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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”.

# 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 [3]. 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].

# 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.

# 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 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 |
| Data Usage Report | 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

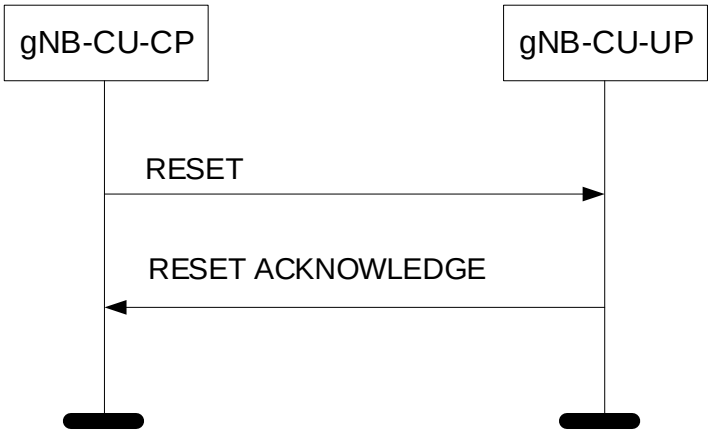


**Figure 8.2.1.2.1-1: Reset procedure initiated from the gNB-CU-CP. Successful operation.**

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

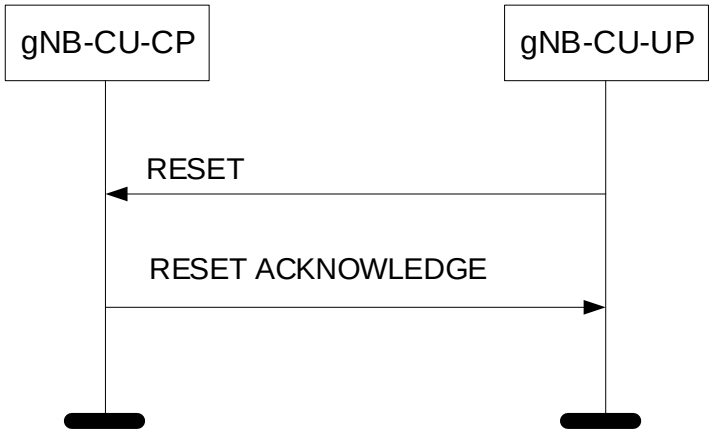


**Figure 8.2.1.2.2-1: Reset procedure initiated from the gNB-CU-UP. Successful operation.**

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

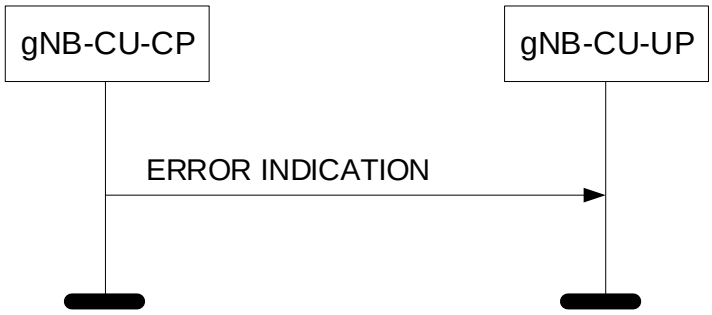


**Figure 8.2.2.2-1: Error Indication procedure, gNB-CU-CP originated. Successful operation.**

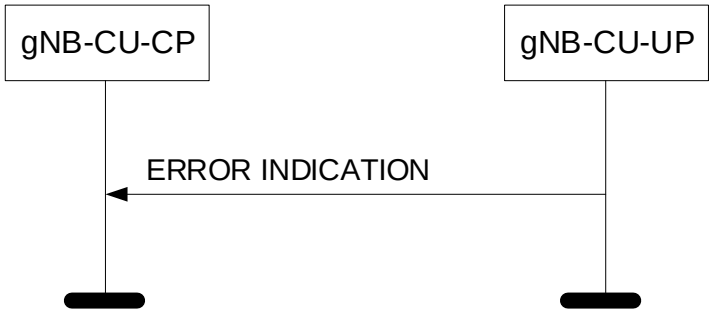


**Figure 8.2.2.2-2: Error Indication procedure, gNB-CU-UP originated. Successful operation.**

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 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

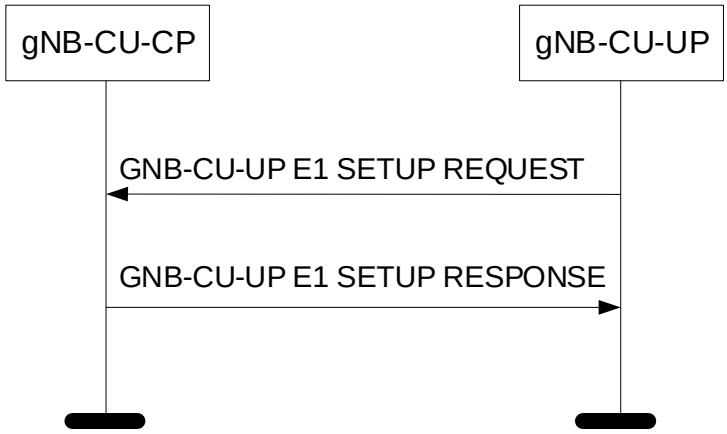


**Figure 8.2.3.2-1: gNB-CU-UP E1 Setup procedure: Successful Operation.**

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 for the duration of the TNL association. When this procedure is finished, the E1 interface is operational and other E1 messages can be exchanged.

### 8.2.3.3 Unsuccessful Operation

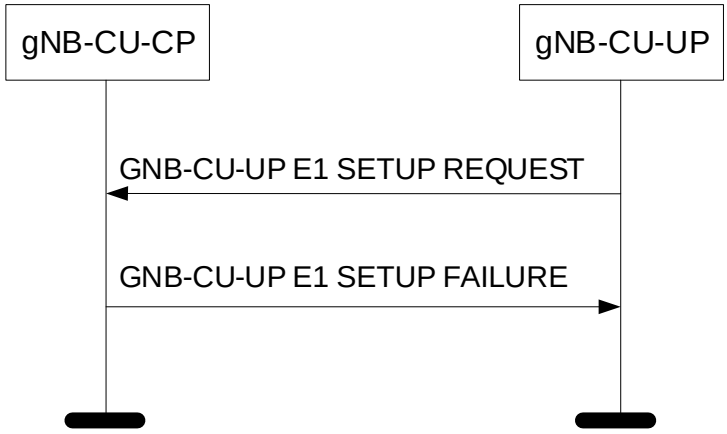


**Figure 8.2.3.3-1: gNB-CU-UP E1 Setup procedure: Unsuccessful Operation.**

If the gNB-CU-CP cannot accept the setup, it should 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 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

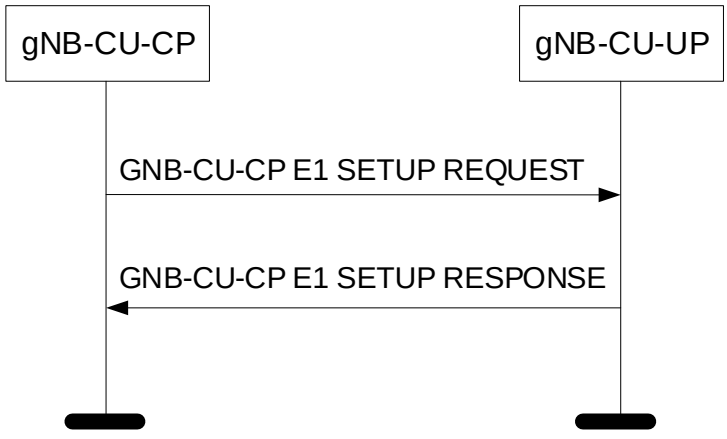


**Figure 8.2.4.2-1: gNB-CU-CP E1 Setup procedure: Successful Operation.**

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 for the duration of the TNL association. When this procedure is finished, the E1 interface is operational and other E1 messages can be exchanged.

#### 8.2.4.3 Unsuccessful Operation

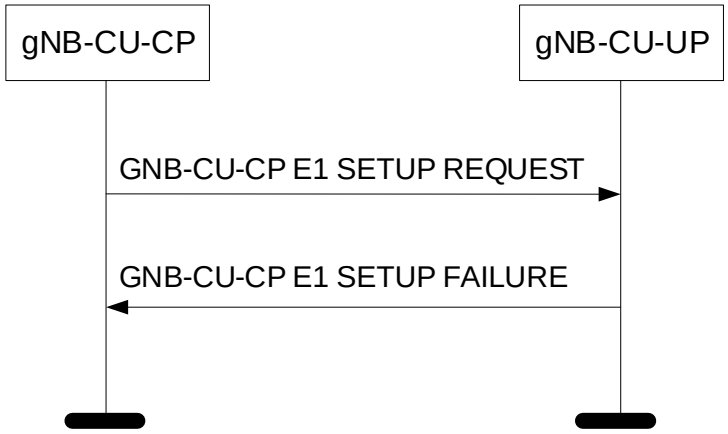


**Figure 8.2.4.3-1: gNB-CU-CP E1 Setup procedure: Unsuccessful Operation.**

If the gNB-CU-UP cannot accept the setup, it should 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

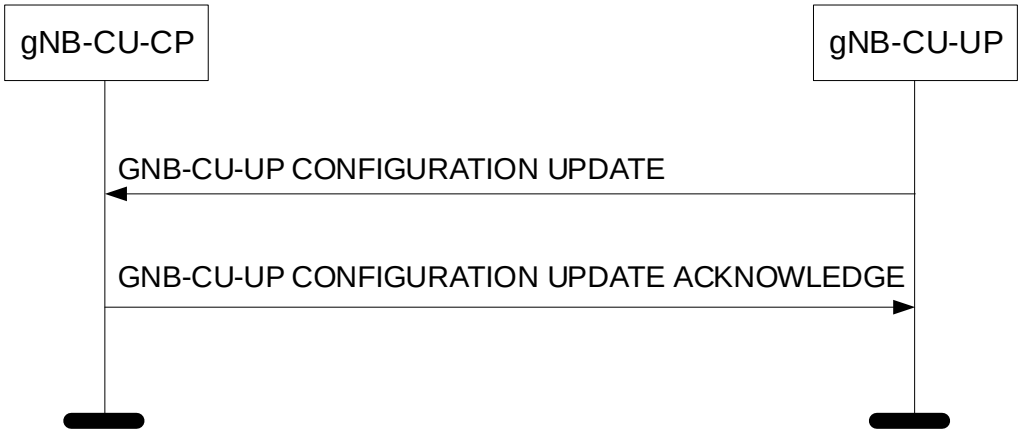


**Figure 8.2.5.2-1: gNB-CU-UP Configuration Update procedure: Successful Operation.**

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 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 replace any existing information.

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 replace any existing information.

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 replace any existing information.

The updated configuration data shall be stored in both nodes and used for the duration of the TNL association or until any further update is performed.

### 8.2.5.3 Unsuccessful Operation

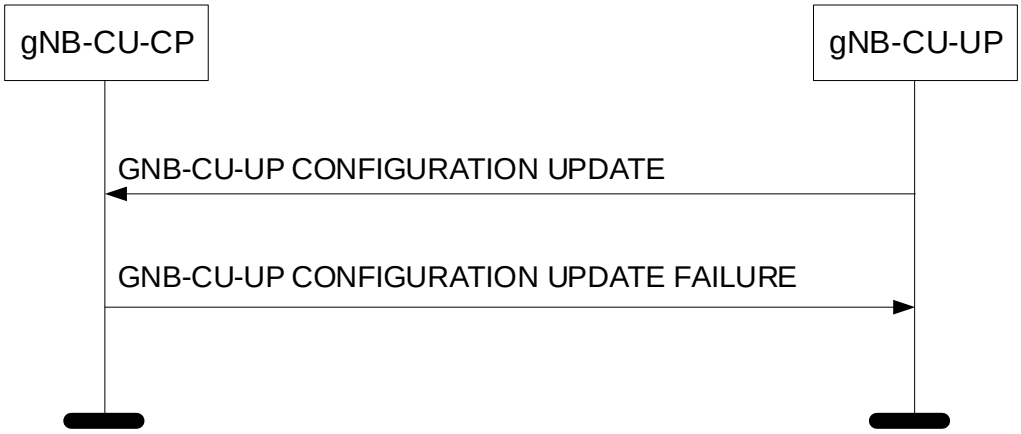


**Figure 8.2.5.3-1: gNB-CU-UP Configuration Update procedure: Unsuccessful Operation.**

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

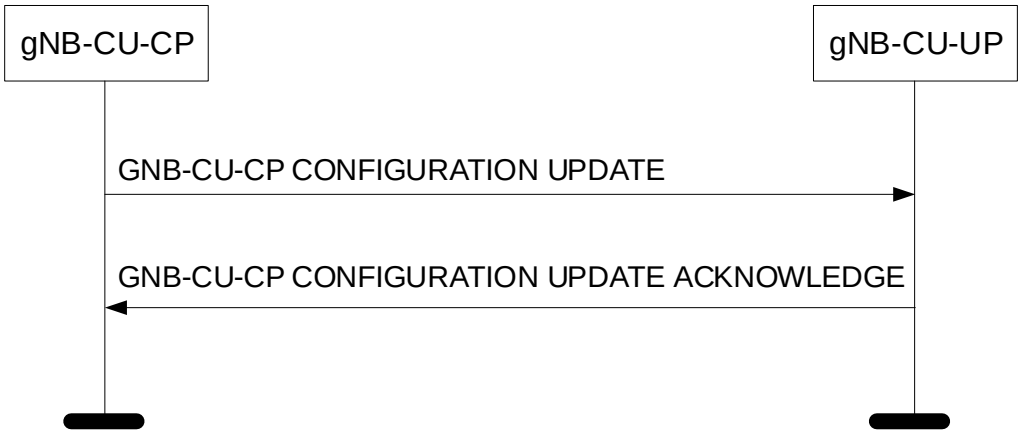


**Figure 8.2.6.2-1: gNB-CU-CP Configuration Update procedure: Successful Operation.**

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.

The updated configuration data shall be stored in both nodes and used for the duration of the TNL association or until any further update is performed.

#### 8.2.6.3 Unsuccessful Operation

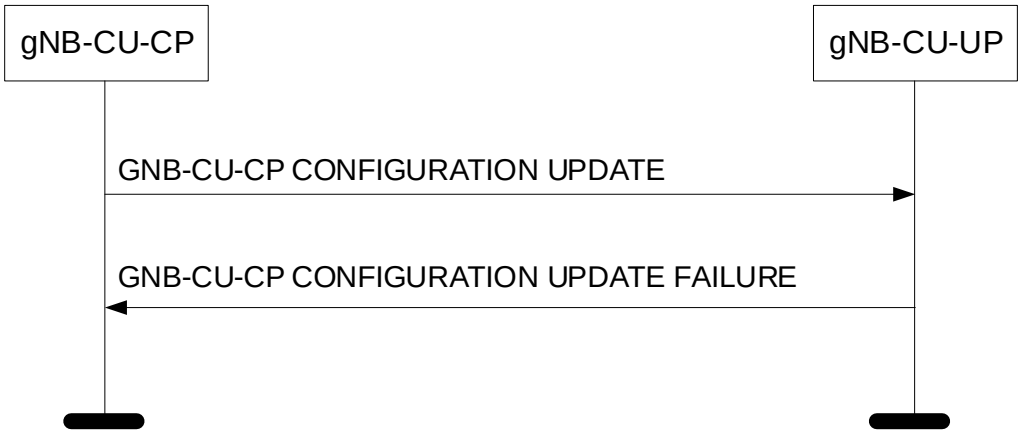


**Figure 8.2.6.3-1: gNB-CU-CP Configuration Update procedure: Unsuccessful Operation.**

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-UP 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

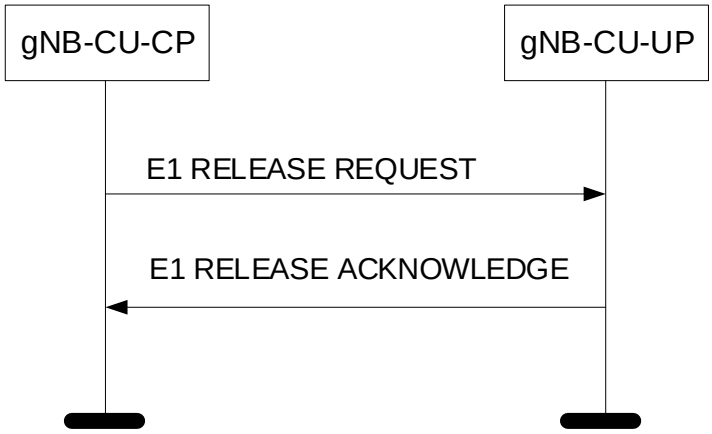


**Figure 8.2.7.2.1-1: E1 Release procedure initiated from the gNB-CU-CP. Successful operation.**

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

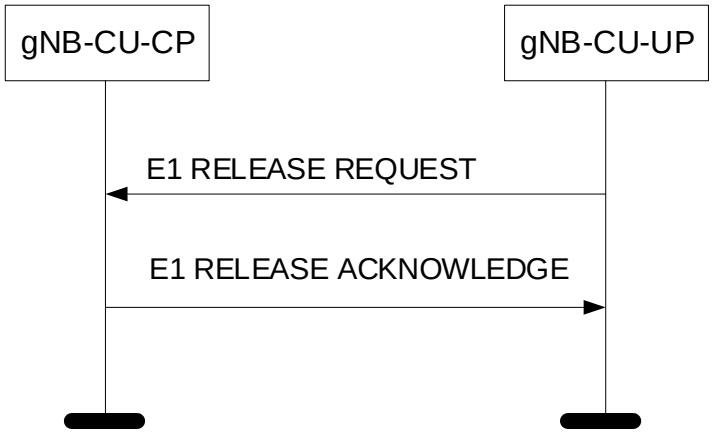


**Figure 8.2.7.2.2-1: E1 Release procedure initiated from the gNB-CU-UP. Successful operation.**

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.

## 8.3 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

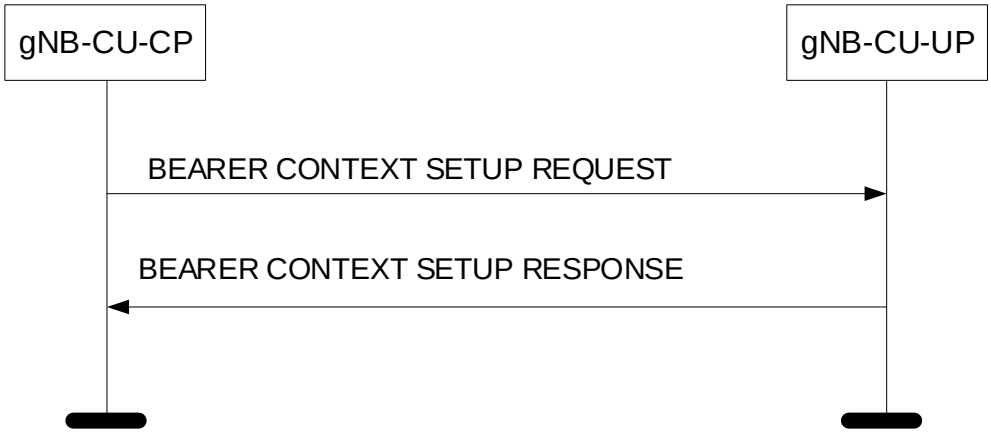


**Figure 8.3.1.2-1: Bearer Context Setup procedure: Successful Operation.**

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;
- 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 QoS Flows which are successfully established shall be included in the *Flow Setup List* IE;
- 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 *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.

#### 8.3.1.3 Unsuccessful Operation

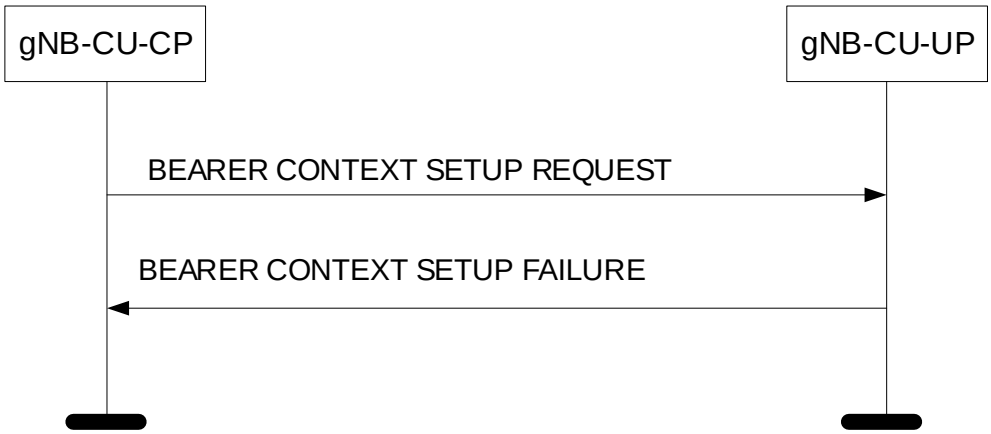


**Figure 8.3.1.3-1: Bearer Context Setup procedure: Unsuccessful Operation.**

If the gNB-CU-UP cannot establish the requested bearer context, it should respond with a BEARER CONTEXT SETUP FAILURE message and appropriate cause value.

#### 8.3.1.4 Abnormal Conditions

Not applicable.

### 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

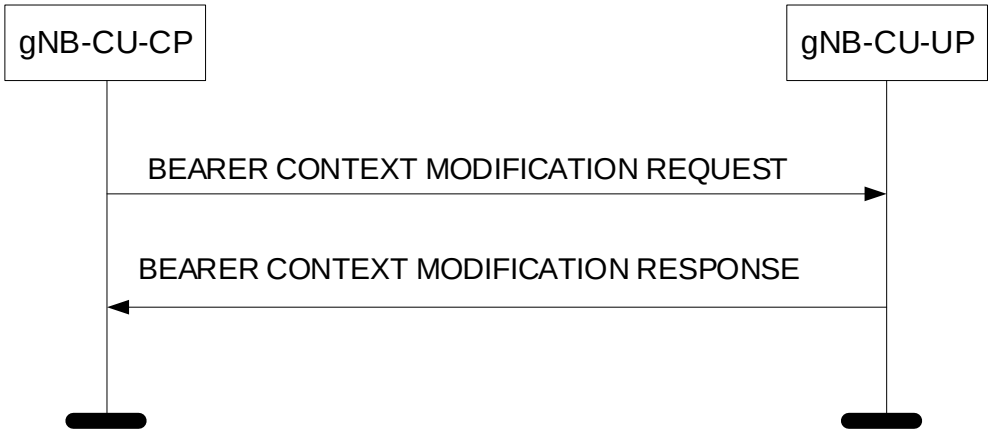


**Figure 8.3.2.2-1: Bearer Context Modification procedure: Successful Operation.**

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.

### 8.3.2.3 Unsuccessful Operation

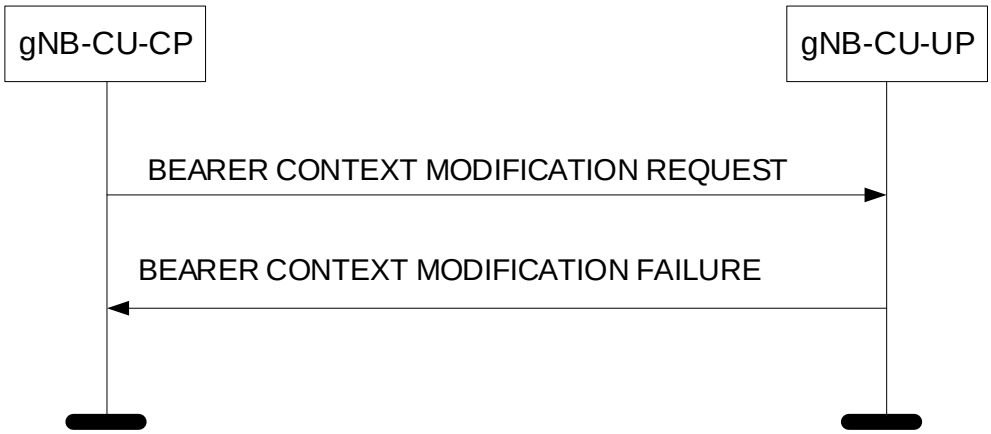


**Figure 8.3.2.3-1: Bearer Context Modification procedure: Unsuccessful Operation.**

If the gNB-CU-UP cannot modify the requested bearer context, it should respond with a BEARER CONTEXT MODIFICATION FAILURE message and appropriate cause value.

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;
- 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;
- A list of QoS Flows which are successfully established shall be included in the *Flow Setup List* IE;
- 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 *Bearer Context Status Change* IE is contained in the BEARER CONTEXT MODIFICATION REQUEST message, the gNB-CU-UP shall consider that the UE is changing 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.

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 Count 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 *PDCP UL Count* IE and the *PDCP DL Count* IE in the BEARER CONTEXT MODIFICATION RESPONSE message.

If the *PDCP UL Count* IE and the *PDCP DL Count* IE are contained in 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 Type* 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 *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 update the corresponding information.

If the *Security Indication* 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 *PDU Session 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.

#### 8.3.2.4 Abnormal Conditions

Not applicable.

### 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

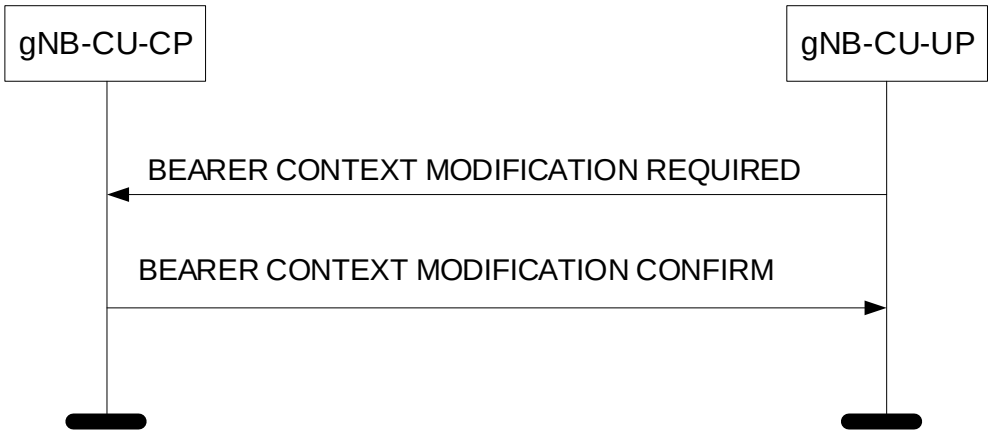


**Figure 8.3.3.2-1: Bearer Context Modification Required procedure: Successful Operation.**

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 *Data Forwarding Information Response* IE, *PDU Session Data Forwarding Information Response* IE or the *DRB Data Forwarding Information Response* IE are included in the BEARER CONTEXT MODIFICATION REQUIRED message, the gNB-CU-CP shall update the corresponding information.

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-UP 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-UP 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

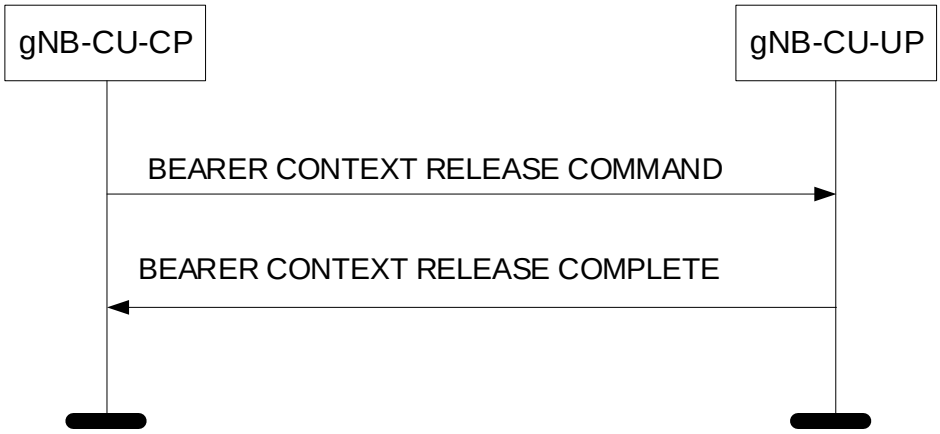


**Figure 8.3.4.2-1: Bearer Context Release procedure: Successful Operation.**

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-CP shall release all related signalling and user data transport resources and reply with the UE 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 Remove 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.

#### 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

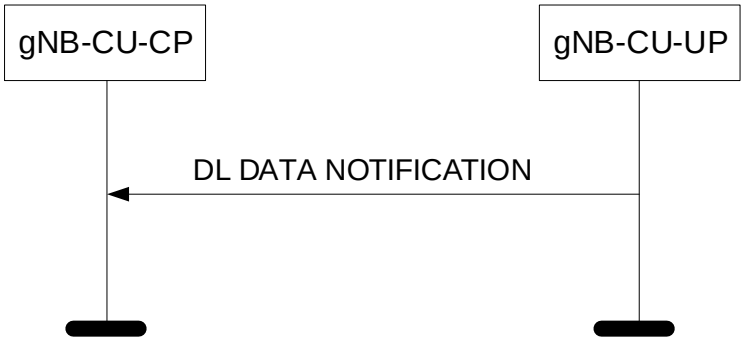


**Figure 8.3.7.2-1: DL Data Notification procedure: Successful Operation.**

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

#### 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

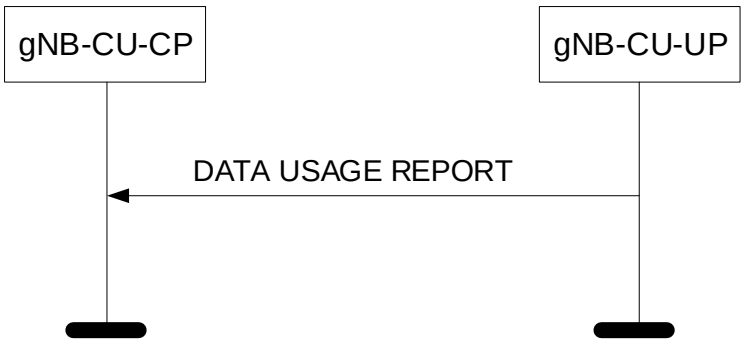


**Figure 8.3.8.2-1: Data Usage Report procedure: Successful Operation.**

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.

# 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 |
| 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 |
| **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 |
| 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 |
| 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 | EACH | Reject |
| >PLMN Identity | M | | 9.3.1.7 | | - | - |
| >Slice Support List | O | | Slice Support List 9.3.1.8 | Supported S-NSSAIs. | - | - |
| >NR CGI Support List | O | | 9.3.1.36 | Supported cells. | - | - |
| >QoS Parameters Support List | O | | 9.3.1.37 | Supported QoS parameters. | - | - |

| Range bound | Explanation |
|---|---|
| maxnoofSPLMNs | Maximum no. of Supported PLMN Ids. Value is 6. |

### 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 |
| 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 |
| 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 |
| 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 |
| 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 | EACH | reject |
| >PLMN Identity | M | | 9.3.1.7 | | - | - |
| >Slice Support List | O | | Slice Support List 9.3.1.8 | Supported S-NSSAIs. | - | - |
| >NR CGI Support List | O | | 9.3.1.36 | Supported cells. | - | - |
| >QoS Paramters Support List | O | | 9.3.1.37 | Supported QoS parameters. | - | - |

| Range bound | Explanation |
|---|---|
| maxnoofSPLMNs | Maximum no. of Supported PLMN Ids. Value is 6. |

### 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 |
| 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 |
| 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 | EACH | reject |
| >PLMN Identity | M | | 9.3.1.7 | | - | - |
| >Slice Support List | O | | Slice Support List 9.3.1.8 | Supported S-NSSAIs. | - | - |
| >NR CGI Support List | O | | 9.3.1.36 | Supported cells. | - | - |
| >QoS Parameters Support List | O | | 9.3.1.37 | Supported QoS parameters. | - | - |

| Range bound | Explanation |
|---|---|
| maxnoofSPLMNs | Maximum no. of Supported PLMN Ids. Value is 6. |

### 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 |
| 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 |
| 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 |
| gNB-CU-CP Name | O | | PrintableString(SIZE(1..150,…)) | Human readable name of the gNB-CU-CP | YES | ignore |

#### 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 |
| Criticality Diagnostics | O | | 9.3.1.3 | | YES | ignore |

#### 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 |
| 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 |
| 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 |

### 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 |
| CHOICE *System* | M | | | | YES | reject |
| *>E-UTRAN* | | | | | | |
| **>>DRB To Setup List** | | *1* | | | YES | reject |
| **>>>DRB To Setup Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>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 | | - | - |
| >>>>Cell Group Information | M | | 9.3.1.11 | The gNB-CU-UP shall provide one UL UP Transport Layer Information Item per cell group entry. | - | - |
| *>NG-RAN* | | | | | | |
| **>>PDU Session Resource To Setup List** | | *1* | | | YES | reject |
| **>>>PDU Session Resource To Setup Item** | | *1..<maxnoofPDU SessionResource>* | | | EACH | reject |
| >>>>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 Aggregate Maximum Bit Rate | O | | 9.3.1.20 | | - | - |
| >>>>NG UP UL Transport Layer Information | M | | UP Transport Layer Information 9.3.2.1 | | - | - |
| >>>>PDU Session Data Forwarding Information Request | O | | Data Forwarding Information Request 9.3.2.6 | | - | - |
| **>>>>DRB To Setup List** | | *1* | | | YES | reject |
| **>>>>>DRB To Setup Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>>>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 | The gNB-CU-UP shall provide one UL UP Transport Layer Information Item per cell group entry. | - | - |
| >>>>>>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 | | - | - |

| 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** | | *1* | | | YES | ignore |
| **>>>DRB Setup Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>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 Response 9.3.2.6 | | - | - |
| >>>>UL UP Transport Parameters | M | | UP Parameters 9.3.1.13 | | - | - |
| **>>DRB Failed List** | | *0.. 1* | | | YES | ignore |
| **>>>DRB Failed Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>DRB ID | M | | | | - | - |
| >>>>Cause | M | | | | - | - |
| *>NG-RAN* | | | | | | |
| **>>PDU Session Resource Setup List** | | *1* | | | YES | ignore |
| **>>>PDU Session Resource Setup Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | ignore |
| >>>>PDU Session ID | M | | | | - | - |
| >>>>NG-U DL UP Transport Layer Information | O | | UP Trasport Layer Information 9.3.2.1 | | | |
| >>>>PDU Session Data Forwarding Information Response | O | | Data Forwarding Information Respone 9.3.2.6 | | - | - |
| **>>>>DRB Setup List** | | *1* | | | - | - |
| **>>>>>DRB Setup Item** | | *1..<maxnoofDRBs>* | | | - | - |
| >>>>>>DRB ID | M | | | | - | - |
| >>>>>>DRB Data forwarding information Response | O | | Data Forwarding Information Respone 9.3.2.6 | | - | - |
| >>>>>>UL UP Parameters | M | | 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* | | | YES | ignore |
| **>>>>>DRB Failed Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>>>DRB ID | M | | | | - | - |
| >>>>>>Cause | M | | | | - | - |
| **>>PDU Session Resource Failed List** | | *0.. 1* | | | YES | ignore |

| | | | | | | |
|---|---|---|---|---|---|---|
| **>>>PDU Session Resource Failed Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | ignore |
| >>>>PDU Session ID | M | | | | - | - |
| >>>>Cause | M | | | | - | - |

| 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 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 |
| 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 |
| Bearer Context Status Change | O | | ENUMERATED (Suspend, Resume, …) | Indicates to Suspend or Resume the Bearer Context | YES | reject |
| CHOICE *System* | M | | | | YES | reject |
| *>E-UTRAN* | | | | | | |
| **>>DRB To Setup List** | | *0.. 1* | | | YES | reject |
| **>>>DRB To Setup Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>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 Trasnport Layer Information | M | | UP Transport Layer Information 9.3.2.1 | | - | - |
| >>>>Data Forwarding Information Request | O | | 9.3.2.5 | | - | - |
| >>>>Cell Group Information | M | | 9.3.1.11 | The gNB-CU-UP shall provide one UL UP Transport Layer Information Item per cell group entry | - | - |
| **>>DRB To Modify List** | | *0.. 1* | | | YES | reject |
| **>>>DRB To Modify Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>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 Parameters | O | | UP Transport Layer Information 9.3.2.1 | | - | - |
| >>>>Data Forwarding Information Request | O | | 9.3.2.5 | | - | - |
| >>>>PDCP Count Request | O | | ENUMERATED (requested, …) | The gNB-CU-CP requests the gNB-CU-UP to provide the PDCP Count in the response message. | - | - |
| >>>>PDCP UL Count | O | | PDCP Count 9.3.1.35 | PDCP count for first un-acknowledged UL packet. | - | - |
| >>>>PDCP DL Count | O | | PDCP Count 9.3.1.35 | PDCP count for next DL packet to be assigned. | - | - |
| >>>>DL UP Parameters | O | | 9.3.1.13 | | - | - |
| >>>>Cell Group To Add | O | | 9.3.1.11 | | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>>>Cell Group To Modify | O | | 9.3.1.11 | | - | - |
| >>>>Cell Group To Remove | O | | 9.3.1.11 | | - | - |
| **>>DRB To Remove List** | | *0.. 1* | | | YES | reject |
| **>>>DRB To Remove Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>DRB ID | M | | | | - | - |
| *>NG-RAN* | | | | | | |
| **>>PDU Session Resource To Setup List** | | *0.. 1* | | | YES | reject |
| **>>>PDU Session Resource To Setup Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | reject |
| >>>>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 Aggregate Maximum Bit Rate | M | | 9.3.1.20 | | - | - |
| >>>>NG UP UL 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 | | - | - |
| | | | | | | |
| **>>>>DRB To Setup List** | | *1* | | | | |
| **>>>>>DRB To Setup Item** | | *1..<maxnoofDRBs>* | | | | |
| >>>>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>>>SDAP Configuration | M | | 9.3.1.39 | 9.3.1.xx24 | - | - |
| >>>>>>PDCP Configuration | M | | 9.3.1.38 | | - | - |
| >>>>>>Cell Group Information | M | | 9.3.1.11 | The gNB-CU-UP shall provide one UL UP Transport Layer Information Item per cell group entry. | - | - |
| >>>>>>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 | | - | - |
| **>>PDU Session Resource To Modify List** | | *0.. 1* | | | YES | reject |
| **>>>PDU Session Resource To Modify Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | reject |
| >>>>PDU Session ID | M | | 9.3.1.21 | | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>>>PDU Session Type | O | | 9.3.1.22 | | - | - |
| >>>>S-NSSAI | O | | 9.3.1.9 | | - | - |
| >>>>Security Indication | O | | 9.3.1.23 | | - | - |
| >>>>PDU Session Resource Aggregate Maximum Bit Rate | O | | 9.3.1.20 | | - | - |
| >>>>NG UP UL 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 | | - | - |
| **>>>>DRB To Setup List** | | *0..1* | | | | |
| **>>>>>DRB To Setup Item** | | *1..<maxnoofDRBs>* | | | | |
| >>>>>>DRB ID | M | | 9.3.xx1 | | - | - |
| >>>>>>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 | | - | - |
| **>>>>DRB To Modify List** | | *0.. 1* | | | | |
| **>>>>>DRB To Modify Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>>>DRB ID | M | | | | - | - |
| >>>>>>SDAP Configuration | O | | 9.3.1.39 | | - | - |
| >>>>>>PDCP Configuration | O | | 9.3.1.38 | | - | - |
| >>>>>>DRB Data forwarding information Request | O | | Data Forwarding Information Request 9.3.2.5 | Overrides previous information. | - | - |
| >>>>>>PDCP Count Request | O | | ENUMERATED (requested, …) | The gNB-CU-CP requests the gNB-CU-UP to provide the PDCP Count in the response message. | - | - |
| >>>>>>PDCP UL Count | O | | PDCP Count 9.3.1.35 | PDCP count for first un-acknowledged UL packet. | - | - |
| >>>>>>PDCP DL Count | O | | PDCP Count 9.3.1.35 | PDCP count for next DL packet to be assigned. | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>>>>>DL UP Parameters | O | | 9.3.1.13 | | - | - |
| >>>>>>Cell Group To Add | O | | 9.3.1.11 | | - | - |
| >>>>>>Cell Group To Modify | O | | 9.3.1.11 | | - | - |
| >>>>>>Cell Group To Remove | O | | 9.3.1.11 | | - | - |
| >>>>>>Flow Mapping Information | O | | QoS Flow QoS Parameters List 9.3.1.25 | Overrides previous mapping information. | - | - |
| **>>>>DRB To Remove List** | | *0.. 1* | | | YES | reject |
| **>>>>>DRB To Remove Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>>>DRB ID | M | | | | - | - |
| **>>PDU Session Resource To Remove List** | | *0.. 1* | | | YES | reject |
| **>>>PDU Session Resource To Remove Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | reject |
| >>>>PDU Session ID | M | | | | - | - |

| 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* | M | | | | YES | ignore |
| *>E-UTRAN* | | | | | | |
| **>>DRB Setup List** | | *0.. 1* | | | YES | ignore |
| **>>>DRB Setup Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>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 Response 9.3.2.6 | | - | - |
| >>>>UL UP Transport Parameters | M | | UP Parameters 9.3.1.13 | | - | - |
| **>>DRB Failed List** | | *0.. 1* | | | YES | ignore |
| **>>>DRB Failed Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>Cause | M | | 9.3.1.2 | | - | - |
| **>>DRB Modified List** | | *0.. 1* | | | YES | ignore |
| **>>>DRB Modified Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>PDCP UL Count | O | | PDCP Count 9.3.1.35 | PDCP count for first un-acknowledged UL packet. | - | - |
| >>>>PDCP DL Count | O | | PDCP Count 9.3.1.35 | PDCP count for next DL packet to be assigned. | - | - |
| >>>>UL UP Transport Parameters | O | | UP Parameters 9.3.1.13 | Carries the UL UP parameters for newly added cell groups. | - | - |
| **>>DRB Failed To Modify List** | | *0.. 1* | | | YES | ignore |
| **>>>DRB Failed To Modify Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>Cause | M | | 9.3.1.2 | | - | - |
| *>NG-RAN* | | | | | | |
| **>>PDU Session Resource Setup List** | | *0.. 1* | | | YES | ignore |
| **>>>PDU Session Resource Setup Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | ignore |
| >>>>PDU Session ID | M | | 9.3.1.21 | | - | - |
| >>>>NG-U DL UP Transport Layer Information | O | | UP Trasport Layer Information 9.3.2.1 | | | |
| >>>>PDU Session Data Forwarding Information Response | O | | Data Forwarding Information Respone 9.3.2.6 | | - | - |
| **>>>>DRB Setup List** | | *1* | | | - | - |
| **>>>>>DRB Setup Item** | | *1..<maxnoofDRBs>* | | | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>>>>>DRB ID | M | | 9.3..1.xx1 | | - | - |
| >>>>>>DRB Data forwarding information Response | O | | Data Forwarding Information Respone 9.3.2.6 | | - | - |
| >>>>>>UL UP Parameters | M | | 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* | | | YES | ignore |
| **>>>>>DRB Failed Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>>>Cause | M | | 9.3.1.2 | | - | - |
| **>>PDU Session Resource Failed List** | | *0.. 1* | | | YES | ignore |
| **>>>PDU Session Resource Failed Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | ignore |
| >>>>PDU Session ID | M | | 9.3.1.21 | | - | - |
| >>>>Cause | M | | 9.3.1.2 | | - | - |
| **>>PDU Session Resource Modified List** | | *0.. 1* | | | YES | ignore |
| **>>>PDU Session Resource Modified Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | ignore |
| >>>>PDU Session ID | M | | 9.3.1..xx6 | | - | - |
| **>>>>DRB Setup List** | | *1* | | | - | - |
| **>>>>>DRB Setup Item** | | *1..<maxnoofDRBs>* | | | - | - |
| >>>>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>>>DRB Data forwarding information Response | O | | Data Forwarding Information Respone 9.3.2.6 | | - | - |
| >>>>>>UL UP Parameters | O | | 9.3.1.13 | | - | - |
| >>>>>>Flow Setup List | O | | QoS Flow List 9.3.1.12 | | | |
| >>>>>>Flow Failed List | O | | Flow Failed List 9.3.1.45 | | | |
| **>>>>DRB Failed List** | | *0.. 1* | | | YES | ignore |
| **>>>>>DRB Failed Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>>>Cause | M | | 9.3.1.2 | | - | - |
| **>>>>DRB Modified List** | | *0.. 1* | | | YES | ignore |
| **>>>>>DRB Modified Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>>>PDCP UL Count | O | | PDCP Count 9.3.1.35 | PDCP count for first un-acknowledged UL packet. | - | - |
| >>>>>>PDCP DL Count | O | | PDCP Count 9.3.1.35 | PDCP count for next DL packet to be assigned. | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>>>>>UL UP Transport Parameters | O | | UP Parameters 9.3.1.13 | Carries the UL UP parameters for newly added cell groups. | - | - |
| >>>>>>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* | | | YES | ignore |
| **>>>>>DRB Failed To Modify Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>>>Cause | M | | 9.3.1.2 | | - | - |
| **>>PDU Session Resource Failed To Modify List** | | *0.. 1* | | | YES | ignore |
| **>>>PDU Session Resource Failed To Modify Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | ignore |
| >>>>PDU Session ID | M | | 9.3.1.21 | | - | - |
| >>>>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. |

### 9.2.2.6 BEARER CONTEXT MODIFICATION FAILURE

This message is sent by the gNB-CU-UP to indicate that the modifcation 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** | | *0.. 1* | | | YES | reject |
| **>>>DRB To Modify Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>S1 DL UP Transport Layer Information | O | | UP Transport Layer Information 9.3.2.1 | | - | - |
| >>>>Data Forwarding Information Response | O | | Data Forwarding Information Response 9.3.2.6 | | - | - |
| >>>>gNB-CU-UP Cell Group Related Configuration | O | | gNB-CU-UP Cell Group Related Configuration 9.3.1.19 | | - | - |
| **>>DRB To Remove List** | | *0.. 1* | | | YES | reject |
| **>>>DRB To Remove Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>DRB ID | M | | | | - | - |
| *>NG-RAN* | | | | | | |
| **>>PDU Session Resource To Modify List** | | *0.. 1* | | | YES | reject |
| **>>>PDU Session Resource To Modify Item** | | *1..<maxnoofPDU SessionResource>* | | | EACH | reject |
| >>>>PDU Session ID | M | | 9.3.1.21 | | - | - |
| >>>>NG-U DL UP Transport Layer Information | O | | UP Trasport Layer Information 9.3.2.1 | | - | - |
| >>>>PDU Session Data Forwarding Information Response | O | | Data Forwarding Information Respone 9.3.2.6 | | - | - |
| **>>>>DRB To Modify List** | | *0.. 1* | | | YES | reject |
| **>>>>>DRB To Modify Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>>>DRB ID | M | | 9.3.1.16 | | - | - |
| >>>>>>DRB Data Forwarding Information Response | O | | Data Forwarding Information Response 9.3.2.6 | | - | - |
| >>>>>>gNB-CU-UP Cell Group Related Configuration | O | | gNB-CU-UP Cell Group Related Configuration 9.3.1.34 | | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| >>>>>>Flow To Remove | O | | QoS Flow List 9.3.1.12 | | - | - |
| **>>>>DRB To Remove List** | | *0.. 1* | | | YES | reject |
| **>>>>>DRB To Remove Item** | | *1..<maxnoofDRBs>* | | | EACH | reject |
| >>>>>>DRB ID | M | | | | - | - |
| **>>PDU Session Resource To Remove List** | | *0.. 1* | | | YES | reject |
| **>>>PDU Session Resource To Remove Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | reject |
| >>>>PDU Session ID | M | | | | - | - |

| 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* | M | | | | YES | ignore |
| *>E-UTRAN* | | | | | | |
| **>>DRB Modified List** | | *0.. 1* | | | YES | ignore |
| **>>>DRB Modified Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>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 Information* IE (e.g., UL Configuration). | - | - |
| *>NG-RAN* | | | | | | |
| **>>PDU Session Resource Modified List** | | *0.. 1* | | | YES | Ignore |
| **>>>PDU Session Resource Modified Item** | | *1..<maxnoofPDUSessionResource>* | | | EACH | ignore |
| >>>>PDU Session ID | M | | 9.3.1.21 | | - | - |
| **>>>>DRB Modified List** | | *0.. 1* | | | YES | ignore |
| **>>>>>DRB Modified Item** | | *1..<maxnoofDRBs>* | | | EACH | ignore |
| >>>>>>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 Information* 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. |

## 9.2.2.9 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 |
| CU-CP UE E1AP ID | M | | 9.3.1.4 | | YES | reject |
| 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>* | | | EACH | ignore |
| >>DRB ID | M | | 9.3.1.1 | | - | - |
| >>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 next DL packet to be assigned. | - | - |
| >>Data Forwarding Information Response | O | | Data Forwarding Information Response 9.3.2.6 | PDCP count for first un-acknowledged UL packet. | - | - |

| 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 |
| **DRB Activity List** | | *1* | | | YES | reject |
| **>DRB Activity Item** | | *1 .. <maxnoof DRBs>* | | | EACH | ignore |
| >>DRB ID | M | | 9.3.1.16 | | - | - |
| >>DRB Activity | M | | ENUMERATED (Active, Not active, …) | | - | - |

| Range bound | Explanation |
|---|---|
| maxnoofDRBs | Maximum no. of DRB for a UE, the maximum value is 32. |

### 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 |

### 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 |

## 9.3 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, …) | |
| *>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. |

| 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.

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). |
| **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' shall not be used. |
| >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,<br>- 1111 used as filler digit,<br>two digits per octet,<br>- bits 4 to 1 of octet n encoding digit 2n-1<br>- bits 8 to 5 of octet n encoding digit 2n<br><br>-The PLMN identity consists of 3 digits from MCC followed by either<br>-a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or<br>-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 (0=MCG, 1=SCG). In this version of the specification, values “2” and “3” shall not be set by the sender and ignored by the receiver. |
| >>UL Configuration | O | | 9.3.1.33 | Indicates whetehr the Cell Group is used for UL traffic. |
| >>DL TX Stop | O | | ENUMERATED (stop, …) | |
| >>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 Indicator.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| **QoS Flow List** | | *1* | | |
| **>QoS Flow Item** | | *1..<maxnoofQoSflows>* | | |
| >>QoS Flow Indicator | M | | 9.3.1.24 | |

| 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” shall not be set by the sender and ignored by the receiver. |

| Range bound | Explanation |
|---|---|
| maxnoofUPParameters | Maximum no. of UP parameters (e.g., GTP tunnels) for a DRB. Value is 4. |

### 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 [8]. |

### 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 shall be 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]).<br>**Usage:**<br>Value 15 means "no priority".<br>Values between 1 and 14 are ordered in decreasing order of priority, i.e. 1 is the highest and 14 the lowest.<br>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<br>**Usage:**<br>The E-RAB shall not pre-empt other E-RABs or, the E-RAB may pre-empt other E-RABs<br>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.<br>**Usage**:<br>The E-RAB shall not be pre-empted by other E-RABs or the E-RAB may be pre-empted by other RABs.<br>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 [11].

| 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 [11].

| 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 sessions, 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. |
| 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. |

### 9.3.1.24 QoS Flow Indicator

This IE identifies a QoS Flow within a PDU Session. Definition and use of the QoS Flow Indicator is specified in TS 23.501 [11].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| QoS Flow Indicator | 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 Indicator | M | | 9.3.1.24 | | - | - |
| >>QoS Flow Level QoS Parameters | M | | 9.3.1.26 | | - | - |

| 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 | | NG-RAN Allocation and Retention Priority 9.3.1.29 | |
| GBR QoS Flow Information | O | | 9.3.1.30 | This IE shall be present for GBR QoS Flows only. |
| Reflective QoS Attribute | O | | ENUMERATED (subject to, …) | Details in TS 23.501 [11]. This IE applies to non-GBR flows only and shall be 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. |
| PPI | O | | INTEGER (1..8, …) | Paging Policy Indicator used in PPD (Paging Policy Differentiation). See details in TS 23.501 [11]. This IE applies to PDU sessions of IP type. |
| RQI | O | | ENUMERATED (enabled, …) | Indicates whether Reflective QoS 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) | Details in TS 23.501 [11]. |
| Priority Level | O | | 9.3.1.51 | For details see TS 23.501 [11]. 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 [11]. When included overrides standardized or pre-configured value. |
| Maximum Data Burst Volume | O | | 9.3.1.50 | For details see TS 23.501 [11]. 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 [11]. |
| Packet Delay Budget | M | | 9.3.1.47 | For details see TS 23.501 [11]. |
| Packet Error Rate | M | | 9.3.1.48 | For details see TS 23.501 [11]. |
| Delay Critical | C-ifGBRflow | | ENUMERATED (delay critical, non-delay critical) | For details see TS 23.501 [11]. |
| Averaging Window | C-ifGBRflow | | 9.3.1.49 | For details see TS 23.501 [11]. |
| Maximum Data Burst Volume | O | | 9.3.1.50 | For details see TS 23.501 [11]. |

| 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 [9]).<br>**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 [9]. |
| 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.<br>**Usage**: The QoS flow shall not pre-empt other QoS flows or, the QoS flow may pre-empt other QoS flows.<br>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.<br>**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.<br>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 [11]. |
| Maximum Flow Bit Rate Uplink | M | | Bit Rate 9.3.1.20 | Maximum Bit Rate in UL. Details in TS 23.501 [11]. |
| 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 [11]. |
| 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 [11]. |
| Notification Control | O | | ENUMERATED (notification enabled, ...) | Details in TS 23.501 [11]. |
| 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 [11]. |
| 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 [11]. |

### 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 E-UTRAN, this IE shall not be included. |

### 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 | | OCTECT STRING | As defined in TS 33.501 [13]. |
| Integrity Protection Key | O | | OCTECT STRING | As defined in TS 33.501 [13]. For E-UTRAN, this IE shall not be included. |

### 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 Information

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. | - | - |
| >>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 4. |

### 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 Size | M | | ENUMERATED (12, 18, …) | Indicates the PDCP SN size in bits. For more information see *PDCP-Config IE* in TS 38.331. |
| RLC mode | M | | ENUMERATED (TM, UM, AM, …) | Indicates the RLC mode for the DRB. For more information see *PDCP-Config IE* in TS 38.331. |
| 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. |

### 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 For more information see *SDAP-Config IE* in TS 38.331. |
| 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. |
| 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. |

### 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 |
|---|---|---|---|---|
| **ROHC Parameters** | | | | For more information see *PDCP-Config IE* in TS 38.331. |
| >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. |

### 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 UL Timer | M | | INTEGER (0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 220, 240, 260, 280, 300, 500, 750, 1000, 1500, 3000) | Indicates the t-Reordering UL timer. The values are expressed in *ms*. For more information see *PDCP-Config IE* in TS 38.331. |
| T-Reordering DL Timer | M | | INTEGER (0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 220, 240, 260, 280, 300, 500, 750, 1000, 1500, 3000) | Indicates the t-Reordering DL timer. The values are expressed in *ms*. For more information see *PDCP-Config IE* in TS 38.331. |

### 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 | | | INTEGER (10, 20, 30, 40, 50, 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. |

### 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 | | | INTEGER (0, 100, 200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200, 102400, 204800, 409600, 819200, 1228800, 1638400, 2457600, 3276800, 4096000, 4915200, 5734400, 6553600, infinity, Infinity, …) | Indicates the UL data split threshold. The values are expressed in bits. For more information see *PDCP-Config IE* in TS 38.331. |

### 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.

| 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 | | | - | - |
| >>DAB Usage Report Item | | 1.. <maxnoof time periods> | | | - | - |
| >>>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. |
| maxnoof time periods | 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 Indicator | 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.

| 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.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| Packet Delay Budget | M | | INTEGER (0..63) | This IE may need to be refined |

#### 9.3.1.48 Packet Error Rate

This IE indicates the Packet Error Rate.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| Packet Error Rate | M | | INTEGER (0..63) | This IE may need to be refined |

#### 9.3.1.49 Averaging Window

This IE indicates the Averaging Window.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| Averaging Window | M | | INTEGER (0..63) | This IE may need to be refined |

#### 9.3.1.50 Maximum Data Burst Volume

This IE indicates the Maximum Data Burst Volume.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| Maximum Data Burst Volume | M | | INTEGER (0..63) | This IE may need to be refined |

#### 9.3.1.51 Priority Level

This IE indicates the Priority Level.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| Priority Level | M | | INTEGER (1..127) | This IE may need to be refined |

### 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 |
|---|---|---|---|---|
| CHOICE *CP Transport Layer Information* | | | | |
| *>Endpoint-IP-address* | | | | |
| >> Endpoint IP address | M | | Transport Layer Address 9.3.2.4 | |

### 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 data forwarding addresses e.g., to the target gNB-CU-UP for handover.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|---|---|---|---|
| Data Forwarding Request | M | | ENUMERATED (UL, DL, both, …) | |
| UL Data Forwarding | O | | UP Transport Layer Information 9.3.2.1 | |
| DL Data Forwarding | O | | UP Transport Layer Information 9.3.2.1 | |

#### 9.3.2.6 Data Forwarding Information Response

This IE includes data forwarding information generated by the gNB-CU-UP upon request from the gNB-CU-CP.

| 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 | |

## 9.4 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

```
-- **************************************************************
--
-- 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,
   DataUsageReport,
   E1ReleaseRequest,
   E1ReleaseResponse,
   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-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                          |
    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
}

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


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

END
```

## 9.4.4 PDU Definitions

```
-- **************************************************************
--
-- 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-Modify-List-EUTRAN,
    DRB-Confirm-Modified-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,
    DRB-Status-Item,
    DRB-Activity-Item,
    Data-Usage-Report-List,
    TimeToWait


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-SupportedPLMNs-Item,
    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-DRB-Status-Item,
    id-DRB-Activity-List,
    id-DRB-Activity-Item,
    id-Data-Usage-Report-List,
    id-TimeToWait,

    maxnoofErrors,
    maxnoofSPLMNs,
    maxnoofDRBs,
    maxnoofIndividualE1ConnectionsToReset


FROM E1AP-Constants;

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

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

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

ResetIEs E1AP-PROTOCOL-IES ::= {
    { 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,
    ...
}


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-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-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-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   },
    ...
}

SupportedPLMNs-List ::= SEQUENCE (SIZE (1..maxnoofSPLMNs)) OF ProtocolIE-SingleContainer { {SupportedPLMNs-ItemIEs} }

SupportedPLMNs-ItemIEs  E1AP-PROTOCOL-IES ::= {
    { ID id-SupportedPLMNs-Item     CRITICALITY reject      TYPE SupportedPLMNs-Item    PRESENCE mandatory }
}

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-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-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-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-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   },
    ...
}

-- **************************************************************
--
-- 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-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-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 },
    ...
}

-- **************************************************************
--
-- 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-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-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-gNB-CU-CP-Name                      CRITICALITY ignore  TYPE GNB-CU-UP-Name             PRESENCE optional },
    ...
}

-- **************************************************************
--
-- 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-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics         PRESENCE optional },
    ...
}

-- **************************************************************
--
-- 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-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-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory   },
    ...
}

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

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

E1ReleaseResponseIEs E1AP-PROTOCOL-IES ::= {
    ...
}

-- **************************************************************
--
-- 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-System-BearerContextSetupRequest   CRITICALITY reject  TYPE System-BearerContextSetupRequest        PRESENCE mandatory },
    ...
}

System-BearerContextSetupRequest    ::= CHOICE {
    e-UTRAN-BearerContextSetupRequest       EUTRAN-BearerContextSetupRequest,
    nG-RAN-BearerContextSetupRequest        NG-RAN-BearerContextSetupRequest,
    ...
}

EUTRAN-BearerContextSetupRequest    ::=     SEQUENCE {

    dRB-To-Setup-List-EUTRAN                DRB-To-Setup-List-EUTRAN,
    iE-Extensions                           ProtocolExtensionContainer { { EUTRAN-BearerContextSetupRequest-ExtIEs } } OPTIONAL,
    ...
}

EUTRAN-BearerContextSetupRequest-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-BearerContextSetupRequest    ::=     SEQUENCE {
    pDU-Session-Resource-To-Setup-List      PDU-Session-Resource-To-Setup-List,
    iE-Extensions                           ProtocolExtensionContainer { { NG-RAN-BearerContextSetupRequest-ExtIEs } } OPTIONAL,
    ...
}

NG-RAN-BearerContextSetupRequest-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ************************************************************
--
-- 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-BearerContextSetupRequest        PRESENCE mandatory  },
    ...
```

```
}

System-BearerContextSetupResponse::=    CHOICE {
    e-UTRAN-BearerContextSetupResponse      EUTRAN-BearerContextSetupResponse,
    nG-RAN-BearerContextSetupResponse       NG-RAN-BearerContextSetupResponse,
    ...
}

EUTRAN-BearerContextSetupResponse   ::=     SEQUENCE {
    dRB-Setup-List-EUTRAN               DRB-Setup-List-EUTRAN,
    dRB-Failed-List-EUTRAN              DRB-Failed-List-EUTRAN      OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { EUTRAN-BearerContextSetupResponse-ExtIEs } } OPTIONAL,
    ...
}

EUTRAN-BearerContextSetupResponse-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-BearerContextSetupResponse   ::=     SEQUENCE {
    pDU-Session-Resource-Setup-List         PDU-Session-Resource-Setup-List,
    pDU-Session-Resource-Failed-List        PDU-Session-Resource-Failed-List        OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { NG-RAN-BearerContextSetupResponse-ExtIEs } }  OPTIONAL,
    ...
}

NG-RAN-BearerContextSetupResponse-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- 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-BearerContextStatusChange             CRITICALITY reject  TYPE BearerContextStatusChange                    PRESENCE optional  }|
    { ID id-System-BearerContextModificationRequest CRITICALITY reject  TYPE System-BearerContextModificationRequest      PRESENCE optional
},
    ...
}

System-BearerContextModificationRequest ::= CHOICE {
    e-UTRAN-BearerContextModificationRequest       EUTRAN-BearerContextModificationRequest,
    nG-RAN-BearerContextModificationRequest        NG-RAN-BearerContextModificationRequest,
    ...
}

EUTRAN-BearerContextModificationRequest ::=     SEQUENCE {
    dRB-To-Setup-List-EUTRAN               DRB-To-Setup-List-EUTRAN    OPTIONAL,
    dRB-To-Modify-List-EUTRAN              DRB-To-Modify-List-EUTRAN   OPTIONAL,
    dRB-To-Remove-List-EUTRAN              DRB-To-Remove-List-EUTRAN   OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { { EUTRAN-BearerContextModificationRequest-ExtIEs } }  OPTIONAL,
    ...
}

EUTRAN-BearerContextModificationRequest-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-BearerContextModificationRequest ::=     SEQUENCE {
    pDU-Session-Resource-To-Setup-List     PDU-Session-Resource-To-Setup-List  OPTIONAL,
    pDU-Session-Resource-To-Modify-List    PDU-Session-Resource-To-Modify-List OPTIONAL,
    pDU-Session-Resource-To-Remove-List    PDU-Session-Resource-To-Remove-List OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { { NG-RAN-BearerContextModificationRequest-ExtIEs } }  OPTIONAL,
    ...
}

NG-RAN-BearerContextModificationRequest-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

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

```
--
-- 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           EUTRAN-BearerContextModificationResponse,
    nG-RAN-BearerContextModificationResponse            NG-RAN-BearerContextModificationResponse,
    ...
}

EUTRAN-BearerContextModificationResponse    ::=     SEQUENCE {
    dRB-Setup-List-EUTRAN               DRB-Setup-List-EUTRAN               OPTIONAL,
    dRB-Failed-List-EUTRAN              DRB-Failed-List-EUTRAN              OPTIONAL,
    dRB-Modified-List-EUTRAN            DRB-Modified-List-EUTRAN            OPTIONAL,
    dRB-Failed-To-Modify-List-EUTRAN    DRB-Failed-To-Modify-List-EUTRAN    OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { EUTRAN-BearerContextModificationResponse-ExtIEs } }  OPTIONAL,
    ...
}

EUTRAN-BearerContextModificationResponse-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-BearerContextModificationResponse    ::=     SEQUENCE {
    pDU-Session-Resource-Setup-List                 PDU-Session-Resource-Setup-List             OPTIONAL,
    pDU-Session-Resource-Failed-List                PDU-Session-Resource-Failed-List            OPTIONAL,
    pDU-Session-Resource-Modified-List              PDU-Session-Resource-Modified-List          OPTIONAL,
    pDU-Session-Resource-Failed-To-Modify-List      PDU-Session-Resource-Failed-To-Modify-List  OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { NG-RAN-BearerContextModificationResponse-ExtIEs } }  OPTIONAL,
    ...
}

NG-RAN-BearerContextModificationResponse-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- 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       EUTRAN-BearerContextModificationRequired,
    nG-RAN-BearerContextModificationRequired        NG-RAN-BearerContextModificationRequired,
    ...
}

EUTRAN-BearerContextModificationRequired    ::=     SEQUENCE {
    dRB-Required-To-Modify-List-EUTRAN              DRB-Required-To-Modify-List-EUTRAN  OPTIONAL,
    dRB-To-Remove-List-EUTRAN                       DRB-To-Remove-List-EUTRAN           OPTIONAL,
    iE-Extensions                                   ProtocolExtensionContainer { { EUTRAN-BearerContextModificationRequired-ExtIEs } }  OPTIONAL,
    ...
}
```

```
EUTRAN-BearerContextModificationRequired-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-BearerContextModificationRequired    ::=     SEQUENCE {
    pDU-Session-Resource-Required-To-Modify-List        PDU-Session-Resource-Required-To-Modify-List OPTIONAL,
    pDU-Session-Resource-To-Remove-List                 PDU-Session-Resource-To-Remove-List          OPTIONAL,
    iE-Extensions                                       ProtocolExtensionContainer { { NG-RAN-BearerContextModificationRequired-ExtIEs } }  OPTIONAL,
    ...
}

NG-RAN-BearerContextModificationRequired-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ************************************************************
--
-- 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        EUTRAN-BearerContextModificationConfirm,
    nG-RAN-BearerContextModificationConfirm         NG-RAN-BearerContextModificationConfirm,
    ...
}

EUTRAN-BearerContextModificationConfirm ::=     SEQUENCE {
    dRB-Confirm-Modified-List-EUTRAN            DRB-Confirm-Modified-List-EUTRAN            OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { { EUTRAN-BearerContextModificationConfirm-ExtIEs } } OPTIONAL,
    ...
}

EUTRAN-BearerContextModificationConfirm-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

NG-RAN-BearerContextModificationConfirm ::=     SEQUENCE {
    pDU-Session-Resource-Confirm-Modified-List          PDU-Session-Resource-Confirm-Modified-List        OPTIONAL,
```

```
    iE-Extensions                                   ProtocolExtensionContainer { { NG-RAN-BearerContextModificationConfirm-ExtIEs } }
    OPTIONAL,
    ...
}

NG-RAN-BearerContextModificationConfirm-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- 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  },
    ...
}

DRB-Status-List ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF ProtocolIE-SingleContainer { { DRB-Status-ItemIEs} }

DRB-Status-ItemIEs E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-Status-Item     CRITICALITY ignore  TYPE DRB-Status-Item            PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- 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-DRB-Activity-List              CRITICALITY reject  TYPE DRB-Activity-List           PRESENCE mandatory },
    ...
}

DRB-Activity-List ::= SEQUENCE (SIZE(1..maxnoofDRBs)) OF ProtocolIE-SingleContainer { { DRB-Activity-ItemIEs} }
```

```
DRB-Activity-ItemIEs E1AP-PROTOCOL-IES ::= {
    { ID id-DRB-Activity-Item       CRITICALITY reject  TYPE DRB-Activity-Item          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 },
    ...
}

-- **************************************************************
--
-- 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 },
    ...
}

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

```
--
-- PRIVATE MESSAGE
--
-- **************************************************************


PrivateMessage ::= SEQUENCE {
   privateIEs     PrivateIE-Container  {{PrivateMessage-IEs}},
   ...
}

PrivateMessage-IEs E1AP-PRIVATE-IES ::= {
   ...
}

END
```

## 9.4.5 Information Element Definitions

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

    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

AveragingWindow  ::= INTEGER (0..63) -- this IE may need to be refined


-- B

BearerContextStatusChange   ::=     ENUMERATED {
    suspend,
    resume,
    ...
}

BitRate ::= INTEGER (0..4000000000000,...)

-- C

Cause ::= CHOICE {
    radioNetwork        CauseRadioNetwork,
    transport           CauseTransport,
    protocol            CauseProtocol,
    misc                CauseMisc,
    ...
}

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,
    ...
}

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-Gorup-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-Gorup-ID   ::=     INTEGER (0..3, ...)

CipheringAlgorithm  ::= ENUMERATED {
    nEA0,
    c-128-NEA1,
    c-128-NEA2,
    c-128-NEA3,
    ...
}

CNSupport ::= ENUMERATED {
    c-epc,
    c-5gc,
    both,
    ...
}

ConfidentialityProtectionIndication ::= ENUMERATED {
    required,
    preferred,
    not-needed,
```

```
    ...
}

CP-TNL-Information      ::=     CHOICE {
    endpoint-IP-Address     TransportLayerAddress,
    ...
}

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode                   ProcedureCode                   OPTIONAL,
    triggeringMessage               TriggeringMessage               OPTIONAL,
    procedureCriticality            Criticality                     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,
    uL-Data-Forwarding                      UP-TNL-Information      OPTIONAL,
    dL-Data-Forwarding                      UP-TNL-Information      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { Data-Forwarding-Information-Request-ExtIEs } }OPTIONAL,
    ...
}

Data-Forwarding-Information-Request-ExtIEs      E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Data-Forwarding-Information-Response    ::= SEQUENCE {
    uL-Data-Forwarding                      UP-TNL-Information      OPTIONAL,
    dL-Data-Forwarding                      UP-TNL-Information      OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { Data-Forwarding-Information-Response-ExtIEs } }  OPTIONAL,
    ...
```

```
}

Data-Forwarding-Information-Response-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Data-Forwarding-Request ::= ENUMERATED  {
    uL,
    dL,
    both,
    ...
}

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, ms75, ms100, ms150, ms200, ms250, ms300, ms500, ms750, ms1500, infinity, ...}

DL-TX-Stop  ::= ENUMERATED  {
    stop,
    ...
}

DRB-Acivity ::= ENUMERATED {
    active,
    not-active,
    ...
}

DRB-Activity-Item   ::= SEQUENCE {
    dRB-ID                      DRB-ID,
    dRB-Activity                DRB-Acivity,
    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-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-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,
    pDCP-UL-Count                           PDCP-Count                              OPTIONAL,
    pDCP-DL-Count                           PDCP-Count                              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,
    pDCP-UL-Count                               PDCP-Count                              OPTIONAL,
    pDCP-DL-Count                               PDCP-Count                              OPTIONAL,
    uL-UP-Transport-Parameters                  UP-Parameters                           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,
    data-Forwarding-Information-Response    Data-Forwarding-Information-Response        OPTIONAL,
    gNB-CU-UP-CellGroupRelatedConfiguration GNB-CU-UP-CellGroupRelatedConfiguration     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,
    data-Forwarding-Information-Response    Data-Forwarding-Information-Response        OPTIONAL,
    gNB-CU-UP-CellGroupRelatedConfiguration GNB-CU-UP-CellGroupRelatedConfiguration     OPTIONAL,
    flow-To-Remove                          QoS-Flow-List                               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-Response        OPTIONAL,
    uL-UP-Transport-Parameters              UP-Parameters,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-Setup-Item-EUTRAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-Setup-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-Response       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-Status-Item ::= SEQUENCE {
    dRB-ID                      DRB-ID,
    pDCP-DL-Count               PDCP-Count      OPTIONAL,
    pDCP-UL-Count               PDCP-Count      OPTIONAL,
    data-Forwarding-Information-Response    Data-Forwarding-Information-Response    OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { { DRB-Status-ItemExtIEs } }    OPTIONAL,
    ...
}

DRB-Status-ItemExtIEs   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-Request     Data-Forwarding-Information-Request     OPTIONAL,
    pDCP-Count-Request                      PDCP-Count-Request                      OPTIONAL,
    pDCP-UL-Count                           PDCP-Count                              OPTIONAL,
    pDCP-DL-Count                           PDCP-Count                              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,
    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-Request     Data-Forwarding-Information-Request     OPTIONAL,
    pDCP-Count-Request                      PDCP-Count-Request                      OPTIONAL,
    pDCP-UL-Count                           PDCP-Count                              OPTIONAL,
    pDCP-DL-Count                           PDCP-Count                              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,
    iE-Extensions                       ProtocolExtensionContainer { { DRB-To-Modify-Item-NG-RAN-ExtIEs } }  OPTIONAL,
    ...
}

DRB-To-Modify-Item-NG-RAN-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

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-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-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,
```

```
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Setup-Item-EUTRAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-To-Setup-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,
    flow-Mapping-Information                QoS-Flow-QoS-Parameter-List,
    dRB-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { DRB-To-Setup-Item-NG-RAN-ExtIEs } }   OPTIONAL,
    ...
}

DRB-To-Setup-Item-NG-RAN-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

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 ::= {
    ...
}



Dynamic5QIDescriptor    ::= SEQUENCE {
    qoSPriorityLevel                    INTEGER (1..127),
    packetDelayBudget                   PacketDelayBudget,
    packetErrorRate                     PacketErrorRate,
    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 ::= {
    ...
```

```
}

-- E


EncryptionKey   ::= OCTET STRING

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-CellGroupRelatedConfiguration  ::= SEQUENCE (SIZE(1.. maxnoofUPParameters)) OF GNB-CU-UP-CellGroupRelatedConfiguration-Item

GNB-CU-UP-CellGroupRelatedConfiguration-Item ::= SEQUENCE {
```

```
    cell-Group-ID               Cell-Gorup-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)

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,
    notificationControl             ENUMERATED {notification-enabled, ...}  OPTIONAL,
    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 ::= {
    ...
}

-- 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

-- J

-- K

-- L

-- M

MaxDataBurstVolume  ::= INTEGER (0..63) -- this IE may need to be refined

MaxPacketLossRate ::= INTEGER (0..1000)

-- N

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            INTEGER (1..127, ...)          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

-- P

PacketDelayBudget ::= INTEGER (0..63) -- this IE may need to be refined

PacketErrorRate ::= INTEGER (0..63) -- this IE may need to be refined

PDCP-Configuration  ::= SEQUENCE {
    pDCP-SN-Size                        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,
    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-Count-Request  ::=     ENUMERATED {
    requested,
    ...
}

PDCP-Duplication    ::= ENUMERATED  {
    true,
    ...
}

PDCP-SN     ::=     INTEGER (0..262143)

PDCP-SN-Size    ::= ENUMERATED  {
    s-12,
    s-18,
    ...
}

PDU-Session-ID  ::= INTEGER (0..255)

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,
    casue                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer  { { PDU-Session-Resource-Failed-Item-ExtIEs } }  OPTIONAL,
    ...
}

PDU-Session-Resource-Failed-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,
    casue                                   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,
    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,
    dRB-To-Remove-List-NG-RAN               DRB-To-Remove-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,
    pDU-Session-Data-Forwarding-Information-Response        Data-Forwarding-Information-Response    OPTIONAL,
    dRB-Required-To-Modify-List-NG-RAN      DRB-Required-To-Modify-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,
    nG-DL-UP-TNL-Information                UP-TNL-Information          OPTIONAL,
    pDU-Session-Data-Forwarding-Information-Response        Data-Forwarding-Information-Response    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-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,
    pDU-Session-Type                        PDU-Session-Type                OPTIONAL,
    sNSSAI                                  SNSSAI                          OPTIONAL,
    securityIndication                      SecurityIndication              OPTIONAL,
    pDU-Session-Resource-AMBR               BitRate                         OPTIONAL,
    nG-UL-UP-TNL-Information                UP-TNL-Information              OPTIONAL,
    pDU-Session-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     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 ::= {
    ...
}

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 ::= {
```

```
    ...
}

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-AMBR               BitRate                     OPTIONAL,
    nG-UL-UP-TNL-Information                UP-TNL-Information,
    pDU-Session-Data-Forwarding-Information-Request     Data-Forwarding-Information-Request     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 ::= {
    ...
}

PDU-Session-Type ::= ENUMERATED {
    ipv4,
    ipv6,
    ipv4v6,
    ethernet,
    unstructured,
    ...
}

PLMN-Identity ::= OCTET STRING (SIZE(3))

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,
    ...
}
```

```
QoS-Flow-Indicator  ::= INTEGER (0..63)

QoS-Flow-List   ::= SEQUENCE (SIZE(1.. maxnoofQoSFlows)) OF QoS-Flow-Item

QoS-Flow-Item   ::= SEQUENCE {
    qoS-Flow-Indicator                  QoS-Flow-Indicator,
    iE-Extensions                       ProtocolExtensionContainer  { { QoS-Flow-Item-ExtIEs } } OPTIONAL,
    ...
}

QoS-Flow-Item-ExtIEs        E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

QoS-Flow-Failed-List    ::= SEQUENCE (SIZE(1.. maxnoofQoSFlows)) OF QoS-Flow-Failed-Item

QoS-Flow-Failed-Item    ::= SEQUENCE {
    qoS-Flow-Indicator                  QoS-Flow-Indicator,
    casue                               Cause,
    iE-Extensions                       ProtocolExtensionContainer  { { QoS-Flow-Failed-Item-ExtIEs } }   OPTIONAL,
    ...
}

QoS-Flow-Failed-Item-ExtIEs     E1AP-PROTOCOL-EXTENSION ::= {
    ...
}


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 ::= {
    ...
}

QoS-Flow-QoS-Parameter-List ::= SEQUENCE (SIZE(1.. maxnoofQoSFlows)) OF QoS-Flow-QoS-Parameter-Item

QoS-Flow-QoS-Parameter-Item ::= SEQUENCE {
    qoS-Flow-Indicator                  QoS-Flow-Indicator,
    qoSFlowLevelQoSParameters           QoSFlowLevelQoSParameters,
    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

RAT-Type    ::= ENUMERATED  {
    e-UTRA,
    nR,
    ...
}

RLC-Mode    ::= ENUMERATED  {
    tM,
    uM,
    aM,
    ...
}

ROHC-Parameters ::= SEQUENCE {
    rOHC-Profiles       ROHC-Profiles,
    iE-Extensions       ProtocolExtensionContainer { { ROHC-Parameters-ItemExtIEs} } OPTIONAL,
    ...
}

ROHC-Parameters-ItemExtIEs E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

ROHC-Profiles   ::= INTEGER (0..511, ...)

-- 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,
    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 ::= {
    ...
}

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, ...}

TransportLayerAddress       ::=     BIT STRING (SIZE(1..160, ...))

T-ReorderingDL  ::= ENUMERATED  {ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35, ms40, ms45, ms50, ms55, ms60, ms65, ms70, ms75, ms80, ms85, ms90,
ms95, ms100, ms110, ms120, ms130, ms140, ms150, ms160, ms170, ms180, ms190, ms200, ms220, ms240, ms260, ms280, ms300, ms500, ms750, ms1000, ms1500,
ms3000, ...}

T-ReorderingTimer ::= SEQUENCE {
    t-ReorderingUL              T-ReorderingUL,
    t-ReorderingDL              T-ReorderingDL,
    iE-Extensions               ProtocolExtensionContainer { { T-ReorderingTimer-ExtIEs } } OPTIONAL,
    ...
}

T-ReorderingTimer-ExtIEs    E1AP-PROTOCOL-EXTENSION ::= {
    ...
}

T-ReorderingUL  ::= ENUMERATED  {ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35, ms40, ms45, ms50, ms55, ms60, ms65, ms70, ms75, ms80, ms85, ms90,
ms95, ms100, ms110, ms120, ms130, ms140, ms150, ms160, ms170, ms180, ms190, ms200, ms220, ms240, ms260, ms280, ms300, ms500, ms750, ms1000, ms1500,
ms3000, ...}

TypeOfError ::= ENUMERATED {
    not-understood,
    missing,
    ...
}

-- U

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-Gorup-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,
    ...
}

-- V

-- W

-- X

-- Y

-- Z
```

```
END
```

## 9.4.6 Common Definitions

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

## 9.4.7 Constant Definitions

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

-- **************************************************************
--
-- Lists
--
```

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

maxnoofErrors                               INTEGER ::= 256
maxnoofSPLMNs                               INTEGER ::= 6
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 ::= 4
maxnoofCellGroups                           INTEGER ::= 4
maxnooftimeperiods                          INTEGER ::= 2

-- ************************************************************
--
-- 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-SupportedPLMNs-Item                                      ProtocolIE-ID ::= 12
id-TimeToWait                                               ProtocolIE-ID ::= 13
id-SecurityInformation                                      ProtocolIE-ID ::= 14
id-UEDLAggregateMaximumBitRate                              ProtocolIE-ID ::= 15
id-System-BearerContextSetupRequest                         ProtocolIE-ID ::= 16
id-System-BearerContextSetupResponse                        ProtocolIE-ID ::= 17
id-BearerContextStatusChange                                ProtocolIE-ID ::= 18
id-System-BearerContextModificationRequest                  ProtocolIE-ID ::= 19
id-System-BearerContextModificationResponse                 ProtocolIE-ID ::= 20
id-System-BearerContextModificationConfirm                  ProtocolIE-ID ::= 21
id-System-BearerContextModificationRequired                 ProtocolIE-ID ::= 22
id-DRB-Status-List                                          ProtocolIE-ID ::= 23
id-DRB-Status-Item                                          ProtocolIE-ID ::= 24
id-DRB-Activity-List                                        ProtocolIE-ID ::= 25
id-DRB-Activity-Item                                        ProtocolIE-ID ::= 26
id-Data-Usage-Report-List                                   ProtocolIE-ID ::= 27

END
```

## 9.4.8 Container Definitions

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

## 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 [5].

## 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.

# 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 |

# History

| Document history | | |
|---|---|---|
| V15.0.0 | July 2018 | Publication |
| | | |
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| | | |