-List-NG-RAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRBs-Subject-To-Counter-Check-Item-NG-RAN

DRBs-Subject-To-Counter-Check-Item-NG-RAN   ::= SEQUENCE {
    pDU-Session-ID              PDU-Session-ID,
    dRB-ID                      DRB-ID,
    pDCP-UL-Count               PDCP-Count,
    pDCP-DL-Count               PDCP-Count,
    iE-Extensions           ProtocolExtensionContainer { { DRBs-Subject-To-Counter-Check-Item-NG-RAN-ExtIEs } }  OPTIONAL,
```

```
    ...
}

DRBs-Subject-To-Counter-Check-Item-NG-RAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}


DRB-To-Modify-List-EUTRAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Modify-Item-EUTRAN

DRB-To-Modify-Item-EUTRAN   ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    pDCP-Configuration                      PDCP-Configuration                      OPTIONAL,
    eUTRAN-QoS                              EUTRAN-QoS                              OPTIONAL,
    s1-UL-UP-TNL-Information                UP-TNL-Information                      OPTIONAL,
    data-Forwarding-Information     Data-Forwarding-Information     OPTIONAL,
    pDCP-SN-Status-Request                  PDCP-SN-Status-Request                      OPTIONAL,
    pDCP-SN-Status-Information              PDCP-SN-Status-Information              OPTIONAL,
    dL-UP-Parameters                        UP-Parameters                           OPTIONAL,
    cell-Group-To-Add                       Cell-Group-Information                  OPTIONAL,
    cell-Group-To-Modify                    Cell-Group-Information                  OPTIONAL,
    cell-Group-To-Remove                    Cell-Group-Information                  OPTIONAL,
    dRB-Inactivity-Timer                    Inactivity-Timer                        OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Modify-Item-EUTRAN-ExtIEs } }  OPTIONAL,
    ...
}

DRB-To-Modify-Item-EUTRAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-To-Modify-List-NG-RAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Modify-Item-NG-RAN

DRB-To-Modify-Item-NG-RAN   ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    sDAP-Configuration                      SDAP-Configuration                      OPTIONAL,
    pDCP-Configuration                      PDCP-Configuration                      OPTIONAL,
    dRB-Data-Forwarding-Information     Data-Forwarding-Information     OPTIONAL,
    pDCP-SN-Status-Request                      PDCP-SN-Status-Request                      OPTIONAL,
    pdcp-SN-Status-Information              PDCP-SN-Status-Information              OPTIONAL,
    dL-UP-Parameters                        UP-Parameters                           OPTIONAL,
    cell-Group-To-Add                       Cell-Group-Information                  OPTIONAL,
    cell-Group-To-Modify                    Cell-Group-Information                  OPTIONAL,
    cell-Group-To-Remove                    Cell-Group-Information                  OPTIONAL,
    flow-Mapping-Information                QoS-Flow-QoS-Parameter-List             OPTIONAL,
    dRB-Inactivity-Timer                    Inactivity-Timer                        OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Modify-Item-NG-RAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-To-Modify-Item-NG-RAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    {ID id-OldQoSFlowMap-ULendmarkerexpected    CRITICALITY reject  EXTENSION QoS-Flow-List PRESENCE optional}|
    {ID id-DRB-QoS  CRITICALITY ignore  EXTENSION QoSFlowLevelQoSParameters PRESENCE optional},
    ...
```

```
}

DRB-To-Remove-List-EUTRAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Remove-Item-EUTRAN

DRB-To-Remove-Item-EUTRAN   ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-To-Remove-Item-EUTRAN-ExtIEs } }  OPTIONAL,
    ...
}

DRB-To-Remove-Item-EUTRAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Required-To-Remove-List-EUTRAN  ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Required-To-Remove-Item-EUTRAN

DRB-Required-To-Remove-Item-EUTRAN  ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    cause                               Cause,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-Required-To-Remove-Item-EUTRAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Required-To-Remove-Item-EUTRAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-To-Remove-List-NG-RAN   ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Remove-Item-NG-RAN

DRB-To-Remove-Item-NG-RAN   ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-To-Remove-Item-NG-RAN-ExtIEs } }  OPTIONAL,
    ...
}

DRB-To-Remove-Item-NG-RAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-Required-To-Remove-List-NG-RAN  ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-Required-To-Remove-Item-NG-RAN

DRB-Required-To-Remove-Item-NG-RAN  ::= SEQUENCE {
    dRB-ID                              DRB-ID,
    cause                               Cause,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-Required-To-Remove-Item-NG-RAN-ExtIEs } } OPTIONAL,
    ...
}

DRB-Required-To-Remove-Item-NG-RAN-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-To-Setup-List-EUTRAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Setup-Item-EUTRAN
```

```
DRB-To-Setup-Item-EUTRAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    pDCP-Configuration                      PDCP-Configuration,
    eUTRAN-QoS                              EUTRAN-QoS,
    s1-UL-UP-TNL-Information                UP-TNL-Information,
    data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    cell-Group-Information                  Cell-Group-Information,
    dL-UP-Parameters                        UP-Parameters                           OPTIONAL,
    dRB-Inactivity-Timer                    Inactivity-Timer                        OPTIONAL,
    existing-Allocated-S1-DL-UP-TNL-Info    UP-TNL-Information                      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Setup-Item-EUTRAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-To-Setup-Item-EUTRAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-To-Setup-Mod-List-EUTRAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Setup-Mod-Item-EUTRAN

DRB-To-Setup-Mod-Item-EUTRAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    pDCP-Configuration                      PDCP-Configuration,
    eUTRAN-QoS                              EUTRAN-QoS,
    s1-UL-UP-TNL-Information                 UP-TNL-Information,
    data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    cell-Group-Information                  Cell-Group-Information,
    dL-UP-Parameters                        UP-Parameters                           OPTIONAL,
    dRB-Inactivity-Timer                    Inactivity-Timer                        OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Setup-Mod-Item-EUTRAN-ExtIEs } }OPTIONAL,
    ...
}

DRB-To-Setup-Mod-Item-EUTRAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRB-To-Setup-List-NG-RAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Setup-Item-NG-RAN

DRB-To-Setup-Item-NG-RAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    sDAP-Configuration                      SDAP-Configuration,
    pDCP-Configuration                      PDCP-Configuration,
    cell-Group-Information                  Cell-Group-Information,
    qos-flow-Information-To-Be-Setup                QoS-Flow-QoS-Parameter-List,
    dRB-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    dRB-Inactivity-Timer                    Inactivity-Timer    OPTIONAL,
    pDCP-SN-Status-Information                          PDCP-SN-Status-Information                      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Setup-Item-NG-RAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-To-Setup-Item-NG-RAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
        {ID id-DRB-QoS  CRITICALITY ignore  EXTENSION QoSFlowLevelQoSParameters PRESENCE optional},
```

```
    ...
}

DRB-To-Setup-Mod-List-NG-RAN    ::= SEQUENCE (SIZE(1.. maxnoofDRBs)) OF DRB-To-Setup-Mod-Item-NG-RAN

DRB-To-Setup-Mod-Item-NG-RAN    ::= SEQUENCE {
    dRB-ID                                  DRB-ID,
    sDAP-Configuration                      SDAP-Configuration,
    pDCP-Configuration                      PDCP-Configuration,
    cell-Group-Information                  Cell-Group-Information,
    flow-Mapping-Information                QoS-Flow-QoS-Parameter-List,
    dRB-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    dRB-Inactivity-Timer                    Inactivity-Timer                    OPTIONAL,
    pDCP-SN-Status-Information              PDCP-SN-Status-Information              OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Setup-Mod-Item-NG-RAN-ExtIEs } }OPTIONAL,
    ...
}

DRB-To-Setup-Mod-Item-NG-RAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    {ID id-DRB-QoS  CRITICALITY ignore  EXTENSION QoSFlowLevelQoSParameters PRESENCE optional},
    ...
}

DRB-Usage-Report-List ::= SEQUENCE (SIZE(1..maxnooftimeperiods)) OF DRB-Usage-Report-Item

DRB-Usage-Report-Item   ::= SEQUENCE {
    startTimeStamp                  OCTET STRING (SIZE(4)),
    endTimeStamp                    OCTET STRING (SIZE(4)),
    usageCountUL                    INTEGER (0..18446744073709551615),
    usageCountDL                    INTEGER (0..18446744073709551615),
    iE-Extensions                   ProtocolExtensionContainer { { DRB-Usage-Report-Item-ExtIEs} } OPTIONAL,
    ...
}

DRB-Usage-Report-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Duplication-Activation  ::=     ENUMERATED {
    active,
    inactive,
    ...
}


Dynamic5QIDescriptor    ::= SEQUENCE {
    qoSPriorityLevel                    QoSPriorityLevel,
    packetDelayBudget                   PacketDelayBudget,
    packetErrorRate                     PacketErrorRate,
    fiveQI                              INTEGER (0..255, ...)                               OPTIONAL,
    delayCritical                       ENUMERATED {delay-critical, non-delay-critical}     OPTIONAL,
    averagingWindow                     AveragingWindow                                     OPTIONAL,
    maxDataBurstVolume                  MaxDataBurstVolume                                  OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { Dynamic5QIDescriptor-ExtIEs } } OPTIONAL
```

```
}

Dynamic5QIDescriptor-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DataDiscardRequired ::=     ENUMERATED {
    required,
    ...
}

-- E

EncryptionKey   ::= OCTET STRING

Endpoint-IP-address-and-port::= SEQUENCE {
    endpoint-IP-Address         TransportLayerAddress,
    portNumber                  PortNumber,
    iE-Extensions                           ProtocolExtensionContainer { { Endpoint-IP-address-and-port-ExtIEs} } OPTIONAL
}

Endpoint-IP-address-and-port-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

EUTRANAllocationAndRetentionPriority ::= SEQUENCE {
    priorityLevel               PriorityLevel,
    pre-emptionCapability       Pre-emptionCapability,
    pre-emptionVulnerability    Pre-emptionVulnerability,
    iE-Extensions               ProtocolExtensionContainer { {EUTRANAllocationAndRetentionPriority-ExtIEs} } OPTIONAL,
    ...
}

EUTRANAllocationAndRetentionPriority-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}


EUTRAN-QoS-Support-List ::= SEQUENCE (SIZE(1.. maxnoofEUTRANQOSParameters)) OF EUTRAN-QoS-Support-Item

EUTRAN-QoS-Support-Item ::= SEQUENCE {
    eUTRAN-QoS  EUTRAN-QoS,
    iE-Extensions           ProtocolExtensionContainer { { EUTRAN-QoS-Support-Item-ExtIEs } }   OPTIONAL
}

EUTRAN-QoS-Support-Item-ExtIEs  E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

EUTRAN-QoS  ::= SEQUENCE {
    qCI                                 QCI,
    eUTRANallocationAndRetentionPriority    EUTRANAllocationAndRetentionPriority,
    gbrQosInformation                   GBR-QosInformation                                  OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { EUTRAN-QoS-ExtIEs } }  OPTIONAL,
```

```
    ...
}

EUTRAN-QoS-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- F

-- G

GNB-CU-CP-Name              ::= PrintableString(SIZE(1..150,...))

GNB-CU-CP-UE-E1AP-ID        ::= INTEGER (0..4294967295)

GNB-CU-UP-Capacity              ::= INTEGER (0..255)

GNB-CU-UP-CellGroupRelatedConfiguration  ::= SEQUENCE (SIZE(1.. maxnoofUPParameters)) OF GNB-CU-UP-CellGroupRelatedConfiguration-Item

GNB-CU-UP-CellGroupRelatedConfiguration-Item ::= SEQUENCE {
    cell-Group-ID               Cell-Group-ID,
    uP-TNL-Information          UP-TNL-Information,
    uL-Configuration            UL-Configuration        OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { {GNB-CU-UP-CellGroupRelatedConfiguration-Item-ExtIEs } } OPTIONAL
}

GNB-CU-UP-CellGroupRelatedConfiguration-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-CU-UP-ID                ::= INTEGER (0..68719476735)

GNB-CU-UP-Name              ::= PrintableString(SIZE(1..150,...))

GNB-CU-UP-UE-E1AP-ID        ::= INTEGER (0..4294967295)

GNB-CU-CP-TNLA-Setup-Item::= SEQUENCE {
    tNLAssociationTransportLayerAddress     CP-TNL-Information,
    iE-Extensions                           ProtocolExtensionContainer { { GNB-CU-CP-TNLA-Setup-Item-ExtIEs} } OPTIONAL,
    ...
}

GNB-CU-CP-TNLA-Setup-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-CU-CP-TNLA-Failed-To-Setup-Item ::= SEQUENCE {
    tNLAssociationTransportLayerAddress     CP-TNL-Information,
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer { { GNB-CU-CP-TNLA-Failed-To-Setup-Item-ExtIEs} } OPTIONAL
}

GNB-CU-CP-TNLA-Failed-To-Setup-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
```

```
}

GNB-CU-CP-TNLA-To-Add-Item ::= SEQUENCE {
    tNLAssociationTransportLayerAddress     CP-TNL-Information,
    tNLAssociationUsage                     TNLAssociationUsage,
    iE-Extensions                           ProtocolExtensionContainer { { GNB-CU-CP-TNLA-To-Add-Item-ExtIEs} } OPTIONAL
}

GNB-CU-CP-TNLA-To-Add-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-CU-CP-TNLA-To-Remove-Item::= SEQUENCE {
    tNLAssociationTransportLayerAddress     CP-TNL-Information,
    iE-Extensions                           ProtocolExtensionContainer { { GNB-CU-CP-TNLA-To-Remove-Item-ExtIEs} } OPTIONAL
}

GNB-CU-CP-TNLA-To-Remove-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    {ID id-TNLAssociationTransportLayerAddressgNBCUUP   CRITICALITY reject  EXTENSION CP-TNL-Information   PRESENCE optional},
    ...
}

GNB-CU-CP-TNLA-To-Update-Item::= SEQUENCE {
    tNLAssociationTransportLayerAddress     CP-TNL-Information,
    tNLAssociationUsage                     TNLAssociationUsage     OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { GNB-CU-CP-TNLA-To-Update-Item-ExtIEs} } OPTIONAL
}

GNB-CU-CP-TNLA-To-Update-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-CU-UP-TNLA-To-Remove-Item::= SEQUENCE {
    tNLAssociationTransportLayerAddress         CP-TNL-Information,
    tNLAssociationTransportLayerAddressgNBCUCP  CP-TNL-Information      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { GNB-CU-UP-TNLA-To-Remove-Item-ExtIEs} } OPTIONAL
}

GNB-CU-UP-TNLA-To-Remove-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GBR-QosInformation ::= SEQUENCE {
    e-RAB-MaximumBitrateDL          BitRate,
    e-RAB-MaximumBitrateUL          BitRate,
    e-RAB-GuaranteedBitrateDL       BitRate,
    e-RAB-GuaranteedBitrateUL       BitRate,
    iE-Extensions                   ProtocolExtensionContainer { { GBR-QosInformation-ExtIEs} } OPTIONAL,
    ...
}

GBR-QosInformation-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
GBR-QoSFlowInformation::= SEQUENCE {
    maxFlowBitRateDownlink          BitRate,
    maxFlowBitRateUplink            BitRate,
    guaranteedFlowBitRateDownlink   BitRate,
    guaranteedFlowBitRateUplink     BitRate,
    maxPacketLossRateDownlink       MaxPacketLossRate       OPTIONAL,
    maxPacketLossRateUplink         MaxPacketLossRate       OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { GBR-QosFlowInformation-ExtIEs} } OPTIONAL,
    ...
}

GBR-QosFlowInformation-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GTP-TEID                ::= OCTET STRING (SIZE (4))

GTPTunnel               ::= SEQUENCE {
    transportLayerAddress               TransportLayerAddress,
    gTP-TEID                            GTP-TEID,
    iE-Extensions                       ProtocolExtensionContainer { { GTPTunnel-ExtIEs} } OPTIONAL,
    ...
}

GTPTunnel-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-CU-UP-OverloadInformation ::= ENUMERATED {overloaded, not-overloaded}

GNB-DU-ID   ::= INTEGER (0..68719476735)


-- H

HFN     ::=     INTEGER (0..4294967295)

-- I

IntegrityProtectionIndication ::= ENUMERATED {
    required,
    preferred,
    not-needed,
    ...
}

IntegrityProtectionAlgorithm    ::= ENUMERATED {
    nIA0,
    i-128-NIA1,
    i-128-NIA2,
    i-128-NIA3,
    ...
}
```

```
IntegrityProtectionKey  ::= OCTET STRING

IntegrityProtectionResult ::= ENUMERATED {
    performed,
    not-performed,
    ...
}

Inactivity-Timer    ::= INTEGER (1..7200, ...)

-- J

-- K

-- L

-- M

MaxDataBurstVolume  ::= INTEGER (0..4095, ...)

MaximumIPdatarate ::= SEQUENCE {
    maxIPrate           MaxIPrate,
    iE-Extensions       ProtocolExtensionContainer { {MaximumIPdatarate-ExtIEs} }   OPTIONAL,
    ...
}

MaximumIPdatarate-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

MaxIPrate ::= ENUMERATED {
    bitrate64kbs,
    max-UErate,
    ...
}

MaxPacketLossRate ::= INTEGER (0..1000, ...)

MRDC-Data-Usage-Report-Item ::= SEQUENCE {
    startTimeStamp              OCTET STRING (SIZE(4)),
    endTimeStamp                OCTET STRING (SIZE(4)),
    usageCountUL                INTEGER (0..18446744073709551615),
    usageCountDL                INTEGER (0..18446744073709551615),
    iE-Extensions               ProtocolExtensionContainer { { MRDC-Data-Usage-Report-Item-ExtIEs} } OPTIONAL,
...
}

MRDC-Data-Usage-Report-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

MRDC-Usage-Information ::= SEQUENCE {
    data-Usage-per-PDU-Session-Report       Data-Usage-per-PDU-Session-Report           OPTIONAL,
```

```
    data-Usage-per-QoS-Flow-List           Data-Usage-per-QoS-Flow-List               OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { MRDC-Usage-Information-ExtIEs} } OPTIONAL,
...
}

MRDC-Usage-Information-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- N

NetworkInstance ::= INTEGER (1..256, ...)

New-UL-TNL-Information-Required::=  ENUMERATED {
    required,
    ...
}
NGRANAllocationAndRetentionPriority ::= SEQUENCE {
    priorityLevel              PriorityLevel,
    pre-emptionCapability      Pre-emptionCapability,
    pre-emptionVulnerability   Pre-emptionVulnerability,
    iE-Extensions              ProtocolExtensionContainer { {NGRANAllocationAndRetentionPriority-ExtIEs} } OPTIONAL
}

NGRANAllocationAndRetentionPriority-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-QoS-Support-List ::= SEQUENCE (SIZE(1.. maxnoofNGRANQOSParameters)) OF NG-RAN-QoS-Support-Item

NG-RAN-QoS-Support-Item ::= SEQUENCE {
    non-Dynamic5QIDescriptor   Non-Dynamic5QIDescriptor,
    iE-Extensions              ProtocolExtensionContainer { { NG-RAN-QoS-Support-Item-ExtIEs } } OPTIONAL
}

NG-RAN-QoS-Support-Item-ExtIEs  E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Non-Dynamic5QIDescriptor    ::= SEQUENCE {
    fiveQI                      INTEGER (0..255, ...),
    qoSPriorityLevel            QoSPriorityLevel               OPTIONAL,
    averagingWindow             AveragingWindow                OPTIONAL,
    maxDataBurstVolume          MaxDataBurstVolume             OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { { Non-Dynamic5QIDescriptor-ExtIEs } } OPTIONAL
}

Non-Dynamic5QIDescriptor-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NR-Cell-Identity    ::=     BIT STRING (SIZE(36))

NR-CGI ::= SEQUENCE {
```

```
    pLMN-Identity           PLMN-Identity,
    nR-Cell-Identity        NR-Cell-Identity,
    iE-Extensions           ProtocolExtensionContainer { { NR-CGI-ExtIEs } }    OPTIONAL
}

NR-CGI-ExtIEs   E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NR-CGI-Support-List ::= SEQUENCE (SIZE(1.. maxnoofNRCGI)) OF NR-CGI-Support-Item

NR-CGI-Support-Item ::= SEQUENCE {
    nR-CGI  NR-CGI,
    iE-Extensions               ProtocolExtensionContainer { { NR-CGI-Support-Item-ExtIEs } }   OPTIONAL
}

NR-CGI-Support-Item-ExtIEs  E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- O

OutOfOrderDelivery  ::= ENUMERATED  {
    true,
    ...
}


-- P

PacketDelayBudget ::= INTEGER (0..1023, ...)

PacketErrorRate ::= SEQUENCE {
    pER-Scalar          PER-Scalar,
    pER-Exponent        PER-Exponent,
    iE-Extensions       ProtocolExtensionContainer { {PacketErrorRate-ExtIEs} } OPTIONAL,
    ...
}

PacketErrorRate-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PER-Scalar ::= INTEGER (0..9, ...)
PER-Exponent ::= INTEGER (0..9, ...)

PDCP-Configuration  ::= SEQUENCE {

    pDCP-SN-Size-UL                         PDCP-SN-Size,
    pDCP-SN-Size-DL                         PDCP-SN-Size,
    rLC-Mode                                RLC-Mode,
    rOHC-Parameters                         ROHC-Parameters         OPTIONAL,
    t-ReorderingTimer                       T-ReorderingTimer       OPTIONAL,
    discardTimer                            DiscardTimer            OPTIONAL,
```

```
    uLDataSplitThreshold                    ULDataSplitThreshold    OPTIONAL,
    pDCP-Duplication                        PDCP-Duplication        OPTIONAL,
    pDCP-Reestablishment                    PDCP-Reestablishment    OPTIONAL,
    pDCP-DataRecovery                       PDCP-DataRecovery       OPTIONAL,
    duplication-Activation              Duplication-Activation      OPTIONAL,
    outOfOrderDelivery                      OutOfOrderDelivery      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer  { { PDCP-Configuration-ExtIEs } }  OPTIONAL,
    ...
}

PDCP-Configuration-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDCP-Count  ::= SEQUENCE {
    pDCP-SN             PDCP-SN,
    hFN                 HFN,
    iE-Extensions                           ProtocolExtensionContainer  { { PDCP-Count-ExtIEs } } OPTIONAL,
    ...
}

PDCP-Count-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDCP-SN-Status-Request  ::=     ENUMERATED {
    requested,
    ...
}

PDCP-DataRecovery   ::= ENUMERATED  {
    true,
    ...
}

PDCP-Duplication    ::= ENUMERATED  {
    true,
    ...
}

PDCP-Reestablishment    ::= ENUMERATED  {
    true,
    ...
}

PDU-Session-Resource-Data-Usage-List    ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Data-Usage-Item

PDU-Session-Resource-Data-Usage-Item    ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    mRDC-Usage-Information                      MRDC-Usage-Information,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Data-Usage-Item-ExtIEs } } OPTIONAL,
    ...
}
```

```
PDU-Session-Resource-Data-Usage-Item-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDCP-SN     ::=     INTEGER (0..262143)

PDCP-SN-Size    ::= ENUMERATED  {
    s-12,
    s-18,
    ...
}

PDCP-SN-Status-Information ::= SEQUENCE {
    pdcpStatusTransfer-UL   DRBBStatusTransfer,
    pdcpStatusTransfer-DL   PDCP-Count,
    iE-Extension        ProtocolExtensionContainer { {DRBsSubjectToStatusTransfer-Item-ExtIEs} }  OPTIONAL,
    ...
}

DRBsSubjectToStatusTransfer-Item-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

DRBBStatusTransfer ::= SEQUENCE {
    receiveStatusofPDCPSDU  BIT STRING (SIZE(1..131072))                                    OPTIONAL,
    countValue              PDCP-Count,
    iE-Extension            ProtocolExtensionContainer { {DRBBStatusTransfer-ExtIEs} }  OPTIONAL,
    ...
}

DRBBStatusTransfer-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-ID  ::= INTEGER (0..255)

PDU-Session-Resource-Activity   ::= ENUMERATED {
    active,
    not-active,
    ...
}

PDU-Session-Resource-Activity-List ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Activity-Item

PDU-Session-Resource-Activity-Item  ::= SEQUENCE {
    pDU-Session-ID                              PDU-Session-ID,
    pDU-Session-Resource-Activity               PDU-Session-Resource-Activity,
    iE-Extensions   ProtocolExtensionContainer      { { PDU-Session-Resource-Activity-ItemExtIEs } } OPTIONAL,
    ...
}

PDU-Session-Resource-Activity-ItemExtIEs    E1AP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
PDU-Session-Resource-Confirm-Modified-List  ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Confirm-Modified-Item

PDU-Session-Resource-Confirm-Modified-Item  ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    dRB-Confirm-Modified-List-NG-RAN        DRB-Confirm-Modified-List-NG-RAN    OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Confirm-Modified-Item-ExtIEs } } OPTIONAL,
    ...
}

PDU-Session-Resource-Confirm-Modified-Item-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Resource-Failed-List    ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Failed-Item

PDU-Session-Resource-Failed-Item    ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Failed-Item-ExtIEs } }  OPTIONAL,
    ...
}

PDU-Session-Resource-Failed-Item-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Resource-Failed-Mod-List    ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Failed-Mod-Item

PDU-Session-Resource-Failed-Mod-Item    ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Failed-Mod-Item-ExtIEs } } OPTIONAL,
    ...
}

PDU-Session-Resource-Failed-Mod-Item-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Resource-Failed-To-Modify-List  ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Failed-To-Modify-Item

PDU-Session-Resource-Failed-To-Modify-Item  ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Failed-To-Modify-Item-ExtIEs } } OPTIONAL,
    ...
}

PDU-Session-Resource-Failed-To-Modify-Item-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
PDU-Session-Resource-Modified-List  ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Modified-Item

PDU-Session-Resource-Modified-Item  ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    nG-DL-UP-TNL-Information                UP-TNL-Information                      OPTIONAL,
    securityResult                          SecurityResult                         OPTIONAL,
    pDU-Session-Data-Forwarding-Information-Response        Data-Forwarding-Information     OPTIONAL,
    dRB-Setup-List-NG-RAN                   DRB-Setup-List-NG-RAN                  OPTIONAL,
    dRB-Failed-List-NG-RAN              DRB-Failed-List-NG-RAN              OPTIONAL,
    dRB-Modified-List-NG-RAN                DRB-Modified-List-NG-RAN               OPTIONAL,
    dRB-Failed-To-Modify-List-NG-RAN        DRB-Failed-To-Modify-List-NG-RAN       OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Modified-Item-ExtIEs } }OPTIONAL,
    ...
}

PDU-Session-Resource-Modified-Item-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Resource-Required-To-Modify-List    ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Required-To-Modify-Item

PDU-Session-Resource-Required-To-Modify-Item    ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    nG-DL-UP-TNL-Information                UP-TNL-Information                      OPTIONAL,
    dRB-Required-To-Modify-List-NG-RAN      DRB-Required-To-Modify-List-NG-RAN      OPTIONAL,
    dRB-Required-To-Remove-List-NG-RAN              DRB-Required-To-Remove-List-NG-RAN           OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Required-To-Modify-Item-ExtIEs } }  OPTIONAL,
    ...
}

PDU-Session-Resource-Required-To-Modify-Item-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Resource-Setup-List ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Setup-Item

PDU-Session-Resource-Setup-Item ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    securityResult                          SecurityResult              OPTIONAL,
    nG-DL-UP-TNL-Information                UP-TNL-Information,
    pDU-Session-Data-Forwarding-Information-Response        Data-Forwarding-Information     OPTIONAL,
    nG-DL-UP-Unchanged                      ENUMERATED {true, ...}      OPTIONAL,
    dRB-Setup-List-NG-RAN                   DRB-Setup-List-NG-RAN,
    dRB-Failed-List-NG-RAN                  DRB-Failed-List-NG-RAN      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Setup-Item-ExtIEs } }OPTIONAL,
    ...
}

PDU-Session-Resource-Setup-Item-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Resource-Setup-Mod-List ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-Setup-Mod-Item
```

```
PDU-Session-Resource-Setup-Mod-Item ::= SEQUENCE {
    pDU-Session-ID                                      PDU-Session-ID,
    securityResult                                      SecurityResult                          OPTIONAL,
    nG-DL-UP-TNL-Information                             UP-TNL-Information,
    pDU-Session-Data-Forwarding-Information-Response     Data-Forwarding-Information     OPTIONAL,
    dRB-Setup-Mod-List-NG-RAN                           DRB-Setup-Mod-List-NG-RAN,
    dRB-Failed-Mod-List-NG-RAN                          DRB-Failed-Mod-List-NG-RAN              OPTIONAL,
    iE-Extensions                                       ProtocolExtensionContainer  { { PDU-Session-Resource-Setup-Mod-Item-ExtIEs } }
    OPTIONAL,
    ...
}

PDU-Session-Resource-Setup-Mod-Item-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Resource-To-Modify-List ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-To-Modify-Item

PDU-Session-Resource-To-Modify-Item ::= SEQUENCE {
    pDU-Session-ID                                      PDU-Session-ID,
    securityIndication                                  SecurityIndication                      OPTIONAL,
    pDU-Session-Resource-DL-AMBR                        BitRate                                 OPTIONAL,
    nG-UL-UP-TNL-Information                            UP-TNL-Information                      OPTIONAL,
    pDU-Session-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    pDU-Session-Data-Forwarding-Information Data-Forwarding-Information OPTIONAL,
    pDU-Session-Inactivity-Timer                        Inactivity-Timer                        OPTIONAL,
    networkInstance                                     NetworkInstance                         OPTIONAL,
    dRB-To-Setup-List-NG-RAN                            DRB-To-Setup-List-NG-RAN                OPTIONAL,
    dRB-To-Modify-List-NG-RAN                           DRB-To-Modify-List-NG-RAN               OPTIONAL,
    dRB-To-Remove-List-NG-RAN                   DRB-To-Remove-List-NG-RAN       OPTIONAL,
    iE-Extensions                                       ProtocolExtensionContainer  { { PDU-Session-Resource-To-Modify-Item-ExtIEs } }  OPTIONAL,
    ...
}

PDU-Session-Resource-To-Modify-Item-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    {ID id-SNSSAI       CRITICALITY reject  EXTENSION SNSSAI        PRESENCE optional}|
    { ID id-CommonNetworkInstance                       CRITICALITY ignore  EXTENSION CommonNetworkInstance                     PRESENCE optional
    },
    ...
}

PDU-Session-Resource-To-Remove-List ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-To-Remove-Item

PDU-Session-Resource-To-Remove-Item ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-To-Remove-Item-ExtIEs } }  OPTIONAL,
    ...
}

PDU-Session-Resource-To-Remove-Item-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    {ID id-Cause        CRITICALITY ignore  EXTENSION Cause     PRESENCE optional},
    ...
}
```

```
PDU-Session-Resource-To-Setup-List  ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-To-Setup-Item

PDU-Session-Resource-To-Setup-Item  ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    pDU-Session-Type                        PDU-Session-Type,
    sNSSAI                                  SNSSAI,
    securityIndication                      SecurityIndication,
    pDU-Session-Resource-DL-AMBR            BitRate                     OPTIONAL,
    nG-UL-UP-TNL-Information                UP-TNL-Information,
    pDU-Session-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    pDU-Session-Inactivity-Timer            Inactivity-Timer    OPTIONAL,
    existing-Allocated-NG-DL-UP-TNL-Info    UP-TNL-Information      OPTIONAL,
    networkInstance                         NetworkInstance     OPTIONAL,
    dRB-To-Setup-List-NG-RAN                DRB-To-Setup-List-NG-RAN,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-To-Setup-Item-ExtIEs } }OPTIONAL,
    ...
}

PDU-Session-Resource-To-Setup-Item-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    { ID id-CommonNetworkInstance                       CRITICALITY ignore  EXTENSION CommonNetworkInstance                     PRESENCE optional
    },
    ...
}

PDU-Session-Resource-To-Setup-Mod-List  ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-Resource-To-Setup-Mod-Item

PDU-Session-Resource-To-Setup-Mod-Item  ::= SEQUENCE {
    pDU-Session-ID                                  PDU-Session-ID,
    pDU-Session-Type                                PDU-Session-Type,
    sNSSAI                                          SNSSAI,
    securityIndication                              SecurityIndication,
    pDU-Session-Resource-AMBR                       BitRate                                 OPTIONAL,
    nG-UL-UP-TNL-Information                        UP-TNL-Information,
    pDU-Session-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    pDU-Session-Inactivity-Timer                    Inactivity-Timer                        OPTIONAL,
    dRB-To-Setup-Mod-List-NG-RAN                    DRB-To-Setup-Mod-List-NG-RAN,
    iE-Extensions                                   ProtocolExtensionContainer  { { PDU-Session-Resource-To-Setup-Mod-Item-ExtIEs } }
    OPTIONAL,
    ...
}

PDU-Session-Resource-To-Setup-Mod-Item-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    {ID id-NetworkInstance      CRITICALITY ignore  EXTENSION NetworkInstance       PRESENCE optional}|
    {ID id-CommonNetworkInstance    CRITICALITY ignore  EXTENSION CommonNetworkInstance PRESENCE optional},
    ...
}

PDU-Session-To-Notify-List  ::= SEQUENCE (SIZE(1.. maxnoofPDUSessionResource)) OF PDU-Session-To-Notify-Item

PDU-Session-To-Notify-Item  ::= SEQUENCE {
    pDU-Session-ID                          PDU-Session-ID,
    qoS-Flow-List                           QoS-Flow-List,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-To-Notify-Item-ExtIEs } }  OPTIONAL,
    ...
```

```
}

PDU-Session-To-Notify-Item-ExtIEs       E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PDU-Session-Type ::= ENUMERATED {
    ipv4,
    ipv6,
    ipv4v6,
    ethernet,
    unstructured,
    ...
}

PLMN-Identity ::= OCTET STRING (SIZE(3))

PortNumber ::= BIT STRING (SIZE(16))

PPI ::= INTEGER (0..7, ...)

PriorityLevel   ::= INTEGER { spare (0), highest (1), lowest (14), no-priority (15) } (0..15)

Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
}

Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable
}

-- Q

QCI ::= INTEGER (0..255)

QoS-Characteristics ::= CHOICE {
    non-Dynamic-5QI             Non-Dynamic5QIDescriptor,
    dynamic-5QI                 Dynamic5QIDescriptor,
    choice-extension            ProtocolIE-SingleContainer  {{QoS-Characteristics-ExtIEs}}
}

QoS-Characteristics-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

QoS-Flow-Identifier ::= INTEGER (0..63)

QoS-Flow-List   ::= SEQUENCE (SIZE(1.. maxnoofQoSFlows)) OF QoS-Flow-Item

QoS-Flow-Item   ::= SEQUENCE {
    qoS-Flow-Identifier                     QoS-Flow-Identifier,
    iE-Extensions                           ProtocolExtensionContainer  { { QoS-Flow-Item-ExtIEs } } OPTIONAL,
```

```
    ...
}

QoS-Flow-Item-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    {ID id-QoSFlowMappingIndication     CRITICALITY ignore  EXTENSION QoS-Flow-Mapping-Indication    PRESENCE optional},
    ...
}

QoS-Flow-Failed-List    ::= SEQUENCE (SIZE(1.. maxnoofQoSFlows)) OF QoS-Flow-Failed-Item

QoS-Flow-Failed-Item    ::= SEQUENCE {
    qoS-Flow-Identifier                     QoS-Flow-Identifier,
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer  { { QoS-Flow-Failed-Item-ExtIEs } }  OPTIONAL,
    ...
}

QoS-Flow-Failed-Item-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

QoS-Flow-Mapping-List   ::= SEQUENCE (SIZE(1.. maxnoofQoSFlows)) OF QoS-Flow-Mapping-Item

QoS-Flow-Mapping-Item   ::= SEQUENCE {
    qoS-Flow-Identifier                     QoS-Flow-Identifier,
    qoSFlowMappingIndication                        QoS-Flow-Mapping-Indication     OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer  { { QoS-Flow-Mapping-Item-ExtIEs } }  OPTIONAL,
    ...
}

QoS-Flow-Mapping-Item-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

QoS-Flow-Mapping-Indication ::= ENUMERATED {ul, dl, ...}

QoS-Parameters-Support-List ::= SEQUENCE {
    eUTRAN-QoS-Support-List         EUTRAN-QoS-Support-List         OPTIONAL,
    nG-RAN-QoS-Support-List         NG-RAN-QoS-Support-List         OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { QoS-Parameters-Support-List-ItemExtIEs} } OPTIONAL,
    ...
}

QoS-Parameters-Support-List-ItemExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

QoSPriorityLevel ::= INTEGER (0..127, ...)


QoS-Flow-QoS-Parameter-List ::= SEQUENCE (SIZE(1.. maxnoofQoSFlows)) OF QoS-Flow-QoS-Parameter-Item

QoS-Flow-QoS-Parameter-Item ::= SEQUENCE {
    qoS-Flow-Identifier                     QoS-Flow-Identifier,
```

```
    qoSFlowLevelQoSParameters              QoSFlowLevelQoSParameters,
    qoSFlowMappingIndication               QoS-Flow-Mapping-Indication     OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer  { { QoS-Flow-QoS-Parameter-Item-ExtIEs } } OPTIONAL,
    ...
}

QoS-Flow-QoS-Parameter-Item-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

QoSFlowLevelQoSParameters   ::= SEQUENCE {
    qoS-Characteristics                    QoS-Characteristics,
    nGRANallocationRetentionPriority       NGRANAllocationAndRetentionPriority,
    gBR-QoS-Flow-Information               GBR-QoSFlowInformation                  OPTIONAL,
    reflective-QoS-Attribute               ENUMERATED {subject-to, ...}            OPTIONAL,
    additional-QoS-Information             ENUMERATED {more-likely, ...}           OPTIONAL,
    paging-Policy-Indicator                INTEGER (1..8,  ...)                    OPTIONAL,
    reflective-QoS-Indicator               ENUMERATED {enabled, ...}               OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { { QoSFlowLevelQoSParameters-ExtIEs } } OPTIONAL
}

QoSFlowLevelQoSParameters-ExtIEs    E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- R

RANUEID ::= OCTET STRING (SIZE (8))

RAT-Type    ::= ENUMERATED  {
    e-UTRA,
    nR,
    ...
}

RLC-Mode    ::= ENUMERATED  {
    rlc-tm,
    rlc-am,
    rlc-um-bidirectional,
    rlc-um-unidirectional-ul,
    rlc-um-unidirectional-dl,
    ...
}


ROHC-Parameters ::= CHOICE {
    rOHC                    ROHC,
    uPlinkOnlyROHC          UplinkOnlyROHC,
    choice-Extension        ProtocolIE-SingleContainer { { ROHC-Parameters-ExtIEs} }
}

ROHC-Parameters-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}
```

```
ROHC    ::= SEQUENCE {
    maxCID                          INTEGER (0..16383, ...),
    rOHC-Profiles                   INTEGER (0..511, ...),
    continueROHC                    ENUMERATED {true, ...}                              OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { ROHC-ExtIEs } }      OPTIONAL
}

ROHC-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}


-- S

SecurityAlgorithm   ::= SEQUENCE {
    cipheringAlgorithm              CipheringAlgorithm,
    integrityProtectionAlgorithm    IntegrityProtectionAlgorithm    OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { SecurityAlgorithm-ExtIEs } } OPTIONAL,
    ...
}

SecurityAlgorithm-ExtIEs    E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

SecurityIndication ::= SEQUENCE {
    integrityProtectionIndication           IntegrityProtectionIndication,
    confidentialityProtectionIndication     ConfidentialityProtectionIndication,
    maximumIPdatarate                           MaximumIPdatarate                           OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {SecurityIndication-ExtIEs} }  OPTIONAL,
    ...
}

SecurityIndication-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

SecurityInformation ::= SEQUENCE {
    securityAlgorithm           SecurityAlgorithm,
    uPSecuritykey               UPSecuritykey,
    iE-Extensions               ProtocolExtensionContainer { { SecurityInformation-ExtIEs } }   OPTIONAL,
    ...
}

SecurityInformation-ExtIEs  E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

SecurityResult ::= SEQUENCE {
    integrityProtectionResult           IntegrityProtectionResult,
    confidentialityProtectionResult     ConfidentialityProtectionResult,
    iE-Extensions                       ProtocolExtensionContainer { {SecurityResult-ExtIEs} }  OPTIONAL,
    ...
```

```
}

SecurityResult-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Slice-Support-List ::= SEQUENCE (SIZE(1.. maxnoofSliceItems)) OF Slice-Support-Item

Slice-Support-Item ::= SEQUENCE {
    sNSSAI  SNSSAI,
    iE-Extensions               ProtocolExtensionContainer { { Slice-Support-Item-ExtIEs } }    OPTIONAL
}

Slice-Support-Item-ExtIEs   E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

SNSSAI ::= SEQUENCE {
    sST         OCTET STRING (SIZE(1)),
    sD          OCTET STRING (SIZE(3))  OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { { SNSSAI-ExtIEs } }    OPTIONAL,
    ...
}

SNSSAI-ExtIEs   E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

SDAP-Configuration ::= SEQUENCE {
    defaultDRB              DefaultDRB,
    sDAP-Header-UL          SDAP-Header-UL,
    sDAP-Header-DL          SDAP-Header-DL,
    iE-Extensions           ProtocolExtensionContainer { { SDAP-Configuration-ExtIEs } }    OPTIONAL,
    ...
}

SDAP-Configuration-ExtIEs   E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

SDAP-Header-DL  ::= ENUMERATED  {
    present,
    absent,
    ...
}

SDAP-Header-UL  ::= ENUMERATED  {
    present,
    absent,
    ...
}

-- T
```

```
TimeToWait ::= ENUMERATED {v1s, v2s, v5s, v10s, v20s, v60s, ...}

TNLAssociationUsage ::= ENUMERATED {
    ue,
    non-ue,
    both,
...
}


TransportLayerAddress       ::=     BIT STRING (SIZE(1..160, ...))

TransactionID               ::= INTEGER (0..255, ...)

T-Reordering    ::= ENUMERATED  {ms0, ms1, ms2, ms4, ms5, ms8, ms10, ms15, ms20, ms30, ms40, ms50, ms60, ms80, ms100, ms120, ms140, ms160, ms180,
ms200, ms220, ms240, ms260, ms280, ms300, ms500, ms750, ms1000, ms1250, ms1500, ms1750, ms2000, ms2250, ms2500, ms2750, ms3000, ...}

T-ReorderingTimer ::= SEQUENCE {
    t-Reordering                T-Reordering,
        iE-Extensions               ProtocolExtensionContainer { { T-ReorderingTimer-ExtIEs } } OPTIONAL,
    ...
}

T-ReorderingTimer-ExtIEs    E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

TypeOfError ::= ENUMERATED {
    not-understood,
    missing,
    ...
}

-- U

UE-Activity ::= ENUMERATED  {
    active,
    not-active,
    ...
}

UE-associatedLogicalE1-ConnectionItem ::= SEQUENCE {
    gNB-CU-CP-UE-E1AP-ID        GNB-CU-CP-UE-E1AP-ID     OPTIONAL,
    gNB-CU-UP-UE-E1AP-ID        GNB-CU-UP-UE-E1AP-ID     OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { { UE-associatedLogicalE1-ConnectionItemExtIEs} } OPTIONAL,
    ...
}

UE-associatedLogicalE1-ConnectionItemExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-Configuration    ::= ENUMERATED  {
    no-data,
```

```
    shared,
    only,
    ...
}

ULDataSplitThreshold    ::= ENUMERATED {b0, b100, b200, b400, b800, b1600, b3200, b6400, b12800, b25600, b51200, b102400, b204800, b409600,
b819200, b1228800, b1638400, b2457600, b3276800, b4096000, b4915200, b5734400, b6553600, infinity, ...}

UP-Parameters ::= SEQUENCE (SIZE(1.. maxnoofUPParameters)) OF UP-Parameters-Item

UP-Parameters-Item ::= SEQUENCE {
    uP-TNL-Information          UP-TNL-Information,
    cell-Group-ID               Cell-Group-ID,
    iE-Extensions               ProtocolExtensionContainer { { UP-Parameters-Item-ExtIEs } }    OPTIONAL,
    ...
}

UP-Parameters-Item-ExtIEs   E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

UPSecuritykey   ::= SEQUENCE {
    encryptionKey               EncryptionKey,
    integrityProtectionKey      IntegrityProtectionKey      OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { { UPSecuritykey-ExtIEs } } OPTIONAL,
    ...
}

UPSecuritykey-ExtIEs    E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

UP-TNL-Information      ::=     CHOICE {
    gTPTunnel       GTPTunnel,
    choice-extension        ProtocolIE-SingleContainer  {{UP-TNL-Information-ExtIEs}}
}

UP-TNL-Information-ExtIEs E1AP-PROTOCOL-IES ::= {
    ...
}

UplinkOnlyROHC ::= SEQUENCE {
    maxCID                          INTEGER (0..16383, ...),
    rOHC-Profiles                   INTEGER (0..511, ...),
    continueROHC                    ENUMERATED {true, ...}  OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { UplinkOnlyROHC-ExtIEs } }     OPTIONAL
}

UplinkOnlyROHC-ExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}


-- V
```

```
-- W

-- X

-- Y

-- Z

END
-- ASN1STOP
```

9.4.6 Common Definitions

```
-- ASN1START
-- **************************************************************
--
-- Common definitions
--
-- **************************************************************

E1AP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) e1ap (5) version1 (1) e1ap-CommonDataTypes (3)}


DEFINITIONS AUTOMATIC TAGS ::=

BEGIN


-- **************************************************************
--
-- Extension constants
--
-- **************************************************************

maxPrivateIEs                                   INTEGER ::= 65535
maxProtocolExtensions                           INTEGER ::= 65535
maxProtocolIEs                                  INTEGER ::= 65535

-- **************************************************************
--
-- Common Data Types
--
-- **************************************************************

Criticality     ::=     ENUMERATED { reject, ignore, notify }

Presence        ::= ENUMERATED { optional, conditional, mandatory }

PrivateIE-ID    ::= CHOICE {
    local               INTEGER (0.. maxPrivateIEs),
    global          OBJECT IDENTIFIER
```

```
}

ProcedureCode       ::= INTEGER (0..255)

ProtocolExtensionID ::= INTEGER (0..maxProtocolExtensions)

ProtocolIE-ID       ::= INTEGER (0..maxProtocolIEs)

TriggeringMessage   ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome}

END
-- ASN1STOP
```

9.4.7 Constant Definitions

```
-- ASN1START
-- **************************************************************
--
-- Constant definitions
--
-- **************************************************************


E1AP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) e1ap (5) version1 (1) e1ap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    ProcedureCode,
    ProtocolIE-ID

FROM E1AP-CommonDataTypes;

-- **************************************************************
--
-- Elementary Procedures
--
-- **************************************************************

id-reset                                                    ProcedureCode ::= 0
id-errorIndication                                          ProcedureCode ::= 1
id-privateMessage                                           ProcedureCode ::= 2
id-gNB-CU-UP-E1Setup                                        ProcedureCode ::= 3
id-gNB-CU-CP-E1Setup                                        ProcedureCode ::= 4
id-gNB-CU-UP-ConfigurationUpdate                            ProcedureCode ::= 5
id-gNB-CU-CP-ConfigurationUpdate                            ProcedureCode ::= 6
id-e1Release                                                ProcedureCode ::= 7
id-bearerContextSetup                                       ProcedureCode ::= 8
```

```
id-bearerContextModification                                    ProcedureCode ::= 9
id-bearerContextModificationRequired                            ProcedureCode ::= 10
id-bearerContextRelease                                         ProcedureCode ::= 11
id-bearerContextReleaseRequest                                  ProcedureCode ::= 12
id-bearerContextInactivityNotification                          ProcedureCode ::= 13
id-dLDataNotification                                           ProcedureCode ::= 14
id-dataUsageReport                                              ProcedureCode ::= 15
id-gNB-CU-UP-CounterCheck                                       ProcedureCode ::= 16
id-gNB-CU-UP-StatusIndication                                   ProcedureCode ::= 17
id-uLDataNotification                                           ProcedureCode ::= 18
id-mRDC-DataUsageReport                                         ProcedureCode ::= 19


-- **************************************************************
--
-- Lists
--
-- **************************************************************

maxnoofErrors                           INTEGER ::= 256
maxnoofSPLMNs                           INTEGER ::= 12
maxnoofSliceItems                       INTEGER ::= 1024
maxnoofIndividualE1ConnectionsToReset   INTEGER ::= 65536
maxnoofEUTRANQOSParameters              INTEGER ::= 256
maxnoofNGRANQOSParameters               INTEGER ::= 256
maxnoofDRBs                             INTEGER ::= 32
maxnoofNRCGI                            INTEGER ::= 512
maxnoofPDUSessionResource               INTEGER ::= 256
maxnoofQoSFlows                         INTEGER ::= 64
maxnoofUPParameters                     INTEGER ::= 8
maxnoofCellGroups                       INTEGER ::= 4
maxnooftimeperiods                      INTEGER ::= 2
maxnoofTNLAssociations                  INTEGER ::= 32


-- **************************************************************
--
-- IEs
--
-- **************************************************************

id-Cause                                                        ProtocolIE-ID ::= 0
id-CriticalityDiagnostics                                       ProtocolIE-ID ::= 1
id-gNB-CU-CP-UE-E1AP-ID                                         ProtocolIE-ID ::= 2
id-gNB-CU-UP-UE-E1AP-ID                                         ProtocolIE-ID ::= 3
id-ResetType                                                    ProtocolIE-ID ::= 4
id-UE-associatedLogicalE1-ConnectionItem                        ProtocolIE-ID ::= 5
id-UE-associatedLogicalE1-ConnectionListResAck                  ProtocolIE-ID ::= 6
id-gNB-CU-UP-ID                                                 ProtocolIE-ID ::= 7
id-gNB-CU-UP-Name                                               ProtocolIE-ID ::= 8
id-gNB-CU-CP-Name                                               ProtocolIE-ID ::= 9
id-CNSupport                                                    ProtocolIE-ID ::= 10
id-SupportedPLMNs                                               ProtocolIE-ID ::= 11
id-TimeToWait                                                   ProtocolIE-ID ::= 12
```

```
id-SecurityInformation                                  ProtocolIE-ID ::= 13
id-UEDLAggregateMaximumBitRate                          ProtocolIE-ID ::= 14
id-System-BearerContextSetupRequest                     ProtocolIE-ID ::= 15
id-System-BearerContextSetupResponse                    ProtocolIE-ID ::= 16
id-BearerContextStatusChange                            ProtocolIE-ID ::= 17
id-System-BearerContextModificationRequest              ProtocolIE-ID ::= 18
id-System-BearerContextModificationResponse             ProtocolIE-ID ::= 19
id-System-BearerContextModificationConfirm              ProtocolIE-ID ::= 20
id-System-BearerContextModificationRequired             ProtocolIE-ID ::= 21
id-DRB-Status-List                                      ProtocolIE-ID ::= 22
id-ActivityNotificationLevel                            ProtocolIE-ID ::= 23
id-ActivityInformation                                  ProtocolIE-ID ::= 24
id-Data-Usage-Report-List                               ProtocolIE-ID ::= 25
id-New-UL-TNL-Information-Required                      ProtocolIE-ID ::= 26
id-GNB-CU-CP-TNLA-To-Add-List                           ProtocolIE-ID ::= 27
id-GNB-CU-CP-TNLA-To-Remove-List                        ProtocolIE-ID ::= 28
id-GNB-CU-CP-TNLA-To-Update-List                        ProtocolIE-ID ::= 29
id-GNB-CU-CP-TNLA-Setup-List                            ProtocolIE-ID ::= 30
id-GNB-CU-CP-TNLA-Failed-To-Setup-List                  ProtocolIE-ID ::= 31
id-DRB-To-Setup-List-EUTRAN                             ProtocolIE-ID ::= 32
id-DRB-To-Modify-List-EUTRAN                            ProtocolIE-ID ::= 33
id-DRB-To-Remove-List-EUTRAN                            ProtocolIE-ID ::= 34
id-DRB-Required-To-Modify-List-EUTRAN                   ProtocolIE-ID ::= 35
id-DRB-Required-To-Remove-List-EUTRAN                   ProtocolIE-ID ::= 36
id-DRB-Setup-List-EUTRAN                                ProtocolIE-ID ::= 37
id-DRB-Failed-List-EUTRAN                               ProtocolIE-ID ::= 38
id-DRB-Modified-List-EUTRAN                             ProtocolIE-ID ::= 39
id-DRB-Failed-To-Modify-List-EUTRAN                     ProtocolIE-ID ::= 40
id-DRB-Confirm-Modified-List-EUTRAN                     ProtocolIE-ID ::= 41
id-PDU-Session-Resource-To-Setup-List                   ProtocolIE-ID ::= 42
id-PDU-Session-Resource-To-Modify-List                  ProtocolIE-ID ::= 43
id-PDU-Session-Resource-To-Remove-List                  ProtocolIE-ID ::= 44
id-PDU-Session-Resource-Required-To-Modify-List         ProtocolIE-ID ::= 45
id-PDU-Session-Resource-Setup-List                      ProtocolIE-ID ::= 46
id-PDU-Session-Resource-Failed-List                     ProtocolIE-ID ::= 47
id-PDU-Session-Resource-Modified-List                   ProtocolIE-ID ::= 48
id-PDU-Session-Resource-Failed-To-Modify-List           ProtocolIE-ID ::= 49
id-PDU-Session-Resource-Confirm-Modified-List           ProtocolIE-ID ::= 50
id-DRB-To-Setup-Mod-List-EUTRAN                         ProtocolIE-ID ::= 51
id-DRB-Setup-Mod-List-EUTRAN                            ProtocolIE-ID ::= 52
id-DRB-Failed-Mod-List-EUTRAN                           ProtocolIE-ID ::= 53
id-PDU-Session-Resource-Setup-Mod-List                  ProtocolIE-ID ::= 54
id-PDU-Session-Resource-Failed-Mod-List                 ProtocolIE-ID ::= 55
id-PDU-Session-Resource-To-Setup-Mod-List               ProtocolIE-ID ::= 56
id-TransactionID                                        ProtocolIE-ID ::= 57
id-Serving-PLMN                                         ProtocolIE-ID ::= 58
id-UE-Inactivity-Timer                                  ProtocolIE-ID ::= 59
id-System-GNB-CU-UP-CounterCheckRequest                 ProtocolIE-ID ::= 60
id-DRBs-Subject-To-Counter-Check-List-EUTRAN            ProtocolIE-ID ::= 61
id-DRBs-Subject-To-Counter-Check-List-NG-RAN            ProtocolIE-ID ::= 62
id-PPI                                                  ProtocolIE-ID ::= 63
id-gNB-CU-UP-Capacity                                   ProtocolIE-ID ::= 64
id-GNB-CU-UP-OverloadInformation                        ProtocolIE-ID ::= 65
id-UEDLMaximumIntegrityProtectedDataRate                ProtocolIE-ID ::= 66
```

```
id-PDU-Session-To-Notify-List                                   ProtocolIE-ID ::= 67
id-PDU-Session-Resource-Data-Usage-List                         ProtocolIE-ID ::= 68
id-SNSSAI                                                       ProtocolIE-ID ::= 69
id-DataDiscardRequired                                      ProtocolIE-ID ::= 70
id-OldQoSFlowMap-ULendmarkerexpected                            ProtocolIE-ID ::= 71
id-DRB-QoS                                                          ProtocolIE-ID ::= 72
id-GNB-CU-UP-TNLA-To-Remove-List                                ProtocolIE-ID ::= 73
id-endpoint-IP-Address-and-Port                                 ProtocolIE-ID ::= 74
id-TNLAssociationTransportLayerAddressgNBCUUP                   ProtocolIE-ID ::= 75
id-RANUEID                                                  ProtocolIE-ID ::= 76
id-GNB-DU-ID                                                    ProtocolIE-ID ::= 77
id-CommonNetworkInstance                                            ProtocolIE-ID ::= 78
id-NetworkInstance                                              ProtocolIE-ID ::= 79
id-QoSFlowMappingIndication                                 ProtocolIE-ID ::= 80


END
-- ASN1STOP
```

9.4.8 Container Definitions

```
-- ASN1START
-- **************************************************************
--
-- Container definitions
--
-- **************************************************************

E1AP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) e1ap (5) version1 (1) e1ap-Containers (5) }


DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- IE parameter types from other modules.
--
-- **************************************************************

IMPORTS
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs,
    Criticality,
    Presence,
    PrivateIE-ID,
```

```
    ProtocolIE-ID

FROM E1AP-CommonDataTypes;

-- ************************************************************
--
-- Class Definition for Protocol IEs
--
-- ************************************************************

E1AP-PROTOCOL-IES ::= CLASS {
    &id                 ProtocolIE-ID           UNIQUE,
    &criticality        Criticality,
    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    TYPE                &Value
    PRESENCE            &presence
}

-- ************************************************************
--
-- Class Definition for Protocol Extensions
--
-- ************************************************************

E1AP-PROTOCOL-EXTENSION ::= CLASS {
    &id                 ProtocolIE-ID       UNIQUE,
    &criticality        Criticality,
    &Extension,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    EXTENSION           &Extension
    PRESENCE            &presence
}

-- ************************************************************
--
-- Class Definition for Private IEs
--
-- ************************************************************

E1AP-PRIVATE-IES ::= CLASS {
    &id                 PrivateIE-ID,
    &criticality        Criticality,
    &Value,
    &presence           Presence
}
```

```
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    TYPE                &Value
    PRESENCE            &presence
}

-- **************************************************************
--
-- Container for Protocol IEs
--
-- **************************************************************

ProtocolIE-Container { E1AP-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-SingleContainer { E1AP-PROTOCOL-IES : IEsSetParam} ::=
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field { E1AP-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
    id              E1AP-PROTOCOL-IES.&id               ({IEsSetParam}),
    criticality     E1AP-PROTOCOL-IES.&criticality      ({IEsSetParam}{@id}),
    value           E1AP-PROTOCOL-IES.&Value            ({IEsSetParam}{@id})
}

-- **************************************************************
--
-- Container Lists for Protocol IE Containers
--
-- **************************************************************

ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, E1AP-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-Container {{IEsSetParam}}

-- **************************************************************
--
-- Container for Protocol Extensions
--
-- **************************************************************

ProtocolExtensionContainer { E1AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
    SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
    ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField { E1AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
    id                  E1AP-PROTOCOL-EXTENSION.&id             ({ExtensionSetParam}),
    criticality         E1AP-PROTOCOL-EXTENSION.&criticality    ({ExtensionSetParam}{@id}),
    extensionValue      E1AP-PROTOCOL-EXTENSION.&Extension      ({ExtensionSetParam}{@id})
}

-- **************************************************************
--
```

```
-- Container for Private IEs
--
-- ************************************************************

PrivateIE-Container { E1AP-PRIVATE-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (1..maxPrivateIEs)) OF
    PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field { E1AP-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
    id              E1AP-PRIVATE-IES.&id                ({IEsSetParam}),
    criticality     E1AP-PRIVATE-IES.&criticality       ({IEsSetParam}{@id}),
    value           E1AP-PRIVATE-IES.&Value         ({IEsSetParam}{@id})
}

END
-- ASN1STOP
```

9.5 Message Transfer Syntax

E1AP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ITU-T Recommendation X.691 [7].

9.6 Timers

10 Handling of unknown, unforeseen and erroneous protocol data

Section 10 of TS 38.413 [6] is applicable for the purposes of the present document, with the following additions for non-UE-associated procedures:

- In case of Abstract Syntax Error, when reporting the *Criticality Diagnostics* IE for not comprehended IE/IEgroups or missing IE/IE groups, the *Transaction ID* IE shall also be included;
- In case of Logical Error, when reporting the *Criticality Diagnostics* IE, the *Transaction ID* IE shall also be included;
- In case of Logical Error in a response message of a Class 1 procedure, or failure to comprehend *Transaction ID* IE from a received message, the procedure shall be considered as unsuccessfully terminated or not terminated (e.g., transaction ID unknown in response message), and local error handling shall be initiated.

Annex A (informative): Change History

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2018-02	R3 #99	R3-181309	-	-	-	Endorsed skeleton	0.0.0
2018-03	R3 #99	R3-181597	-	-	-	New version capturing agreements from RAN3#99	0.1.0
2018-04	R3 #99b	R3-182531	-	-	-	New version capturing agreements from RAN3#99b	0.2.0
2018-05	R3 #100	R3-183601	-	-	-	New version capturing agreements from RAN3#100	0.3.0
2018-06	RAN#80	RP-181154				Submitted to RAN 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	3	F	BL CR for TS 38.463 covering agreements from RAN3-AH-1807 and R3-101 Note: CR not based on latest version of the spec. Changes to clause 8.3.2.2 in the CR were implemented in clause 8.3.2.3 in the spec.	15.1.0
2018-12	RAN#82	RP-182451	0002	2	F	NR Corrections (TS 38.463 Baseline CR covering RAN3-101Bis and RAN3-102 agreements)	15.2.0
2019-03	RAN#83	RP-190560	0004	2	F	Correction to Data Forwarding Information IE	15.3.0
2019-03	RAN#83	RP-190555	0005	1	F	Corrections related to Integrity Protection handling at the gNB-CU-UP	15.3.0
2019-03	RAN#83	RP-190554	0007	2	F	Corrections on gNB-CU-UP/gNB-DU-CP Configuration Update	15.3.0
2019-03	RAN#83	RP-190556	0008	2	F	Correction of QoS Flow Mapping Indication	15.3.0
2019-03	RAN#83	RP-190560	0009	1	F	Paging Failure	15.3.0
2019-03	RAN#83	RP-190560	0011	1	F	Release due to pre-emption	15.3.0
2019-03	RAN#83	RP-190560	0013	-	F	Transaction ID in Error Indication procedure	15.3.0
2019-03	RAN#83	RP-190560	0017	1	F	CR to TS 38.463 on inactivity timer over E1	15.3.0
2019-03	RAN#83	RP-190560	0020	1	F	Data volume reporting for MR-DC with 5GC	15.3.0
2019-03	RAN#83	RP-190560	0029	1	F	TS 38.463 ASN.1 corrections	15.3.0
2019-03	RAN#83	RP-190560	0030	-	F	Rapporteur corrections for TS 38.463	15.3.0
2019-03	RAN#83	RP-190611	0035	3	F	S-NSSAI update during EPS to 5GS handover	15.3.0
2019-07	RP#84	RP-191399	0023	2	F	Support of ongoing re-mapping on source side during SDAP mobility	15.4.0
2019-07	RP#84	RP-191399	0028	1	F	TS 38.463 Tabular clean up for Bearer Context messages	15.4.0
2019-07	RP-84	RP-191396	0044	2	F	Correction to DRB 5QI on E1	15.4.0
2019-07	RP-84	RP-191399	0049	2	F	Multiple SCTP associations over E1	15.4.0
2019-07	RP-84	RP-191399	0050	2	F	Rapporteur's editorial corrections for TS 38.463	15.4.0
2019-07	RP-84	RP-191399	0051	-	F	E1AP failure messages correction	15.4.0
2019-07	RP-84	RP-191399	0052	1	F	New UL TNL Information clarification	15.4.0
2019-07	RP-84	RP-191399	0053	4	F	UE Identification over E1	15.4.0
2019-07	RP-84	RP-191394	0057	2	F	CR to 38.463 on deconfiguring PDCP duplication	15.4.0
2019-07	RP-84	RP-191399	0062	2	F	Clarification on security indication in the modification procedure over E1 interface	15.4.0
2019-07	RP-84	RP-191399	0064	2	F	Clarification on counter check procedure	15.4.0
2019-07	RP-84	RP-191397	0065		F	Correction of Network Instance	15.4.0
2019-07	RP-84	RP-191399	0073	1	F	Activity Notification Level in Bearer Context Modification Request E1AP	15.4.0
2019-07	RP-84	RP-191394	0075	1	F	PDCP SN length and RLC mode related clean-up over To Be Modified structure in Bearer Context Modification procedure	15.4.0
2019-07	RP-84	RP-191399	0084	-	F	Bearer Context Release Request Cause	15.4.0
2019-07	RP-84	RP-191399	0085	-	F	Clarification on Bearer Context Setup and Bearer Context Modification failures	15.4.0
2019-07	RP-84	RP-191396	0086	1	F	PDU session split for E1	15.4.0
2019-07	RP-84	RP-191399	0091	-	F	Rapporteur's editorial corrections for TS 38.463	15.4.0
2019-07	RP-84	RP-191399	0092	1	F	Rapporteur's ASN.1 corrections for TS 38.463	15.4.0
2019-07	RP-84	RP-191399	0095	1	F	CR to 38.463 on adding Cause when remove DRB and PDU Session	15.4.0
2019-07	RP-84	RP-191399	0097	-	F	Rapporteur's ASN.1 corrections for TS 38.463	15.4.0
2019-09	RP-85	RP-192168	0094	2	F	CR to 38.463 on Security Indication	15.5.0
2019-09	RP-85	RP-192166	0098	1	F	Correction of security indication	15.5.0
2019-09	RP-85	RP-192166	0111	1	F	Clarification for TNLA removal	15.5.0
2019-09	RP-85	RP-192168	0122	2	F	Correction of semantic descriptions in TS 38.463 (rapporteur)	15.5.0

History

Document history		
V15.0.0	July 2018	Publication
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V15.3.0	May 2019	Publication
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