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S1 Application Protocol (S1AP)
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Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x  the first digit
   1  presented to TSG for information;
   2  presented to TSG for approval;
   3  or greater indicates TSG approved document under change control.

y  the second digit is incremented for all changes of substance, i.e., technical enhancements, corrections, updates, etc.

z  the third digit is incremented when editorial only changes have been incorporated in the document.
1 Scope

The present document specifies the E-UTRAN radio network layer signalling protocol for the S1 interface. The S1 Application Protocol (S1AP) supports the functions of S1 interface by signalling procedures defined in this document. S1AP is developed in accordance to the general principles stated in TS 36.401 [2] and TS 36.410 [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".
[7] Void
[10] 3GPP TS 32.422: "Trace control and configuration management".
[13] 3GPP TS 23.203: "Policy and charging control architecture"
[17] 3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2".
[18] 3GPP TS 48.018: "General Packet Radio Service (GPRS); BSS GPRS Protocol (BSSGP)".
[19] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".
3GPP TS 23.003: "Technical Specification Group Core Network and Terminals; Numbering, addressing and identification".

3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP)".

3GPP TS 48.008: "Mobile Switching Centre-Base Station System (MSC-BSS) interface; Layer 3 specification".

3GPP TS 24.301: "Non-Access Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

3GPP2 A.S0008-C: "Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network".

3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".

3GPP2 C.S0024-B: "cdma2000 High Rate Packet Data Air Interface Specification".

3GPP TS 22.220: "Service requirements for Home Node Bs and Home eNode Bs".

3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

3GPP TS 48.016: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Network service".

3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".

3GPP TS 29.281: "General Packet Radio Service (GPRS); Tunnelling Protocol User Plane (GTPv1-U)".

3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

3GPP TS 36.455: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol A (LPPa)".

3GPP TS 29.060: "GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

3GPP TS 29.274: "Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".

3GPP TS 23.139: "3GPP system – fixed broadband access network interworking".

3GPP TS 23.007: "Technical Specification Group Core Network Terminals; Restoration procedures".

3GPP TS 36.104: "Base Station (BS) radio transmission and reception".

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

3GPP TS 36.306: "User Equipment (UE) radio access capabilities".


3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

3GPP TS 38.413: "NG Radio Access Network (NG-RAN); NG Application Protocol (NGAP)".
[45] 3GPP TS 38.300: "NR; Overall description; Stage-2".

3 Definitions and abbreviations

3.1 Definitions

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

**ACL functionality**: A functionality controlling the access to network nodes. In case of Access Control Lists (ACL) functionality is applied in a network node the network node may only accept connections from other peer network nodes once the source addresses of the sending network node is already known in the target node.

**CSG Cell**: an E-UTRAN cell broadcasting a CSG indicator set to true and a CSG identity. This cell operates in Closed Access Mode as defined in TS 22.220 [28].

**DCN-ID**: DCN identity identifies a specific dedicated core network (DCN).

**Dual Connectivity**: as defined in TS 36.300 [14].

**Elementary Procedure**: S1AP consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between eNBs and the EPC. 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 S1AP EPs together or together with EPs from other interfaces is specified in stage 2 specifications (e.g., TS 23.401 [11] and TS 36.300 [14]).

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.

**eNB UE S1AP ID**: as defined in TS 36.401 [2].

**Hybrid Cell**: an E-UTRAN cell broadcasting a CSG indicator set to false and a CSG identity. This cell operates in Hybrid Access Mode as defined in TS 22.220 [28].

**MME UE S1AP ID**: as defined in TS 36.401 [2].

**E-RAB**: as defined in TS 36.401 [2].

**NOTE 1**: The E-RAB is either a default E-RAB or a dedicated E-RAB.
E-RAB ID: the E-RAB ID uniquely identifies an E-RAB for one UE.

NOTE 2: The E-RAB ID remains unique for the UE even if the UE-associated logical S1-connection is released during periods of user inactivity.

Data Radio Bearer: the Data Radio bearer transports the packets of an E-RAB between a UE and an eNB. There is a one-to-one mapping between the E-RAB and the Data Radio Bearer.

Secondary Cell Group: as defined in TS 36.300 [14].

UE-associated signalling: When S1-AP messages associated to one UE uses the UE-associated logical S1-connection for association of the message to the UE in eNB and EPC.

UE-associated logical S1-connection: The UE-associated logical S1-connection uses the identities MME UE S1AP ID and eNB UE S1AP ID according to definition in TS 23.401 [11]. For a received UE associated S1-AP message the MME identifies the associated UE based on the MME UE S1AP ID IE and the eNB identifies the associated UE based on the eNB UE S1AP ID IE. The UE-associated logical S1-connection may exist before the S1 UE context is setup in eNB.

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].

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACL</td>
<td>Access Control List</td>
</tr>
<tr>
<td>BBF</td>
<td>Broadband Forum</td>
</tr>
<tr>
<td>CCO</td>
<td>Cell Change Order</td>
</tr>
<tr>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
</tr>
<tr>
<td>CID</td>
<td>Cell-ID (positioning method)</td>
</tr>
<tr>
<td>CID</td>
<td>Cellular Internet of Things</td>
</tr>
<tr>
<td>CS</td>
<td>Circuit Switched</td>
</tr>
<tr>
<td>CSG</td>
<td>Closed Subscriber Group</td>
</tr>
<tr>
<td>CN</td>
<td>Core Network</td>
</tr>
<tr>
<td>DCN</td>
<td>Dedicated Core Network</td>
</tr>
<tr>
<td>DL</td>
<td>Downlink</td>
</tr>
<tr>
<td>eAN</td>
<td>evolved Access Network</td>
</tr>
<tr>
<td>ECGI</td>
<td>E-UTRAN Cell Global Identifier</td>
</tr>
<tr>
<td>E-CID</td>
<td>Enhanced Cell-ID (positioning method)</td>
</tr>
<tr>
<td>eHRPD</td>
<td>evolved High Rate Packet Data</td>
</tr>
<tr>
<td>eNB</td>
<td>E-UTRAN NodeB</td>
</tr>
<tr>
<td>EN-DC</td>
<td>E-UTRA-NR Dual Connectivity</td>
</tr>
<tr>
<td>EP</td>
<td>Elementary Procedure</td>
</tr>
<tr>
<td>EPS</td>
<td>Evolved Packet Core</td>
</tr>
<tr>
<td>E-RAB</td>
<td>Evolved Packet System</td>
</tr>
<tr>
<td>E-SMLC</td>
<td>E-UTRAN Radio Access Bearer</td>
</tr>
<tr>
<td>E-UTRAN</td>
<td>Evolved UTRAN</td>
</tr>
<tr>
<td>GBR</td>
<td>Guaranteed Bit Rate</td>
</tr>
<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
</tr>
<tr>
<td>GUMMEI</td>
<td>Globally Unique MME Identifier</td>
</tr>
<tr>
<td>GTP</td>
<td>GPRS Tunnelling Protocol</td>
</tr>
<tr>
<td>HFN</td>
<td>Hyper Frame Number</td>
</tr>
<tr>
<td>HRPD</td>
<td>High Rate Packet Data</td>
</tr>
<tr>
<td>IE</td>
<td>Information Element</td>
</tr>
<tr>
<td>IMEISV</td>
<td>International Mobile station Equipment Identity and Software Version number</td>
</tr>
<tr>
<td>IoT</td>
<td>Internet of Things</td>
</tr>
<tr>
<td>LAA</td>
<td>Licensed-Assisted Access</td>
</tr>
<tr>
<td>L-GW</td>
<td>Local GateWay</td>
</tr>
<tr>
<td>LHN</td>
<td>Local Home Network</td>
</tr>
<tr>
<td>LHN ID</td>
<td>Local Home Network ID</td>
</tr>
<tr>
<td>LIPA</td>
<td>Local IP Access</td>
</tr>
</tbody>
</table>
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

LPPa LTE Positioning Protocol Annex
LWA LTE-WLAN Aggregation
LWIP LTE WLAN Level Integration with IPsec Tunnel
MBSFN Multimedia Broadcast multicast service Single Frequency Network
MDT Minimization of Drive Tests
MME Mobility Management Entity
MTSI Multimedia Telephony Service for IMS
NAS Non Access Stratum
NB-IoT Narrowband IoT
NNSF NAS Node Selection Function
OTDOA Observed Time Difference of Arrival
PS Packet Switched
PSCell Primary SCell
ProSe Proximity Services
PWS Public Warning System
PDCP Packet Data Convergence Protocol
PLMN Public Land Mobile Network
PS Packet Switched
RRC Radio Resource Control
RIM RAN Information Management
QMC QoE Measurement Collection
QoE Quality of Experience
SCTP Stream Control Transmission Protocol
SCG Secondary Cell Group
S-GW Serving GateWay
SN Sequence Number
SIPTO Selected IP Traffic Offload
SIPTO@LN Selected IP Traffic Offload at the Local Network
SSID Service Set Identifier
S-TMSI S-Temporary Mobile Subscriber Identity
SUL Supplementary Uplink
TAC Tracking Area Code
TAI Tracking Area Identity
TEID Tunnel Endpoint Identifier
UE User Equipment
UE-AMBR UE-Aggregate Maximum Bitrate
UL Uplink
UTDOA Uplink Time Difference of Arrival
V2X Vehicle-to-Everything
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., E-RAB 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., MESSAGE NAME 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., Information Element 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 subclause 9.2 enclosed by quotation marks, e.g., “Value”.
5 S1AP Services

S1AP provides the signalling service between E-UTRAN and the evolved packet core (EPC) that is required to fulfil the S1AP functions described in clause 7. S1AP services are divided into two groups:

Non UE-associated services: They are related to the whole S1 interface instance between the eNB and MME utilising a non UE-associated signalling connection.

UE-associated services: They are related to one UE. S1AP 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 S1AP messages. S1AP shall be notified if the signalling connection breaks.
7 Functions of S1AP

The S1AP protocol has the following functions:

- E-RAB management function: This overall functionality is responsible for setting up, modifying and releasing E-RABs, which are triggered by the MME. The release and modification of E-RABs may be triggered by the eNB as well.

- Initial Context Transfer function: This functionality is used to establish an S1UE context in the eNB, to setup the default IP connectivity, to setup one or more E-RAB(s) if requested by the MME, and to transfer NAS signalling related information to the eNB if needed.

- UE Capability Info Indication function: This functionality is used to provide the UE Capability Info when received from the UE to the MME.

- Mobility Functions for UEs in LTE_ACTIVE in order to enable
  - a change of eNBs within SAE/LTE (Inter MME/Serving SAE-GW Handovers) via the S1 interface (with EPC involvement).
  - a change of RAN nodes between different RATs (Inter-3GPP-RAT Handovers) via the S1 interface (with EPC involvement).

- Paging: This functionality provides the EPC with the capability to page the UE.

- S1 interface management functions comprise the:
  - Reset functionality to ensure a well defined initialisation on the S1 interface.
  - Error Indication functionality to allow a proper error reporting/handling in cases where no failure messages are defined.
  - Overload function to indicate the load situation in the control plane of the S1 interface.
  - Load balancing function to ensure equally loaded MMEs within an MME pool area
  - S1 Setup functionality for initial S1 interface setup for providing configuration information
  - eNB and MME Configuration Update functions are to update application level configuration data needed for the eNB and MME to interoperate correctly on the S1 interface.

- NAS Signalling transport function between the UE and the MME is used:
  - to transfer and reroute NAS signalling related information and to establish the S1 UE context in the eNB.
  - to transfer NAS signalling related information when the S1 UE context in the eNB is already established.

- S1 UE context Release function: This functionality is responsible to manage the release of UE specific context in the eNB and the MME.

- UE Context Modification function: This functionality allows to modify the established UE Context partly.

- UE Context Resumption function: This functionality allows keeping the UE Context in the eNB for a UE in RRC_IDLE that has been enabled to use User Plane EPS Optimization (see TS 23.401 [11]) and to resume the RRC connection without the need to re-establish the UE Context.

- Status Transfer: This functionality transfers PDCP SN Status information from source eNB to target eNB in support of in-sequence delivery and duplication avoidance for intra LTE handover.

- Trace function: This functionality is to control a trace session recording for a UE in ECM_CONNECTED or to control an MDT session transferring MDT measurements collected by the UE.

- Location Reporting: This functionality allows MME to be aware of the UE’s current location.

- LPPa Signalling transport: This functionality transfers LPPa messages between eNB and E-SMLC over the S1 interface.
- S1 CDMA2000 Tunnelling function: This functionality is to carry CDMA2000 signalling between UE and CDMA2000 RAT over the S1 Interface.

- Warning message transmission function: This functionality provides the means to start and overwrite the broadcasting of warning message.

- RAN Information Management (RIM) function: This functionality allows the request and transfer of RAN information (e.g., GERAN system information) between two RAN nodes via the core network.

- Configuration Transfer function: This functionality allows the request and transfer of RAN configuration information (e.g., SON information) between two RAN nodes via the core network.

- UE Radio Capability Match function: The functionality enables the eNB to derive and provide an indication to the MME whether the UE radio capabilities are compatible with the network configuration for voice continuity.

- PWS Restart Indication function: The functionality enables the eNB to inform the MME that PWS information for some or all cells of the eNB are available for reloading from the CBC if needed.

- PWS Failure Indication function: The functionality enables the eNB to inform the MME that ongoing PWS operation for one or more cells of the eNB has failed.

- Connection Establishment Indication function: The functionality enables the MME to complete the establishment of the UE-associated logical S1-connection.

- Retrieve UE Information function: The functionality enables the eNB to request UE information from the MME.

- UE Information Transfer function: The functionality enables the MME to transfer UE information to the eNB.

- CP Relocation function: The functionality enables the initiation of the UE-associated logical S1-connection for an NB-IOT UE using Control Plane CIoT EPS Optimisation following a re-establishment request.


- QMC function: The functionality enables the eNB to collect QoE measurements from the UE.
8 S1AP Procedures

8.1 List of S1AP 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

<table>
<thead>
<tr>
<th>Elementary Procedure</th>
<th>Initiating Message</th>
<th>Successful Outcome</th>
<th>Unsuccessful Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Response message</td>
<td>Response message</td>
</tr>
<tr>
<td>Handover Preparation</td>
<td>HANOVER REQUIRED</td>
<td>HANOVER COMMAND</td>
<td>HANOVER PREPARATION FAILURE</td>
</tr>
<tr>
<td>Handover Resource Allocation</td>
<td>HANOVER REQUEST</td>
<td>HANOVER REQUEST ACKNOWLEDGE</td>
<td>HANOVER FAILURE</td>
</tr>
<tr>
<td>Path Switch Request</td>
<td>PATH SWITCH REQUEST</td>
<td>PATH SWITCH REQUEST ACKNOWLEDGE</td>
<td>PATH SWITCH REQUEST FAILURE</td>
</tr>
<tr>
<td>Handover Cancellation</td>
<td>HANOVER CANCEL</td>
<td>HANOVER CANCEL ACKNOWLEDGE</td>
<td></td>
</tr>
<tr>
<td>E-RAB Setup</td>
<td>E-RAB SETUP REQUEST</td>
<td>E-RAB SETUP RESPONSE</td>
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</tr>
<tr>
<td>E-RAB Modify</td>
<td>E-RAB MODIFY REQUEST</td>
<td>E-RAB MODIFY RESPONSE</td>
<td></td>
</tr>
<tr>
<td>E-RAB Modification Indication</td>
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<td>E-RAB MODIFICATION CONFIRM</td>
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<tr>
<td>E-RAB Release</td>
<td>E-RAB RELEASE COMMAND</td>
<td>E-RAB RELEASE RESPONSE</td>
<td></td>
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<tr>
<td>Initial Context Setup</td>
<td>INITIAL CONTEXT SETUP REQUEST</td>
<td>INITIAL CONTEXT SETUP RESPONSE</td>
<td>INITIAL CONTEXT SETUP FAILURE</td>
</tr>
<tr>
<td>Reset</td>
<td>RESET</td>
<td>RESET ACKNOWLEDGE</td>
<td></td>
</tr>
<tr>
<td>S1 Setup</td>
<td>S1 SETUP REQUEST</td>
<td>S1 SETUP RESPONSE</td>
<td>S1 SETUP FAILURE</td>
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The following applies concerning interference between Elementary Procedures:

- The Reset procedure takes precedence over all other EPs.
- The UE Context Release procedure takes precedence over all other EPs that are using the UE-associated signalling.
8.2 E-RAB Management procedures

8.2.1 E-RAB Setup

8.2.1.1 General

The purpose of the E-RAB Setup procedure is to assign resources on Uu and S1 for one or several E-RABs and to setup corresponding Data Radio Bearers for a given UE. The procedure uses UE-associated signalling.

8.2.1.2 Successful Operation

The MME initiates the procedure by sending an E-RAB SETUP REQUEST message to the eNB.

- The E-RAB SETUP REQUEST message shall contain the information required by the eNB to build the E-RAB configuration consisting of at least one E-RAB and for each E-RAB to setup include an E-RAB to be Setup Item IE.

Upon reception of the E-RAB SETUP REQUEST message, and if resources are available for the requested configuration, the eNB shall execute the requested E-RAB configuration. For each E-RAB and based on the E-RAB level QoS parameters IE the eNB shall establish a Data Radio Bearer and allocate the required resources on Uu. The eNB shall pass the NAS-PDU IE and the value contained in the E-RAB ID IE received for the E-RAB for each established Data Radio Bearer to the UE. The eNB does not send the NAS PDUs associated to the failed Data radio bearers to the UE. The eNB shall allocate the required resources on S1 for the E-RABs requested to be established.

If the Correlation ID IE is included in the E-RAB SETUP REQUEST message towards the eNB with L-GW function for LIPA operation, then the eNB shall use this information for LIPA operation for the concerned E-RAB.

If the SIPTO Correlation ID IE is included in the E-RAB SETUP REQUEST message towards the eNB with L-GW function for SIPTO@LN operation, then the eNB shall use this information for SIPTO@LN operation for the concerned E-RAB.

If the Bearer Type IE is included in the E-RAB SETUP REQUEST message and is set to “non IP”, then the eNB shall not perform header compression for the concerned E-RAB.

The E-RAB SETUP REQUEST message may contain

- the UE Aggregate Maximum Bit Rate IE.

If the UE Aggregate Maximum Bit Rate IE is included in the E-RAB SETUP REQUEST the eNB shall

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context;
- use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the UE Aggregate Maximum Bit Rate IE is not contained in the E-RAB SETUP REQUEST message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

Figure 8.2.1.2-1: E-RAB Setup procedure. Successful operation.
The eNB shall establish or modify the resources according to the values of the Allocation and Retention Priority IE (priority level and pre-emption indicators) and the resource situation as follows:

- The eNB shall consider the priority level of the requested E-RAB, when deciding on the resource allocation.
- The priority levels and the pre-emption indicators may (individually or in combination) be used to determine whether the E-RAB setup has to be performed unconditionally and immediately. If the requested E-RAB is marked as “may trigger pre-emption” and the resource situation requires so, the eNB may trigger the pre-emption procedure which may then cause the forced release of a lower priority E-RAB which is marked as “pre-emptable”. Whilst the process and the extent of the pre-emption procedure are operator-dependent, the pre-emption indicators shall be treated as follows:

1. The values of the last received Pre-emption Vulnerability IE and Priority Level IE shall prevail.
2. If the Pre-emption Capability IE is set to “may trigger pre-emption”, then this allocation request may trigger the pre-emption procedure.
3. If the Pre-emption Capability IE is set to “shall not trigger pre-emption”, then this allocation request shall not trigger the pre-emption procedure.
4. If the Pre-emption Vulnerability IE is set to “pre-emptable”, then this E-RAB shall be included in the pre-emption process.
5. If the Pre-emption Vulnerability IE is set to “not pre-emptable”, then this E-RAB shall not be included in the pre-emption process.
6. If the Priority Level IE is set to “no priority” the given values for the Pre-emption Capability IE and Pre-emption Vulnerability IE shall not be considered. Instead the values “shall not trigger pre-emption” and “not pre-emptable” shall prevail.

- The E-UTRAN pre-emption process shall keep the following rules:

1. E-UTRAN shall only pre-empt E-RABs with lower priority, in ascending order of priority.
2. The pre-emption may be done for E-RABs belonging to the same UE or to other UEs.

The eNB shall report to the MME, in the E-RAB SETUP RESPONSE message, the result for all the requested E-RABs.

- A list of E-RABs which are successfully established shall be included in the E-RAB Setup List IE.
- A list of E-RABs which failed to be established, if any, shall be included in the E-RAB Failed to Setup List IE.

In case of the establishment of an E-RAB the EPC must be prepared to receive user data before the E-RAB SETUP RESPONSE message has been received.

When the eNB reports unsuccessful establishment of an E-RAB, the cause value should be precise enough to enable the MME to know the reason for an unsuccessful establishment, e.g., “Radio resources not available”, “Failure in the Radio Interface Procedure”.

Interactions with Handover Preparation procedure:

If a handover becomes necessary during E-RAB Setup, the eNB may interrupt the ongoing E-RAB Setup procedure and initiate the Handover Preparation procedure as follows:

1. The eNB shall send the E-RAB SETUP RESPONSE message in which the eNB shall indicate, if necessary
   - all the E-RABs fail with an appropriate cause value, e.g., “S1 intra system Handover triggered”, “S1 inter system Handover triggered” or “X2 Handover triggered”.
2. The eNB shall trigger the handover procedure.

8.2.1.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.
8.2.1.4 Abnormal Conditions

If the eNB receives a E-RAB SETUP REQUEST message containing a E-RAB Level QoS Parameters IE which contains a QCI IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the GBR QoS Information IE, the eNB shall consider the establishment of the corresponding E-RAB as failed.

If the eNB receives an E-RAB SETUP REQUEST message containing several E-RAB ID IEs (in the E-RAB To Be Setup List IE) set to the same value, the eNB shall report the establishment of the corresponding E-RABs as failed in the E-RAB SETUP RESPONSE with the appropriate cause value, e.g., “Multiple E-RAB ID instances”.

If the eNB receives an E-RAB SETUP REQUEST message containing a E-RAB ID IE (in the E-RAB To Be Setup List IE) set to the value that identifies an active E-RAB (established before the E-RAB SETUP REQUEST message was received), the eNB shall report the establishment of the new E-RAB as failed in the E-RAB SETUP RESPONSE with the appropriate cause value, e.g., “Multiple E-RAB ID instances”.

If the eNB receives an E-RAB SETUP REQUEST message containing both the Correlation ID and the SIPTO Correlation ID IEs for the same E-RAB, the eNB shall consider the establishment of the corresponding E-RAB as failed.

8.2.2 E-RAB Modify

8.2.2.1 General

The purpose of the E-RAB Modify procedure is to enable modifications of already established E-RABs for a given UE. The procedure uses UE-associated signalling.

8.2.2.2 Successful Operation

![E-RAB Modify procedure diagram](image)

Figure 8.2.2.2-1: E-RAB Modify procedure. Successful operation.

The MME initiates the procedure by sending an E-RAB MODIFY REQUEST message to the eNB.

- The E-RAB MODIFY REQUEST message shall contain the information required by the eNB to modify one or several E-RABs of the existing E-RAB configuration.

Information shall be present in the E-RAB MODIFY REQUEST message only when any previously set value for the E-RAB configuration is requested to be modified.

Upon reception of the E-RAB MODIFY REQUEST message, and if resources are available for the requested target configuration, the eNB shall execute the modification of the requested E-RAB configuration. For each E-RAB that shall be modified and for which the Transport Information IE is not included and based on the new E-RAB level QoS parameters IE the eNB shall modify the Data Radio Bearer configuration and change allocation of resources on Uu according to the new resource request. The eNB shall pass the NAS-PDU IE received for the E-RAB to the UE when modifying the Data Radio Bearer configuration. The eNB does not send the NAS PDUs associated to the failed Data radio bearers to the UE. The eNB shall change allocation of resources on S1 according to the new resource request.

If the E-UTRAN failed to modify an E-RAB the E-UTRAN shall keep the E-RAB configuration as it was configured prior the E-RAB MODIFY REQUEST.

The E-RAB MODIFY REQUEST message may contain the
- the **UE Aggregate Maximum Bit Rate** IE,
- the **Secondary RAT Data Usage Request** IE.

If the **UE Aggregate Maximum Bit Rate** IE is included in the E-RAB MODIFY REQUEST, the eNB shall
- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context;
- use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the **UE Aggregate Maximum Bit Rate** IE is not contained in the E-RAB MODIFY REQUEST message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

The modification of resources according to the values of the **Allocation and Retention Priority** IE shall follow the principles described for the E-RAB Setup procedure.

If the **Transport Information** IE is included in the E-RAB MODIFY REQUEST message, the eNB shall use the included information as the new S-GW address and uplink packet destination for the relevant E-RAB as defined in TS 23.401 [11], and it shall ignore the **E-RAB Level QoS Parameters** and **NAS-PDU** IEs for the same E-RAB.

The eNB shall report to the MME, in the E-RAB MODIFY RESPONSE message, the result for all the requested E-RABs to be modified.
- A list of E-RABs which are successfully modified shall be included in the **E-RAB Modify List** IE.
- A list of E-RABs which failed to be modified, if any, shall be included in the **E-RAB Failed to Modify List** IE.

When the eNB reports unsuccessful modification of an E-RAB, the cause value should be precise enough to enable the MME to know the reason for an unsuccessful modification, e.g., “Radio resources not available”, “Failure in the Radio Interface Procedure”.

In case of a modification of an E-RAB the EPC must be prepared to receive user data according to the modified E-RAB profile prior to the E-RAB MODIFY RESPONSE message.

If the **Secondary RAT Data Usage Request** IE set to "requested" was included in the E-RAB MODIFY REQUEST message, and the eNB supports EN-DC, LAA, LWA or LWIP and has secondary RAT usage data to report, then the **Secondary RAT Usage Report List** IE shall be included in the E-RAB MODIFY RESPONSE message.

**Interactions with Handover Preparation procedure:**

If a handover becomes necessary during E-RAB modify, the eNB may interrupt the ongoing E-RAB Modify procedure and initiate the Handover Preparation procedure as follows:

1. The eNB shall send the E-RAB MODIFY RESPONSE message in which the eNB shall indicate, if necessary
   - all the E-RABs fail with an appropriate cause value, e.g., “S1 intra system Handover triggered”, “S1 inter system Handover triggered” or “X2 Handover triggered”.
2. The eNB shall trigger the handover procedure.

**8.2.2.3 Unsuccessful Operation**

The unsuccessful operation is specified in the successful operation section.

**8.2.2.4 Abnormal Conditions**

If the eNB receives a E-RAB MODIFY REQUEST message containing a **E-RAB Level QoS Parameters** IE which contains a **QCI** IE indicating a GBR bearer (as defined in TS 23.203 [13]) for a E-RAB previously configured as a non-GBR bearer (as defined in TS 23.203 [13]), and which does not contain the **GBR QoS Information** IE, the eNB shall consider the modification of the corresponding E-RAB as failed.

If the eNB receives an E-RAB MODIFY REQUEST message containing several **E-RAB ID** IEs (in the **E-RAB to be Modified List** IE) set to the same value, the eNB shall report the modification of the corresponding E-RABs as failed in the E-RAB MODIFY RESPONSE with the appropriate cause value, e.g., “Multiple E-RAB ID instances”.
If the eNB receives an E-RAB MODIFY REQUEST message containing some E-RAB ID IEs that eNB does not recognize, the eNB shall report the corresponding invalid E-RABs as failed in the E-RAB MODIFY RESPONSE with the appropriate cause value, e.g., “Unknown E-RAB ID”.

8.2.3 E-RAB Release

8.2.3.1 General

The purpose of the E-RAB Release procedure is to enable the release of already established E-RABs for a given UE. The procedure uses UE-associated signalling.

8.2.3.2 Successful Operation

8.2.3.2.1 E-RAB Release – MME initiated

The MME initiates the procedure by sending an E-RAB RELEASE COMMAND message. The E-RAB RELEASE COMMAND message shall contain the information required by the eNB to release at least one E-RAB in the E-RAB To Be Released List IE. If a NAS-PDU IE is contained in the message, the eNB shall pass it to the UE.

Upon reception of the E-RAB RELEASE COMMAND message the eNB shall execute the release of the requested E-RABs. For each E-RAB to be released the eNB shall release the corresponding Data Radio Bearer and release the allocated resources on Uu. The eNB shall pass the value contained in the E-RAB ID IE received for the E-RAB to the radio interface protocol for each Data Radio Bearer to be released. The eNB shall release allocated resources on S1 for the E-RABs requested to be released.

The E-RAB RELEASE COMMAND message may contain

- the UE Aggregate Maximum Bit Rate IE.

If the UE Aggregate Maximum Bit Rate IE is included in the E-RAB RELEASE COMMAND the eNB shall

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context; the eNB shall use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the UE Aggregate Maximum Bit Rate IE is not contained in the E-RAB RELEASE COMMAND message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

The eNB shall report to the MME, in the E-RAB RELEASE RESPONSE message, the result for all the E-RABs to be released.

- A list of E-RABs which are released successfully shall be included in the E-RAB Release List IE.
- A list of E-RABs which failed to be released, if any, shall be included in the E-RAB Failed to Release List IE.
The eNB shall be prepared to receive an E-RAB RELEASE COMMAND message on an established UE-associated logical S1-connection containing an E-RAB Release List IE at any time and shall always reply to it with an E-RAB RELEASE RESPONSE message.

The eNB shall, if supported, report in the E-RAB RELEASE RESPONSE message location information of the UE in the User Location Information IE.

After sending an E-RAB RELEASE RESPONSE message containing an E-RAB ID within the E-RAB Release List IE, the eNB shall be prepared to receive an E-RAB SETUP REQUEST message requesting establishment of an E-RAB with this E-RAB ID.

If the User Location Information IE is included in the E-RAB RELEASE RESPONSE message, the MME shall handle this information as specified in TS 23.401 [11].

If the Secondary RAT Usage Report List IE is included in the E-RAB RELEASE RESPONSE message, the MME shall handle this information as specified in TS 23.401 [11].

### 8.2.3.2.2 E-RAB Release Indication – eNB initiated

![Figure 8.2.3.2.2-1: E-RAB Release INDICATION procedure. Successful operation.](image)

The eNB initiates the procedure by sending an E-RAB RELEASE INDICATION message towards the MME.

The E-RAB RELEASE INDICATION message shall contain at least one E-RAB released at the eNB, in the E-RAB Released List IE.

The eNB shall, if supported, report in the E-RAB RELEASE INDICATION message location information of the UE in the User Location Information IE.

Upon reception of the E-RAB RELEASE INDICATION message the MME shall normally initiate the appropriate release procedure on the core network side for the E-RABs identified in the E-RAB RELEASE INDICATION message.

If the User Location Information IE is included in the E-RAB RELEASE INDICATION message, the MME shall handle this information as specified in TS 23.401 [11].

If the Secondary RAT Usage Report List IE is included in the E-RAB RELEASE INDICATION message, the MME shall handle this information as specified in TS 23.401 [11].

**Interaction with UE Context Release Request procedure:**

If the eNB wants to remove all remaining E-RABs, e.g., for user inactivity, the UE Context Release Request procedure shall be used instead.

### 8.2.3.3 Abnormal Conditions

If the eNB receives an E-RAB RELEASE COMMAND message containing multiple E-RAB ID IEs (in the E-RAB To Be Released List IE) set to the same value, the eNB shall initiate the release of one corresponding E-RAB and ignore the duplication of the instances of the selected corresponding E-RABs.

If the MME receives an E-RAB RELEASE INDICATION message containing multiple E-RAB ID IEs (in the E-RAB Released List IE) set to the same value, the MME shall initiate the release of one corresponding E-RAB and ignore the duplication of the instances of the selected corresponding E-RABs.
If the eNB receives an E-RAB RELEASE COMMAND message containing some E-RAB ID IEs that eNB does not recognize, the eNB shall report the corresponding invalid E-RABs as failed in the E-RAB RELEASE RESPONSE message with the appropriate cause, e.g., "Unknown E-RAB ID”.

### 8.2.4 E-RAB Modification Indication

#### 8.2.4.1 General

The purpose of the E-RAB Modification Indication procedure is to enable the eNB to request modifications of already established E-RABs for a given UE. The procedure uses UE-associated signalling.

#### 8.2.4.2 Successful Operation

The eNB initiates the procedure by sending an E-RAB MODIFICATION INDICATION message to the MME.

The Transport Layer Address IE and DL GTP TEID IE included in the E-RAB To Be Modified Item IEs IE in the E-RAB MODIFICATION INDICATION message shall be considered by the MME as the new DL address of the E-RABs. The Transport Layer Address IE and DL GTP TEID IE included in the E-RAB Not To Be Modified Item IEs IE in the E-RAB MODIFICATION INDICATION message shall be considered by the MME as the E-RABs with unchanged DL address.

If the Secondary RAT Usage Report List IE is included in the E-RAB MODIFICATION INDICATION message, the MME shall handle this information as specified in TS 23.401 [11].

The E-RAB MODIFICATION CONFIRM message shall contain the result for all the E-RABs that were requested to be modified according to the E-RAB To Be Modified Item IEs IE of the E-RAB MODIFICATION INDICATION message as follows:

- A list of E-RABs which are successfully modified shall be included in the E-RAB Modify List IE.
- A list of E-RABs which failed to be modified, if any, shall be included in the E-RAB Failed to Modify List IE.
- A list of E-RABs which are to be released, if any, shall be included in the E-RAB To Be Released List IE.

If the E-RAB Failed to Modify List IE is received in the E-RAB MODIFICATION CONFIRM message, the eNB shall either

- release all corresponding E-UTRA and E-UTRAN resources for the concerned E-RAB or
- keep the previous transport information before sending the E-RAB MODIFICATION INDICATION message unchanged for the concerned E-RAB.

If the E-RAB To Be Released List IE is received in the E-RAB MODIFICATION CONFIRM message, the eNB shall release all corresponding E-UTRA and E-UTRAN resources for the concerned E-RAB.

If the CSG Membership Info IE is included in the E-RAB MODIFICATION INDICATION message, the MME shall use the information for CSG membership verification as specified in TS 36.300 [14] and provide the result of the membership verification in the CSG Membership Status IE contained in the E-RAB MODIFICATION CONFIRM message.
If PLMN Identity IE is received in the CSG Membership Info IE in the E-RAB MODIFICATION INDICATION message, the MME shall use it for CSG membership verification as specified in TS 36.300 [14].

When the MME reports unsuccessful modification of an E-RAB, the cause value should be precise enough to enable the eNB to know the reason for an unsuccessful modification.

If the Tunnel Information for BBF IE is received in the E-RAB MODIFICATION INDICATION message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

8.2.4.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.4.4 Abnormal Conditions

Interaction with UE Context Release Request procedure:

If the E-RAB MODIFICATION INDICATION message does not contain all the E-RABs previously included in the UE Context, the MME shall trigger the UE Context Release procedure.

If the E-RAB MODIFICATION INDICATION message contains several E-RAB ID IE set to the same value, the MME shall trigger the UE Context Release procedure.

If the CSG Membership Info IE in the E-RAB MODIFICATION INDICATION message does not contain the Cell Access Mode IE set to "hybrid", the MME shall trigger the UE Context Release procedure.

8.3 Context Management procedures

8.3.1 Initial Context Setup

8.3.1.1 General

The purpose of the Initial Context Setup procedure is to establish the necessary overall initial UE Context including E-RAB context, the Security Key, Handover Restriction List, UE Radio capability and UE Security Capabilities etc. The procedure uses UE-associated signalling.

8.3.1.2 Successful Operation

In case of the establishment of an E-RAB the EPC must be prepared to receive user data before the INITIAL CONTEXT SETUP RESPONSE message has been received by the MME. If no UE-associated logical S1-connection exists, the UE-associated logical S1-connection shall be established at reception of the INITIAL CONTEXT SETUP REQUEST message.

The INITIAL CONTEXT SETUP REQUEST message shall contain within the E-RAB to be Setup List IE the information required by the eNB to build the new E-RAB configuration consisting of at least one additional E-RAB.
The **E-RAB to be Setup Item** IE may contain:

- the **NAS-PDU** IE,
- the **Correlation ID** IE in case of LIPA operation,
- the **SIPTO Correlation ID** IE in case of SIPTO@LN operation,
- the **Bearer Type** IE.

The **INITIAL CONTEXT SETUP REQUEST** message may contain

- the **Trace Activation** IE.
- the **Handover Restriction List** IE, which may contain roaming or access restrictions.
- the **UE Radio Capability** IE.
- the **Subscriber Profile ID for RAT/Frequency priority** IE.
- the **CS Fallback Indicator** IE.
- the **SRVCC Operation Possible** IE.
- the **CSG Membership Status** IE.
- the **Registered LAI** IE.
- the **GUMMEI** IE, which indicates the MME serving the UE, and shall only be present according to subclauses 4.6.2 and 4.7.6.6 of TS 36.300 [14].
- the **MME UE S1AP ID 2** IE, which indicates the MME UE S1AP ID assigned by the MME, and shall only be present according to subclause 4.6.2 of TS 36.300 [14].
- the **Management Based MDT Allowed** IE.
- the **Management Based MDT PLMN List** IE.
- the **Additional CS Fallback Indicator** IE.
- the **Masked IMEISV** IE.
- the **Expected UE Behaviour** IE.
- the **ProSe Authorized** IE.
- the **UE User Plane CIoT Support Indicator** IE.
- the **V2X Services Authorized** IE.
- the **UE Sidelink Aggregate Maximum Bit Rate** IE.
- the **NR UE Security Capabilities** IE.
- the **Aerial UE subscription information** IE.
- the **Pending Data Indication** IE.

The **INITIAL CONTEXT SETUP REQUEST** message shall contain the **Subscriber Profile ID for RAT/Frequency priority** IE, if available in the MME.

If the **Correlation ID** IE is included in the **INITIAL CONTEXT SETUP REQUEST** message towards the eNB with L-GW function for LIPA operation, then the eNB shall use this information for LIPA operation for the concerned E-RAB.

If the **SIPTO Correlation ID** IE is included in the **INITIAL CONTEXT SETUP REQUEST** message towards the eNB with L-GW function for SIPTO@LN operation, then the eNB shall use this information for SIPTO@LN operation for the concerned E-RAB.
If the **Bearer Type** IE is included in the INITIAL CONTEXT SETUP REQUEST message and is set to “non IP”, then the eNB shall not perform header compression for the concerned E-RAB.

If the **Masked IMEISV** IE is contained in the INITIAL CONTEXT SETUP REQUEST the target eNB shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

If the **Expected UE Behaviour** IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information and may use it to determine the RRC connection time.

Upon receipt of the INITIAL CONTEXT SETUP REQUEST message the eNB shall

- attempt to execute the requested E-RAB configuration.
- store the UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.
- pass the value contained in the **E-RAB ID** IE and the **NAS-PDU** IE received for the E-RAB for each established Data radio bearer to the radio interface protocol. The eNB shall not send the NAS PDUs associated to the failed Data radio bearers to the UE.
- store the received Handover Restriction List in the UE context.
- store the received UE Radio Capability in the UE context.
- store the received Subscriber Profile ID for RAT/Frequency priority in the UE context and use it as defined in TS 36.300 [14].
- store the received SRVCC Operation Possible in the UE context and use it as defined in TS 23.216 [9].
- store the received UE Security Capabilities in the UE context.
- store the received Security Key in the UE context, take it into use and associate it with the initial value of NCC as defined in TS 33.401 [15].
- store the received CSG Membership Status, if supported, in the UE context.
- store the received Management Based MDT Allowed information, if supported, in the UE context.
- store the received Management Based MDT PLMN List information, if supported, in the UE context.
- store the received ProSe Authorization information, if supported, in the UE context.
- store the received V2X Services Authorization information, if supported, in the UE context.
- store the received UE Sidelink Aggregate Maximum Bit Rate, if supported, in the UE context, and use it for the concerned UE’s sidelink communication in network scheduled mode for V2X services.

For the Initial Context Setup an initial value for the Next Hop Chaining Count is stored in the UE context.

The allocation of resources according to the values of the **Allocation and Retention Priority** IE shall follow the principles described for the E-RAB Setup procedure.

The eNB shall use the information in the **Handover Restriction List** IE if present in the INITIAL CONTEXT SETUP REQUEST message to

- determine a target for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE, except if the **CS Fallback Indicator** IE is set to “CS Fallback High Priority” and the **Additional CS Fallback Indicator** IE is not present in which case the eNB may use the information in the **Handover Restriction List** IE;
- select a proper SCG during dual connectivity operation.

If the **Handover Restriction List** IE is not contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall consider that no roaming and no access restriction apply to the UE. The eNB shall also consider that no roaming and no access restriction apply to the UE when:

- one of the setup E-RABs has a particular ARP value (TS 23.401 [11]);
If the CS Fallback Indicator IE is included in the INITIAL CONTEXT SETUP REQUEST message, it indicates that the UE Context to be set-up is subject to CS Fallback. The eNB shall reply with the INITIAL CONTEXT SETUP RESPONSE message and then act as defined in TS 23.272 [17].

If the Registered LAI IE is included in the INITIAL CONTEXT SETUP REQUEST message, it indicates that the eNB may take the Registered LAI IE into account when selecting the target cell or frequency and then act as defined in TS 23.272 [17].

If the UE Security Capabilities IE included in the INITIAL CONTEXT SETUP REQUEST message only contains the EIA0 algorithm as defined in TS 33.401 [15] and if this EIA0 algorithm is defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the eNB shall take it into use and ignore the keys received in the Security Key IE.

If the GUMMEI IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it for subsequent X2 handovers.

If the MME UE S1AP ID 2 IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it for subsequent X2 handovers.

If the Management Based MDT Allowed IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall use it, if supported, together with information in the Management Based MDT PLMN List IE, if available in the UE context, to allow subsequent selection of the UE for management based MDT defined in TS 32.422 [10].
If the **UE User Plane CIoT Support Indicator** IE is included in the INITIAL CONTEXT SETUP REQUEST message and is set to "supported", the eNB shall, if supported, consider that User Plane CIoT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.

If the **Enhanced Coverage Restricted** IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the **CE-Mode-B Restricted** IE is included in the INITIAL CONTEXT SETUP REQUEST message and the **Enhanced Coverage Restricted** IE is not set to restricted and the Enhanced Coverage Restricted information stored in the UE context is not set to restricted, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the **NR UE Security Capabilities** IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].

If the **Aerial UE subscription information** IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [14].

If the **Pending Data Indication** IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall use it as defined in TS 23.401 [11].

If the **Subscription Based UE Differentiation Information** IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

The eNB shall report to the MME, in the INITIAL CONTEXT SETUP RESPONSE message, the successful establishment of the security procedures with the UE, and, the result for all the requested E-RABs in the following way:

- A list of E-RABs which are successfully established shall be included in the **E-RAB Setup List** IE
- A list of E-RABs which failed to be established shall be included in the **E-RAB Failed to Setup List** IE.

When the eNB reports the unsuccessful establishment of an E-RAB, the cause value should be precise enough to enable the MME to know the reason for the unsuccessful establishment, e.g., “Radio resources not available”, “Failure in the Radio Interface Procedure”.

After sending the INITIAL CONTEXT SETUP RESPONSE message, the procedure is terminated in the eNB.

### 8.3.1.3 Unsuccessful Operation

![Figure 8.3.1.3-1: Initial Context Setup procedure. Unsuccessful operation.](image)

If the eNB is not able to establish an S1 UE context, or cannot even establish one non GBR bearer it shall consider the procedure as failed and reply with the INITIAL CONTEXT SETUP FAILURE message.

### 8.3.1.4 Abnormal Conditions

If the eNB receives an INITIAL CONTEXT SETUP REQUEST message containing a **E-RAB Level QoS Parameters** IE which contains a **QCI** IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the **GBR QoS Information** IE, the eNB shall consider the establishment of the corresponding E-RAB as failed.
If the eNB receives an INITIAL CONTEXT SETUP REQUEST message containing several E-RAB ID IEs (in the E-RAB to Be Setup List IE) set to the same value, the eNB shall consider the establishment of the corresponding E-RABs as failed.

If the supported algorithms for encryption defined in the Encryption Algorithms IE in the UE Security Capabilities IE, plus the mandated support of EEA0 in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed encryption algorithms in the eNB (TS 33.401 [15]), the eNB shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

If the supported algorithms for integrity defined in the Integrity Protection Algorithms IE in the UE Security Capabilities IE, plus the mandated support of the EIA0 algorithm in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the eNB shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

If the CSG Membership Status IE is not included in the INITIAL CONTEXT SETUP REQUEST message and the cell accessed by the UE is a hybrid cell, the eNB shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

If the eNB receives an INITIAL CONTEXT SETUP REQUEST message containing both the Correlation ID and the SIPTO Correlation ID IEs for the same E-RAB, the eNB shall consider the establishment of the corresponding E-RAB as failed.

### 8.3.2 UE Context Release Request (eNB initiated)

#### 8.3.2.1 General

The purpose of the UE Context Release Request procedure is to enable the eNB to request the MME to release the UE-associated logical S1-connection due to E-UTRAN generated reasons, e.g., “TX2RELCOoverall Expiry”. The procedure uses UE-associated signalling.

#### 8.3.2.2 Successful Operation

The eNB controlling a UE-associated logical S1-connection initiates the procedure by generating a UE CONTEXT RELEASE REQUEST message towards the affected MME node.

The UE CONTEXT RELEASE REQUEST message shall indicate the appropriate cause value, e.g., “User Inactivity”, “Radio Connection With UE Lost”, “CSG Subscription Expiry”, “CS Fallback triggered”, “Redirection towards 1xRTT”, “Inter-RAT Redirection”, “UE Not Available for PS Service”, “Release due to pre-emption”, for the requested UE-associated logical S1-connection release.

If the Secondary RAT Usage Report List IE is included in the UE CONTEXT RELEASE REQUEST message, the MME shall handle this information as specified in TS 23.401 [11].

**Interactions with UE Context Release procedure:**
The UE Context Release procedure should be initiated upon reception of a UE CONTEXT RELEASE REQUEST message. If the UE was configured with EN-DC radio resources at the time UE Context Release Request procedure was triggered, and the PSCell information was available, the eNB shall store the PSCell information in the UE context.

### 8.3.3 UE Context Release (MME initiated)

#### 8.3.3.1 General

The purpose of the UE Context Release procedure is to enable the MME to order the release of the UE-associated logical connection due to various reasons, e.g., completion of a transaction between the UE and the EPC, or completion of successful handover, or completion of handover cancellation, or release of the old UE-associated logical S1-connection when two UE-associated logical S1-connections toward the same UE is detected after the UE has initiated the establishment of a new UE-associated logical S1-connection, or the UE is no longer allowed to access the CSG cell (i.e., the UE becomes a non-member of the currently used CSG cell). The procedure uses UE-associated S1 connection.

#### 8.3.3.2 Successful Operation

**Figure 8.3.3.2-1: UE Context Release procedure. Successful operation.**

The MME initiates the procedure by sending the UE CONTEXT RELEASE COMMAND message to the eNB.

The UE CONTEXT RELEASE COMMAND message shall contain the **UE S1AP ID pair** IE if available, otherwise the message shall contain the **MME UE S1AP ID** IE.

The MME provides the **cause** IE set to “Load Balancing TAU Required” in the UE CONTEXT RELEASE COMMAND message sent to the eNB for all load balancing and offload cases in the MME.

Upon reception of the UE CONTEXT RELEASE COMMAND message, the eNB shall release all related signalling and user data transport resources and reply with the UE CONTEXT RELEASE COMPLETE message. In case of eNB supporting L-GW function for LIPA and/or SIPTO@LN operation, the eNB shall also release any related tunnel resources. In case of successful handover, the eNB using L-GW function for SIPTO@LN operation shall also request using intra-node signalling the collocated L-GW to release the SIPTO@LN PDN connection as defined in TS 23.401 [11].

The eNB shall, if supported, report in the UE CONTEXT RELEASE COMPLETE message location information of the UE in the **User Location Information** IE. If the UE was configured with EN-DC radio resources at the time UE context release was initiated, and the PSCell information was available, the **PSCell Information** IE shall be included in the **User Location Information** IE.

If the **User Location Information** IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall handle this information as specified in TS 23.401 [11].

If the **Information on Recommended Cells and eNBs for Paging** IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall, if supported, store it and may use it for subsequent paging.

If the **Cell Identifier and Coverage Enhancement Level** IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall, if supported, store it and use it for subsequent paging.

If the **Secondary RAT Usage Report List** IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall handle this information as specified in TS 23.401 [11].
8.3.3.3 Abnormal Conditions

If the UE Context Release procedure is not initiated towards the eNB before the expiry of the timer $T_{\text{S1RELOCoverall}}$ the eNB shall request the MME to release the UE context.

If the UE returns to the eNB before the reception of the UE CONTEXT RELEASE COMMAND message or the expiry of the timer $T_{\text{S1RELOCoverall}}$, the eNB shall stop the $T_{\text{S1RELOCoverall}}$ and continue to serve the UE.

8.3.4 UE Context Modification

8.3.4.1 General

The purpose of the UE Context Modification procedure is to partly modify the established UE Context, e.g., with the Security Key or the Subscriber Profile ID for RAT/Frequency priority. The procedure uses UE-associated signalling.

8.3.4.2 Successful Operation

![Diagram of UE Context Modification procedure. Successful operation.]

The UE CONTEXT MODIFICATION REQUEST message may contain:

- the Security Key IE.
- the Subscriber Profile ID for RAT/Frequency priority IE.
- the UE Aggregate Maximum Bit Rate IE.
- the CS Fallback Indicator IE.
- the UE Security Capabilities IE.
- the CSG Membership Status IE.
- the Registered LAI IE.
- the Additional CS Fallback Indicator IE.
- the ProSe Authorized IE.
- the SRVCC Operation Possible IE.
- the SRVCC Operation Not Possible IE.
- the V2X Services Authorized IE.
- the UE Sidelink Aggregate Maximum Bit Rate IE.
- the NR UE Security Capabilities IE.
- the Aerial UE subscription information IE.

Upon receipt of the UE CONTEXT MODIFICATION REQUEST message the eNB shall
- store the received Security Key IE, take it into use and associate it with the initial value of NCC as defined in TS 33.401 [15]
- store the UE Security Capabilities IE and take them into use together with the received keys according to TS 33.401 [15].
- if supported, store the NR UE Security Capabilities IE and use it as defined in TS 33.401 [15]
- store the Subscriber Profile ID for RAT/Frequency priority IE and use it as defined in TS 36.300 [14].

If the UE Aggregate Maximum Bit Rate IE is included in the UE CONTEXT MODIFICATION REQUEST message the eNB shall:

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context;
- use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the CSG Membership Status IE is received in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall take the following action:

- If the cell that serves the UE is a hybrid cell, the eNB shall store the value contained in the CSG Membership Status IE and replace any previously stored membership status value by this new one. It shall then use it as defined in TS 36.300 [14].
- If the cell that serves the UE is a CSG cell, and the CSG Membership Status IE is set to “not-member”, the eNB should initiate actions to ensure that the UE is no longer served by the CSG cell as defined in TS 36.300 [14].
- If the UE is in dual connectivity operation and the cell configured as SCG is a hybrid cell, the eNB shall inform the eNB serving the SCG of the updated CSG membership status.

If the UE Aggregate Maximum Bit Rate IE is not contained in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

If the CS Fallback Indicator IE is included in the UE CONTEXT MODIFICATION REQUEST message, it indicates that the concerned UE Context is subject to CS Fallback. The eNB shall reply with the UE CONTEXT MODIFICATION RESPONSE message and then act as defined in TS 23.272 [17]. If the CS Fallback Indicator IE is set to “CS Fallback High Priority” and the Additional CS Fallback Indicator IE is not present and, in case the Handover Restriction List information that may exist in the UE context is applied, no suitable target is found, or if the CS Fallback Indicator IE is set to “CS Fallback High Priority” and the Additional CS Fallback Indicator IE is set to “no restriction”, the eNB shall consider that no roaming and no access restriction apply to the UE and process according to TS 23.272 [17].

If the Registered LAI IE is included in the UE CONTEXT MODIFICATION REQUEST message, it indicates that the eNB may take the Registered LAI IE into account when selecting the target cell or frequency and then act as defined in TS 23.272 [17].

If the ProSe Authorized IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, update its ProSe authorization information for the UE accordingly. If the ProSe Authorized IE includes one or more IEs set to “not authorized”, the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant ProSe service(s).

If the SRVCC Operation Possible IE is included in UE CONTEXT MODIFICATION REQUEST message, the eNB shall store content of the received SRVCC Operation Possible IE in the UE context and, if supported, use it as defined in TS 23.216 [9].

If the SRVCC Operation Not Possible IE is included in UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, remove the SRVCC Operation Possible information from the UE context.

If the V2X Services Authorized IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, update its V2X services authorization information for the UE accordingly. If the V2X Services Authorized IE includes one or more IEs set to “not authorized”, the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).
If the **UE Sidelink Aggregate Maximum Bit Rate** IE is included in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported:

- replace the previously provided UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE’s sidelink communication in network scheduled mode for V2X services.

If the **Aerial UE subscription information** IE is included in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [14].

The eNB shall report, in the UE CONTEXT MODIFICATION RESPONSE message to the MME the successful update of the UE context.

After sending the UE CONTEXT MODIFICATION RESPONSE message, the procedure is terminated in the eNB.

### 8.3.4.3 Unsuccessful Operation

![Figure 8.3.4.3-1: UE Context Modification procedure. Unsuccessful operation.](image)

In case the UE context update cannot be performed successfully the eNB shall respond with the UE CONTEXT MODIFICATION FAILURE message to the MME with an appropriate cause value in the **Cause** IE.

### 8.3.4.4 Abnormal Conditions

If the eNB receives both the **CS Fallback Indicator** IE and one of the security IEs (either the **Security Key** IE or the **UE Security Capabilities** IE) in the UE Context Modification Request message, the eNB shall ignore both IEs and send back the UE CONTEXT MODIFICATION FAILURE message with an appropriate cause value.

### 8.3.5 UE Radio Capability Match

#### 8.3.5.1 General

The purpose of the UE Radio Capability Match procedure is for the MME to request the eNB to derive and provide an indication to the MME whether the UE radio capabilities are compatible with the network configuration for voice continuity.

The procedure uses UE-associated signalling.
8.3.5.2 Successful Operation

The MME initiates the procedure by sending a UE RADIO CAPABILITY MATCH REQUEST message. If the UE-associated logical S1-connection is not established, the MME shall allocate a unique MME UE S1AP ID to be used for the UE and include the MME UE S1AP ID IE in the UE RADIO CAPABILITY MATCH REQUEST message; by receiving the MME UE S1AP ID IE in the UE RADIO CAPABILITY MATCH REQUEST message, the eNB establishes the UE-associated logical S1-connection.

Upon receipt of the UE RADIO CAPABILITY MATCH REQUEST message, the eNB shall act as defined in the TS 23.401 [11] and respond with a UE RADIO CAPABILITY MATCH RESPONSE message.

If the UE Radio Capability IE is contained in the UE RADIO CAPABILITY MATCH REQUEST message, the eNB shall use it to determine the value of the Voice Support Match Indicator IE to be included in the UE RADIO CAPABILITY MATCH RESPONSE message.

8.3.5.3 Unsuccessful Operation

Not applicable.

8.3.5.4 Abnormal Conditions

Not applicable.

8.3.6 UE Context Modification Indication

8.3.6.1 General

The purpose of the UE Context Modification Indication procedure is for the eNB to request the modifications on the established UE Context.

The procedure uses UE-associated signalling.

In the current version of the specification, this procedure is only used for membership verification, as described in TS 36.300 [14].
8.3.6.2 Successful Operation

If the CSG Membership Info IE is included in the UE CONTEXT MODIFICATION INDICATION message, the MME shall use the information for CSG membership verification as specified in TS 36.300 [14] and provide the result of the membership verification in the CSG Membership Status IE contained in the UE CONTEXT MODIFICATION CONFIRM message.

If no CSG Membership Info IE is received in the UE CONTEXT MODIFICATION INDICATION message and the UE was previously configured with resources from a hybrid cell, the MME shall consider that the UE has moved into an open access cell.

If PLMN Identity IE is received in the CSG Membership Info IE in the UE CONTEXT MODIFICATION INDICATION message, the MME shall use it for CSG membership verification as specified in TS 36.300 [14].

8.3.6.3 Unsuccessful Operation

Not applicable.

8.3.6.4 Abnormal Conditions

If the CSG Membership Info IE in the UE CONTEXT MODIFICATION message does not contain the Cell Access Mode IE set to "hybrid" the MME shall trigger the UE Context Release procedure.

8.3.7 UE Context Suspend

8.3.7.1 General

The purpose of the UE Context Suspend procedure is to suspend the UE context, the UE-associated logical S1-connection and the related bearer contexts in the E-UTRAN and the EPC.

8.3.7.2 Successful Operation

Figure 8.3.7.2-1: UE Context Suspend procedure. Successful operation.
The eNB initiates the procedure by sending the UE CONTEXT SUSPEND REQUEST message to the MME.

Upon receipt of the UE CONTEXT SUSPEND REQUEST the MME shall act as defined in TS 23.401 [11].

Upon receipt of the UE CONTEXT SUSPEND RESPONSE message the eNB shall suspend the UE context, the UE-associated logical S1-connection and the related bearer contexts and send the UE to RRC_IDLE.

If the Information on Recommended Cells and eNBs for Paging IE is included in the UE CONTEXT SUSPEND REQUEST message, the MME shall, if supported, store it and may use it for subsequent paging.

If the Cell Identifier and Coverage Enhancement Level IE is included in the UE CONTEXT SUSPEND REQUEST message, the MME shall, if supported, store it and use it for subsequent paging.

If the Secondary RAT Usage Report List IE is included in the UE CONTEXT SUSPEND REQUEST message, the MME shall handle this information as specified in TS 23.401 [11].

If the Security Context IE is included in the UE CONTEXT SUSPEND RESPONSE message, the eNB shall store the received Security Context IE in the UE context and remove any existing unused stored {NH, NCC} as specified in TS 33.401 [15].

8.3.8 UE Context Resume

8.3.8.1 General

The purpose of the UE Context Resume procedure is to indicate to the MME that the UE has resumed the suspended RRC connection or accesses for early data transmission and to request the MME to resume the UE context, UE-associated logical S1-connection and the related bearer contexts in the EPC.

8.3.8.2 Successful Operation

![Figure 8.3.8.2-1: UE Context Resume procedure. Successful operation.](image-url)

The eNB initiates the procedure by sending the UE CONTEXT RESUME REQUEST message to the MME. If the eNB is not able to admit all suspended E-RABs the eNB shall indicate this in the E-RABs Failed To Resume List IE.

Upon receipt of the UE CONTEXT RESUME REQUEST message the MME shall act as defined in TS 23.401 [11] and respond with the UE CONTEXT RESUME RESPONSE. If the MME is not able to admit all suspended E-RABs the MME shall indicate this in the E-RABs Failed To Resume List IE.

The eNB shall release resources for each E-RAB failed to resume and shall assume that the EPC has released respective resources as well.

If the Security Context IE is included in the UE CONTEXT RESUME RESPONSE message, the eNB shall store the received Security Context IE in the UE context and the eNB shall use it for the next suspend/resume or X2 handover or Intra eNB handovers as specified in TS 33.401 [15].

If the Pending Data Indication IE is included in the UE CONTEXT RESUME RESPONSE message, the eNB shall use it as defined in TS 23.401 [11].
8.3.8.3 Unsuccessful Operation

Figure 8.3.8.3-1: UE Context Resume procedure. Unsuccessful operation.

If the MME is not able to resume a single E-RAB it releases the UE-associated logical S1-connection by sending the UE CONTEXT RESUME FAILURE message to the eNB. Upon reception of the UE CONTEXT RESUME FAILURE message the eNB shall release the RRC connection as specified in TS 36.331 [16] and release all related signalling and user data transport resources.

8.3.9 Connection Establishment Indication

8.3.9.1 General

The purpose of the Connection Establishment Indication procedure is to enable the MME to complete the establishment of the UE-associated logical S1-connection, and/or trigger the eNB to obtain and report UE Radio Capability. The procedure uses UE-associated signalling.

8.3.9.2 Successful Operation

Figure 8.3.9.2-1: Connection Establishment Indication procedure. Successful operation.

The MME initiates the procedure by sending a CONNECTION ESTABLISHMENT INDICATION message to the eNB.

If the UE-associated logical S1-connection is not established, the MME shall allocate a unique MME UE S1AP ID to be used for the UE and include that in the CONNECTION ESTABLISHMENT INDICATION message.

If the UE Radio Capability IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall store this information in the UE context, use it as defined in TS 36.300 [14].

If the Enhanced Coverage Restricted IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the DL CP Security Information IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall forward this information to the UE as described in TS 36.300 [14].
If the CE-Mode-B Restricted IE is included in the CONNECTION ESTABLISHMENT INDICATION message and the Enhanced Coverage Restricted IE is not set to restricted and the Enhanced Coverage Restricted information stored in the UE context is not set to restricted, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the End Indication IE is included in the CONNECTION ESTABLISHMENT INDICATION message and set to "no further data", the eNB shall consider that there are no further NAS PDUs to be transmitted for this UE.

If the Subscription Based UE Differentiation Information IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

8.3.9.3 Unsuccessful Operation
Not applicable.

8.3.9.4 Abnormal Conditions
Not applicable.

8.3.10 Retrieve UE Information

8.3.10.1 General
The purpose of the Retrieve UE information procedure is for the eNB to request the UE information including QoS Parameters and UE Radio capability from MME, for a NB-IoT UE using Control Plane CIoT EPS Optimisation.

8.3.10.2 Successful Operation

![Figure 8.3.10.1: Retrieve UE Information Procedure. Successful operation.](image)

The eNB initiates the procedure by sending the RETRIEVE UE INFORMATION message to the MME.

8.3.10.3 Unsuccessful Operation
Not applicable.

8.3.10.4 Abnormal Conditions
Not applicable.
8.3.11 UE Information Transfer

8.3.11.1 General

The purpose of the UE information transfer procedure is for the MME to send the UE information including QoS Parameters and UE Radio capability to the eNB, for a NB-IoT UE using Control Plane CIoT EPS Optimisation.

8.3.11.2 Successful Operation

![Figure 8.3.11.1: UE Information Transfer Procedure. Successful operation.](image)

The MME initiates the procedure by sending the UE INFORMATION TRANSFER message to the eNB.

If the **UE Level QoS Parameters** IE is contained in the UE INFORMATION TRANSFER message, the eNB shall store this information in the UE context, and use it as specified in TS 23.401 [11].

If the **UE Radio Capability** IE is contained in the UE INFORMATION TRANSFER message, the eNB shall store this information in the UE context, and use it as specified in TS 23.401 [11].

If the **Subscription Based UE Differentiation Information** IE is included in the UE INFORMATION TRANSFER message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the **Pending Data Indication** IE is contained in the UE INFORMATION TRANSFER message, the eNB shall store this information in the UE context, and use it as specified in TS 23.401 [11].

8.3.11.3 Unsuccessful Operation

Not applicable.

8.3.11.4 Abnormal Conditions

Not applicable.

8.3.12 eNB CP Relocation Indication

8.3.12.1 General

The purpose of the eNB CP Relocation Indication procedure is to request the MME to authenticate the UE’s re-establishment request as described in TS 36.300 [14], and trigger the establishment of the respective UE-associated logical S1-connection, for a NB-IoT UE using Control Plane CIoT EPS Optimisation.

The procedure uses UE-associated signalling.
8.3.12.2 Successful Operation

![Diagram](image)

**Figure 8.3.12.2-1: eNB CP Relocation Indication. Successful operation.**

The eNB initiates the procedure by sending a eNB CP RELOCATION INDICATION message to the MME.

The eNB shall allocate a unique eNB UE S1AP ID to be used for the UE and the eNB shall include this identity in the eNB CP RELOCATION INDICATION message.

8.3.12.3 Unsuccessful Operation

Not applicable.

8.3.12.4 Abnormal Conditions

Not applicable.

8.3.13 MME CP Relocation Indication

8.3.13.1 General

The purpose of the MME CP Relocation Indication procedure is to inform the eNB that the UE’s connection is to be relocated to another eNB as described in TS 36.300 [14], for a UE using Control Plane CIoT EPS Optimisation.

The procedure uses UE-associated signalling.

8.3.13.2 Successful Operation

![Diagram](image)

**Figure 8.3.13.2-1: MME CP Relocation Indication. Successful operation.**

The MME initiates the procedure by sending a MME CP RELOCATION INDICATION message to the eNB.

Upon reception of the MME CP RELOCATION INDICATION message, the eNB shall terminate the delivery of NAS messages that have been received from the MME, and proceed as described in TS 36.300 [14].
8.3.13.3 Unsuccessful Operation
Not applicable.

8.3.13.4 Abnormal Conditions
Not applicable.

8.4 Handover Signalling

8.4.1 Handover Preparation

8.4.1.1 General
The purpose of the Handover Preparation procedure is to request the preparation of resources at the target side via the EPC. There is only one Handover Preparation procedure ongoing at the same time for a certain UE.

8.4.1.2 Successful Operation

The source eNB initiates the handover preparation by sending the HANDOVER REQUIRED message to the serving MME. When the source eNB sends the HANDOVER REQUIRED message, it shall start the timer TS1_RELOCprep. The source eNB shall indicate the appropriate cause value for the handover in the Cause IE.

The source eNB shall include the Source to Target Transparent Container IE in the HANDOVER REQUIRED message.

In case of intra-system handover, the information in the Source to Target Transparent Container IE shall be encoded according to the definition of the Source eNB to Target eNB Transparent Container IE. In case of handover to UTRAN, the information in the Source to Target Transparent Container IE shall be encoded according to the Source RNC to Target RNC Transparent Container IE definition as specified in TS 25.413 [19] and the source eNB shall include the UE History Information IE in the Source RNC to Target RNC Transparent Container IE. If the handover is to GERAN A/Gb mode then the information in the Source to Target Transparent Container IE shall be encoded according to the definition of the Source BSS to Target BSS Transparent Container IE as described in TS 48.018 [18]. If the handover is to NG-RAN, the information in the Source to Target Transparent Container IE shall be encoded according to the Source NG-RAN Node to Target NG-RAN Node Transparent Container IE definition as specified in TS 38.413 [44].

When the preparation, including the reservation of resources at the target side is ready, the MME responds with the HANDOVER COMMAND message to the source eNB.

If the Target to Source Transparent Container IE has been received by the MME from the handover target then the transparent container shall be included in the HANDOVER COMMAND message.

Upon reception of the HANDOVER COMMAND message the source eNB shall stop the timer TS1_RELOCprep and start the timer TS1_RELOCoverall.
In case of intra-system handover, the information in the Target to Source Transparent Container IE shall be encoded according to the definition of the Target eNB to Source eNB Transparent Container IE. In case of inter-system handover to UTRAN, the information in the Target to Source Transparent Container IE shall be encoded according to the Target RNC to Source RNC Transparent Container IE definition as specified in TS 25.413 [19]. In case of inter-system handover to GERAN A/Gb mode, the information in the Target to Source Transparent Container IE shall be encoded according to the Target BSS to Source BSS Transparent Container IE definition as described in TS 48.018 [18]. In case of inter-system handover to NG-RAN, the information in the Target to Source Transparent Container IE shall be encoded according to the Target NG-RAN Node to Source NG-RAN Node Transparent Container IE definition as specified in TS 38.413 [44].

If there are any E-RABs that could not be admitted in the target, they shall be indicated in the E-RABs to Release List IE.

If the DL forwarding IE is included within the Source eNB to Target eNB Transparent Container IE of the HANDOVER REQUIRED message and it is set to “DL forwarding proposed”, it indicates that the source eNB proposes forwarding of downlink data.

If the MME receives the Direct Forwarding Path Availability IE in the HANDOVER REQUIRED message indicating that a direct data path is available, it shall handle it as specified in TS 23.401 [11].

If the CSG Id IE and no Cell Access Mode IE are received in the HANDOVER REQUIRED message, the MME shall perform the access control according to the CSG Subscription Data of that UE and, if the access control is successful or if at least one of the E-RABs has a particular ARP value (see TS 23.401 [11]), it shall continue the handover and propagate the CSG Id IE to the target side. If the access control is unsuccessful but at least one of the E-RABs has a particular ARP value (see TS 23.401 [11]) the MME shall also provide the CSG Membership Status IE set to “non member” to the target side.

If the CSG Id IE and the Cell Access Mode IE set to “hybrid” are received in the HANDOVER REQUIRED message, the MME shall provide the membership status of the UE and the CSG Id to the target side.

The source eNB shall include the SRVCC HO Indication IE in the HANDOVER REQUIRED message if the SRVCC operation is needed as defined in TS 23.216 [9]. The source eNB shall indicate to the MME in the SRVCC HO Indication IE if the handover shall be prepared for PS and CS domain or only for CS domain. The SRVCC HO Indication IE is set according to the target cell capability and UE capability. In case the target system is GERAN without DTM support or the UE is without DTM support, the source eNB shall indicate “CS only” in the SRVCC HO Indication IE and “PS service not available” in PS Service Not Available IE. In case the target system is either GERAN without DTM HO support and the UE is supporting DTM or the target system is UTRAN without PS HO support, the source eNB shall indicate “CS only” in the SRVCC HO Indication IE. Otherwise, the source eNB shall indicate “PS and CS” in the SRVCC HO Indication IE.

In case of inter-system handover from E-UTRAN, the source eNB shall indicate in the Target ID IE, in case the target system is UTRAN, the Target RNC-ID of the RNC (including the Routing Area Code only in case the UTRAN PS domain is involved), in case the target system is GERAN the Cell Global Identity (including the Routing Area Code only in case the GERAN PS domain is involved) of the cell, and in case the target system is NG-RAN the Target NG-RAN Node ID of the NG-RAN node in the target system.

In case of inter-system handover from E-UTRAN to UTRAN, the source eNB shall, if supported, include the HO Cause Value IE in the UE History Information IE of the HANDOVER REQUIRED message.

In case the SRVCC operation is performed and the SRVCC HO Indication IE indicates that handover shall be prepared only for CS domain, and if

- the target system is GERAN, then the source eNB
  - shall encode the information in the Source to Target Transparent Container IE within the HANDOVER REQUIRED message, according to the definition of the Old BSS to New BSS Information IE as specified in TS 48.008 [23], and
  - shall not include the Source to Target Transparent Container Secondary IE in the HANDOVER REQUIRED message;
- the target system is UTRAN, then the source eNB

ETSI
- shall encode the information in the Source to Target Transparent Container IE within the HANDOVER REQUIRED message according to the definition of the Source RNC to Target RNC Transparent Container IE as specified in TS 25.413 [19],

- shall include the UE History Information IE in the Source RNC to Target RNC Transparent Container IE, and

- shall not include the Source to Target Transparent Container Secondary IE in the HANDOVER REQUIRED message.

In case the SRVCC operation is performed, the SRVCC HO Indication IE in the HANDOVER REQUIRED message indicates that handover shall be prepared for PS and CS domain, and if
- the target system is GERAN with DTM HO support, then the source eNB
  - shall encode the information in the Source to Target Transparent Container IE within the HANDOVER REQUIRED message according to the definition of the Source BSS to Target BSS Transparent Container IE as described in TS 48.018 [18], and

  - shall include the Source to Target Transparent Container Secondary IE in the HANDOVER REQUIRED message and encode information in it according to the definition of the Old BSS to New BSS information IE as specified in TS 48.008 [23];

- the target system is UTRAN, then the source eNB
  - shall encode the information in the Source to Target Transparent Container IE within the HANDOVER REQUIRED message according to the definition of the Source RNC to Target RNC Transparent Container IE as specified in TS 25.413 [19],

  - shall include the UE History Information IE in the Source RNC to Target RNC Transparent Container IE, and

  - shall not include the Source to Target Transparent Container Secondary IE in the HANDOVER REQUIRED message.

In case the SRVCC operation is performed, the SRVCC HO Indication IE in the HANDOVER REQUIRED message indicates that handover shall be prepared only for CS domain, and if
- the target system is GERAN, then the MME
  - shall encode the information in the Target to Source Transparent Container IE within the HANDOVER COMMAND message according to the definition of the Layer 3 Information IE as specified in TS 48.008 [23], and

  - shall not include the Target to Source Transparent Container Secondary IE in the HANDOVER COMMAND message;

- the target system is UTRAN, then the MME
  - shall encode the information in the Target to Source Transparent Container IE within the HANDOVER COMMAND message according to the definition of the Target RNC to Source RNC Transparent Container IE as specified in TS 25.413 [19], and

  - shall not include the Target to Source Transparent Container Secondary IE in the HANDOVER COMMAND message.

In case the SRVCC operation is performed, the SRVCC HO Indication IE in the HANDOVER REQUIRED message indicates that handover shall be prepared for PS and CS domain,
- the target system is GERAN with DTM HO support, and if
  - the Handover Preparation procedure has succeeded in the CS and PS domain, then the MME
    - shall encode the information in the Target to Source Transparent Container IE within the HANDOVER COMMAND message according to the definition of the Layer 3 Information IE as specified in TS 48.008 [23], and
- shall include the Target to Source Transparent Container Secondary IE in the HANDOVER COMMAND message and encode information in it according to the definition of the Target BSS to Source BSS Transparent Container IE as specified in TS 48.018 [18];

- the Handover Preparation procedure has succeeded in the CS domain only, then the MME

- shall encode the information in the Target to Source Transparent Container IE within the HANDOVER COMMAND message according to the definition of the Layer 3 Information IE as specified in TS 48.008 [23], and

- shall not include the Target to Source Transparent Container Secondary IE in the HANDOVER COMMAND message;

- the target system is UTRAN, then the Handover Preparation procedure shall be considered successful if the Handover Preparation procedure has succeeded in the CS domain, and the MME

- shall encode the information in the Target to Source Transparent Container IE within the HANDOVER COMMAND message according to the definition of the Target RNC to Source RNC Transparent Container IE as specified in TS 25.413 [19], and

- shall not include the Target to Source Transparent Container Secondary IE in the HANDOVER COMMAND message.

If the HANDOVER COMMAND message contains the DL GTP-TEID IE and the DL Transport Layer Address IE for a given bearer in the E-RABs Subject to Forwarding List IE, then the source eNB shall consider that the forwarding of downlink data for this given bearer is possible.

If the HANDOVER COMMAND message contains the UL GTP-TEID IE and the UL Transport Layer Address IE for a given bearer in the E-RABs Subject to Forwarding List IE, then it means the target eNB has requested the forwarding of uplink data for this given bearer.

**Interactions with E-RAB Management procedures:**

If, after a HANDOVER REQUIRED message is sent and before the Handover Preparation procedure is terminated, the source eNB receives an MME initiated E-RAB Management procedure on the same UE associated signalling connection, the source eNB shall either:

1. cancel the Handover Preparation procedure by executing the Handover Cancel procedure with an appropriate cause value. After successful completion of the Handover Cancel procedure, the source eNB shall continue the MME initiated E-RAB Management procedure

or

2. terminate the MME initiated E-RAB Management procedure by sending the appropriate response message with an appropriate cause value, e.g., “S1 intra system Handover Triggered”, “S1 inter system Handover Triggered” to the MME and then the source eNB shall continue with the handover procedure.

**8.4.1.3 Unsuccessful Operation**

![Figure 8.4.1.3-1: Handover preparation: unsuccessful operation](image-url)
If the EPC or the target system is not able to accept any of the bearers or a failure occurs during the Handover Preparation, the MME sends the HANDOVER PREPARATION FAILURE message with an appropriate cause value to the source eNB.

If the CSG Id IE and no Cell Access Mode IE are received in the HANDOVER REQUIRED message and the access control is unsuccessful and none of the E-RABs has a particular ARP value (see TS 23.401 [11]) the MME shall send the HANDOVER PREPARATION FAILURE message with an appropriate cause value to the source eNB, except when one of the E-RABs has a particular ARP value (see TS 23.401 [11]). Upon reception, the source eNB may decide to prevent handover for that UE towards CSG (Closed Access Mode) cells with corresponding CSG Id.

**Interaction with Handover Cancel procedure:**

If there is no response from the EPC to the HANDOVER REQUIRED message before timer TS1RELOCprep expires in the source eNB, the source eNB should cancel the Handover Preparation procedure by initiating the Handover Cancel procedure with the appropriate value for the Cause IE. The source eNB shall ignore any HANDOVER COMMAND message or HANDOVER PREPARATION FAILURE message received after the initiation of the Handover Cancel procedure.

### 8.4.1.4 Abnormal Conditions

If the eNB receives at least one E-RAB ID included in the E-RABs Subject to Forwarding List IE without at least one valid associated tunnel address pair (in either UL or DL), then the eNB shall consider it as a logical error and act as described in subclause 10.4. A GTP tunnel address pair is considered valid if both the GTP-TEID IE and the Transport Layer Address IE are present.

### 8.4.2 Handover Resource Allocation

#### 8.4.2.1 General

The purpose of the Handover Resource Allocation procedure is to reserve resources at the target eNB for the handover of a UE.

#### 8.4.2.2 Successful Operation

The MME initiates the procedure by sending the HANDOVER REQUEST message to the target eNB. The HANDOVER REQUEST message may contain the Handover Restriction List IE, which contains roaming or access restrictions.

If the Handover Restriction List IE is contained in the HANDOVER REQUEST message, the target eNB shall store this information in the UE context. This information shall however not be considered whenever one of the handed over E-RABs has a particular ARP value (TS 23.401 [11]).

The target eNB shall use the information in Handover Restriction List IE if present in the HANDOVER REQUEST message to
- determine a target for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE;

![Figure 8.4.2.2-1: Handover resource allocation: successful operation](image)
select a proper SCG during dual connectivity operation.

If the Handover Restriction List IE is not contained in the HANDOVER REQUEST message, the target eNB shall consider that no roaming and no access restriction apply to the UE.

Upon reception of the HANDOVER REQUEST message the eNB shall store the received UE Security Capabilities IE in the UE context and use it to prepare the configuration of the AS security relation with the UE.

If the SRVCC Operation Possible IE is included in the HANDOVER REQUEST message, the target eNB shall store the content of the received SRVCC Operation Possible IE in the UE context and, if supported, use it as defined in TS 23.216 [9].

Upon reception of the HANDOVER REQUEST message the eNB shall store the received Security Context IE in the UE context and the eNB shall use it to derive the security configuration as specified in TS 33.401 [15].

If the Trace Activation IE is included in the HANDOVER REQUEST message, the target eNB shall if supported, initiate the requested trace function as described in TS 32.422 [10]. In particular, the eNB shall, if supported:

- if the Trace Activation IE does not include the MDT Configuration IE, initiate the requested trace session as described in TS 32.422 [10];
- if the Trace Activation IE includes the MDT Activation IE, within the MDT Configuration IE, set to “Immediate MDT and Trace”, initiate the requested trace session and MDT session as described in TS 32.422 [10];
- if the Trace Activation IE includes the MDT Activation IE, within the MDT Configuration IE, set to “Immediate MDT Only”, “Logged MDT only” or “Logged MBSFN MDT”, initiate the requested MDT session as described in TS 32.422 [10] and the target eNB shall ignore Interfaces To Trace IE, and Trace Depth IE.
- if the Trace Activation IE includes the MDT Location Information IE, within the MDT Configuration IE, store this information and take it into account in the requested MDT session.
- if the Trace Activation IE includes the Signalling based MDT PLMN List IE, within the MDT Configuration IE, the eNB may use it to propagate the MDT Configuration as described in TS 37.320 [31].
- if the Trace Activation IE includes the MBSFN-ResultToLog IE, within the MDT Configuration IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the Trace Activation IE includes the MBSFN-AreaId IE in the MBSFN-ResultToLog IE, within the MDT Configuration IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the Trace Activation IE includes the UE Application layer measurement configuration IE, initiate the requested trace session and QoE Measurement Collection function as described in TS 36.300 [14].
- if the Trace Activation IE includes the Bluetooth Measurement Configuration IE, within the MDT Configuration IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the Trace Activation IE includes the WLAN Measurement Configuration IE, within the MDT Configuration IE, take it into account for MDT Configuration as described in TS 37.320 [31].

If the CSG Id IE is received in the HANDOVER REQUEST message, the eNB shall compare the received value with the CSG Id broadcast by the target cell.

If the CSG Membership Status IE is received in the HANDOVER REQUEST message and the CSG Membership Status is set to “member”, the eNB may provide the QoS to the UE as for member provided that the CSG Id received in the HANDOVER REQUEST messages corresponds to the CSG Id broadcast by the target cell.

If the CSG Membership Status IE and the CSG Id IE are received in the HANDOVER REQUEST message and the CSG Id does not correspond to the CSG Id broadcast by the target cell, the eNB may provide the QoS to the UE as for a non member and shall send back in the HANDOVER REQUEST ACKNOWLEDGE message the actual CSG Id broadcast by the target cell.

If the target cell is CSG cell or hybrid cell, the target eNB shall include the CSG ID IE in the HANDOVER REQUEST ACKNOWLEDGE message.

If the target eNB receives the CSG Id IE and the CSG Membership Status IE is set to “non member” in the HANDOVER REQUEST message and the target cell is a closed cell and at least one of the E-RABs has a particular
ARP value (see TS 23.401 [11]), the eNB shall send back the HANDOVER REQUEST ACKNOWLEDGE message to the MME accepting those E-RABs and failing the other E-RABs.

If the **Subscriber Profile ID for RAT/Frequency priority** IE is contained in the **Source eNB to Target eNB Transparent Container** IE, the target eNB shall store the content of the received **Subscriber Profile ID for RAT/Frequency priority** IE in the UE context and use it as defined in TS 36.300 [14].

Upon reception of the **UE History Information** IE, which is included within the **Source eNB to Target eNB Transparent Container** IE in the HANDOVER REQUEST message, the target eNB shall collect the information defined as mandatory in the **UE History Information** IE and shall, if supported, collect the information defined as optional in the **UE History Information** IE, for as long as the UE stays in one of its cells, and store the collected information to be used for future handover preparations.

Upon reception of the **UE History Information from the UE IE**, which is included within the **Source eNB to Target eNB Transparent Container** IE in the HANDOVER REQUEST message, the target eNB shall, if supported, store the collected information, to be used for future handover preparations.

If the **Mobility Information** IE is included within the **Source eNB to Target eNB Transparent Container** IE in the HANDOVER REQUEST message, the target eNB shall, if supported, store this information and use it as defined in TS 36.300 [14].

If the **Expected UE Behaviour** IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information and may use it to determine the RRC connection time.

If the **Bearer Type** IE is included in the HANDOVER REQUEST message and is set to “non IP”, then the eNB shall not perform header compression for the concerned E-RAB.

After all necessary resources for the admitted E-RABs have been allocated, the target eNB shall generate the HANDOVER REQUEST ACKNOWLEDGE message. The target eNB shall include in the **E-RABs Admitted List** IE the E-RABs for which resources have been prepared at the target cell. The E-RABs that have not been admitted in the target cell, if any, shall be included in the **E-RABs Failed to Setup List** IE.

If the HANDOVER REQUEST message contains the **Data Forwarding Not Possible** IE associated with a given E-RAB within the **E-RABs To Be Setup List** IE set to “Data forwarding not possible”, then the target eNB may decide not to include the **DL Transport Layer Address** IE and the **DL GTP-TEID** IE and for intra LTE handover the **UL Transport Layer Address** IE and the **UL GTP-TEID** IE within the **E-RABs Admitted List** IE of the HANDOVER REQUEST ACKNOWLEDGE message for that E-RAB.

For each bearer that target eNB has decided to admit and for which **DL forwarding** IE is set to “DL forwarding proposed”, the target eNB may include the **DL GTP-TEID** IE and the **DL Transport Layer Address** IE within the **E-RABs Admitted List** IE of the HANDOVER REQUEST ACKNOWLEDGE message indicating that it accepts the proposed forwarding of downlink data for this bearer.

If the HANDOVER REQUEST ACKNOWLEDGE message contains the **UL GTP-TEID** IE and the **UL Transport Layer Address** IE for a given bearer in the **E-RABs Admitted List** IE, then it means the target eNB has requested the forwarding of uplink data for this given bearer.

If the **Request Type** IE is included in the HANDOVER REQUEST message, then the target eNB should perform the requested location reporting functionality for the UE as described in subclause 8.11.

If the **UE Security Capabilities** IE included in the HANDOVER REQUEST message only contains the EIA0 algorithm as defined in TS 33.401 [15] and if this EIA0 algorithm is defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the eNB shall take it into use and ignore the keys received in the **Security Context** IE.

The **GUMMEI** IE shall only be contained in the HANDOVER REQUEST message according to subclauses 4.6.2 and 4.7.6.6 of TS 36.300 [14]. If the **GUMMEI** IE is present, the target eNB shall store this information in the UE context and use it for subsequent X2 handovers.

The **MME UE SIAP ID 2** IE shall only be contained in the HANDOVER REQUEST message according to subclause 4.6.2 of TS 36.300 [14]. If the **MME UE SIAP ID 2** IE is present, the target eNB shall store this information in the UE context and use it for subsequent X2 handovers.

If the **Management Based MDT Allowed** IE only or the **Management Based MDT Allowed** IE and the **Management Based MDT PLMN List** IE is contained in the HANDOVER REQUEST message, the target eNB shall, if supported,
store the received information in the UE context, and use this information to allow subsequent selections of the UE for management based MDT defined in TS 32.422 [10].

If the Masked IMEI SV IE is contained in the HANDOVER REQUEST message the target eNB shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

If the HANDOVER REQUEST contains a Target Cell ID IE, as part of the Source eNB to Target eNB Transparent Container IE, for a cell which is no longer active, the eNB may respond with an HANDOVER REQUEST ACKNOWLEDGE in case the PCI of the deactivated cell is in use by another active cell.

If the ProSe Authorized IE is contained in the HANDOVER REQUEST message and it contains one or more IEs set to “authorized”, the eNB shall, if supported, consider that the UE is authorized for the relevant ProSe service(s).

If the UE User Plane CIoT Support Indicator IE is included in the HANDOVER REQUEST message and is set to “supported”, the eNB shall, if supported, consider that User Plane CIoT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.

If the CE-mode-B Support Indicator IE is included in the HANDOVER REQUEST ACKNOWLEDGE message and set to “supported”, the MME shall, if supported, take this information into account when setting NAS timer values for the UE as specified in TS 24.301[24].

If the V2X Services Authorized IE is contained in the HANDOVER REQUEST message and it contains one or more IEs set to “authorized”, the eNB shall, if supported, consider that the UE is authorized for the relevant service(s).

If the UE Sidelink Aggregate Maximum Bit Rate IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, use the received value for the concerned UE’s sidelink communication in network scheduled mode for V2X services.

If the Enhanced Coverage Restricted IE is included in the HANDOVER REQUEST message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the CE-Mode-B Restricted IE is included in the HANDOVER REQUEST message and the Enhanced Coverage Restricted IE is not set to restricted and the Enhanced Coverage Restricted information stored in the UE context is not set to restricted, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the NR UE Security Capabilities IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].

If the Aerial UE subscription information IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [14].

If the Pending Data Indication IE is included in the HANDOVER REQUEST message, the eNB shall use it as defined in TS 23.401 [11].

If the Subscription Based UE Differentiation Information IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the HANDOVER REQUEST message is received for an handover originating from a source NG-RAN node, the list of E-RABs contained in the source eNB to target eNB Transparent Container which are not included in the HANDOVER REQUEST message shall be considered as not to be handed over and ignored.
8.4.2.3 Unsuccessful Operation

If the target eNB does not admit at least one non-GBR E-RAB, or a failure occurs during the Handover Preparation, it shall send the HANDOVER FAILURE message to the MME with an appropriate cause value.

If the target eNB does not receive the CSG Membership Status IE but does receive the CSG Id IE in the HANDOVER REQUEST message and the CSG Id does not correspond to the CSG Id of the target cell, the target eNB shall send the HANDOVER FAILURE message to the MME with an appropriate cause value.

If the target eNB receives a HANDOVER REQUEST message containing RRC Container IE that does not include required information as specified in TS 36.331 [16], the target eNB shall send the HANDOVER FAILURE message to the MME.

8.4.2.4 Abnormal Conditions

If the target eNB receives a HANDOVER REQUEST message containing a E-RAB Level QoS Parameters IE which contains a QCI IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the GBR QoS Information IE, the target eNB shall not admit the corresponding E-RAB.

If the target eNB receives a HANDOVER REQUEST message containing several E-RAB ID IEs (in the E-RABs To Be Setup List IE) set to the same value, the target eNB shall not admit the corresponding E-RABs.

If the Subscriber Profile ID for RAT/Frequency priority IE is not contained in the Source eNB to Target eNB Transparent Container IE whereas available in the source eNB, the target eNB shall trigger a local error handling.

NOTE: It is assumed that the information needed to verify this condition is visible within the system, see subclause 4.1.

If the supported algorithms for encryption defined in the Encryption Algorithms IE in the UE Security Capabilities IE, plus the mandated support of EEA0 in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed encryption algorithms in the eNB (TS 33.401 [15]), the target eNB shall reject the procedure using the HANDOVER FAILURE message.

If the supported algorithms for integrity defined in the Integrity Protection Algorithms IE in the UE Security Capabilities IE, plus the mandated support of the EIA0 algorithm in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the target eNB shall reject the procedure using the HANDOVER FAILURE message.

If the target eNB receives a HANDOVER REQUEST message which does not contain the Handover Restriction List IE, and the serving PLMN cannot be determined otherwise by the eNB, the target eNB shall reject the procedure using the HANDOVER FAILURE message.

If the target eNB receives a HANDOVER REQUEST message containing the Handover Restriction List IE, and the serving PLMN indicated is not supported by the target cell, the target eNB shall reject the procedure using the HANDOVER FAILURE message.
8.4.3 Handover Notification

8.4.3.1 General
The purpose of the Handover Notification procedure is to indicate to the MME that the UE has arrived to the target cell and the S1 handover has been successfully completed.

8.4.3.2 Successful Operation

The target eNB shall send the HANDOVER NOTIFY message to the MME when the UE has been identified in the target cell and the S1 handover has been successfully completed.

If the Tunnel Information for BBF IE is received in the HANDOVER NOTIFY message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

If the LHN ID IE is included in the HANDOVER NOTIFY message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the UE is configured with EN-DC radio resources and the PSCell information is available, the PSCell Information IE shall be included in the HANDOVER NOTIFY message.

8.4.3.3 Abnormal Conditions
Not applicable.

8.4.4 Path Switch Request

8.4.4.1 General
The purpose of the Path Switch Request procedure is to request the switch of a downlink GTP tunnel towards a new GTP tunnel endpoint.

8.4.4.2 Successful Operation

The eNB initiates the procedure by sending the PATH SWITCH REQUEST message to the MME.
If the E-RAB To Be Switched in Downlink List IE in the PATH SWITCH REQUEST message does not include all E-RABs previously included in the UE Context, the MME shall consider the non included E-RABs as implicitly released by the eNB.

When the eNB has received from the radio interface the RRC Resume Cause IE, it shall include it in the PATH SWITCH REQUEST message.

After all necessary updates including the UP path switch have been successfully completed in the EPC for at least one of the E-RABs included in the PATH SWITCH REQUEST E-RAB To Be Switched in Downlink List IE, the MME shall send the PATH SWITCH REQUEST ACKNOWLEDGE message to the eNB and the procedure ends. The UE-associated logical S1-connection shall be established at reception of the PATH SWITCH REQUEST ACKNOWLEDGE message.

In case the EPC failed to perform the UP path switch for at least one, but not all, of the E-RABs included in the PATH SWITCH REQUEST E-RAB To Be Switched in Downlink List IE, the MME shall include the E-RABs it failed to perform UP path switch in the PATH SWITCH REQUEST E-RAB To Be Released List IE. In this case, the eNB shall release the corresponding data radio bearers, and the eNB shall regard the E-RABs indicated in the E-RAB To Be Released List IE as being fully released.

If the CSG Id IE and no Cell Access Mode IE are received in the PATH SWITCH REQUEST message, the MME shall use it in the core network as specified in TS 23.401 [11]. If the CSG Id IE and the Cell Access Mode IE set to “hybrid” are received in the PATH SWITCH REQUEST message, the MME shall decide the membership status of the UE and use it in the core network as specified in TS 23.401 [11]. If no CSG Id IE and no Cell Access Mode IE are received in the PATH SWITCH REQUEST message and the UE was previously either in a CSG cell or in a hybrid cell, the MME shall consider that the UE has moved into a cell that is neither a CSG cell nor a hybrid cell and use this as specified in TS 23.401 [11].

If the GUMMEI of the MME currently serving the UE is available at the eNB (see TS 36.300 [14]) the eNB shall include the Source MME GUMMEI IE within the PATH SWITCH REQUEST message.

Upon reception of the PATH SWITCH REQUEST ACKNOWLEDGE message the eNB shall store the received Security Context IE in the UE context and the eNB shall use it for the next X2 handover or Intra eNB handovers as specified in TS 33.401 [15].

The PATH SWITCH REQUEST ACKNOWLEDGE message may contain
- the UE Aggregate Maximum Bit Rate IE.
- the MME UE S1AP ID 2 IE, which indicates the MME UE S1AP ID assigned by the MME.

If the UE Aggregate Maximum Bit Rate IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message the eNB shall
- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context; the eNB shall use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the UE Aggregate Maximum Bit Rate IE is not contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

In case the EPC decides to change the uplink termination point of the tunnels, it may include the E-RAB To Be Switched in Uplink List IE in the PATH SWITCH REQUEST ACKNOWLEDGE message to specify a new uplink transport layer address and uplink GTP-TEID for each respective E-RAB for which it wants to change the uplink tunnel termination point.

When the eNB receives the PATH SWITCH REQUEST ACKNOWLEDGE message and if this message includes the E-RAB To Be Switched in Uplink List IE, the eNB shall start delivering the uplink packets of the concerned E-RABs to the new uplink tunnel endpoints as indicated in the message.

When the eNB receives the PATH SWITCH REQUEST ACKNOWLEDGE message including the CSG Membership Status IE, and if the cell that serves the UE is a hybrid cell, the eNB shall use it as defined in TS 36.300 [14].

If the MME UE S1AP ID 2 IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall store this information in the UE context and use it for subsequent X2 handovers.
If the **Tunnel Information for BBF** IE is received in the PATH SWITCH REQUEST message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

If the **LHN ID** IE is included in the PATH SWITCH REQUEST message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the **ProSe Authorized** IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, update its ProSe authorization information for the UE accordingly. If the **ProSe Authorized** IE includes one or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant ProSe service(s).

If the **UE User Plane CIoT Support Indicator** IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message and is set to "supported", the eNB shall, if supported, consider that User Plane CIoT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.

If the **V2X Services Authorized** IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, update its V2X services authorization information for the UE accordingly. If the **V2X Services Authorized** IE includes one or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the **UE Sidelink Aggregate Maximum Bit Rate** IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported:

- replace the previously provided UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE’s sidelink communication in network scheduled mode for V2X services.

If the **Enhanced Coverage Restricted** IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the **CE-Mode-B Restricted** IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message and the **Enhanced Coverage Restricted** IE is not set to restricted and the Enhanced Coverage Restricted information stored in the UE context is not set to restricted, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If information on the UE’s NR security capabilities is available at the eNB (see TS 33.401 [15]) the eNB shall include the **NR UE Security Capabilities** IE within the PATH SWITCH REQUEST message.

If the **NR UE Security Capabilities** IE is included in the PATH SWITCH REQUEST message, the MME shall, if supported, consider that the eNB has stored the respective information in the UE context, and proceed as defined in TS 33.401 [15].

If the **Aerial UE subscription information** IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].

If the **Pending Data Indication** IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall use it as defined in TS 23.401 [11].

If the **Subscription Based UE Differentiation Information** IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the UE is configured with EN-DC radio resources and the PSCell information is available, the **PCell Information** IE shall be included in the PATH SWITCH REQUEST message.
8.4.4.3 Unsuccessful Operation

If the EPC fails to switch the downlink GTP tunnel endpoint towards a new GTP tunnel endpoint for all E-RABs included in the *E-RAB To Be Switched in Downlink List* IE during the execution of the Path Switch Request procedure, the MME shall send the PATH SWITCH REQUEST FAILURE message to the eNB with an appropriate cause value. In this case, the eNB should decide its subsequent actions and the MME should behave as described in TS 23.401 [11].

8.4.4.4 Abnormal Conditions

If the MME receives a PATH SWITCH REQUEST message containing several *E-RAB ID* IEs (in the *E-RAB To Be Switched in Downlink List* IE) set to the same value, the MME shall send the PATH SWITCH REQUEST FAILURE message to the eNB.

If the MME receives a PATH SWITCH REQUEST message without the *CSG Membership Status* IE, and the cell accessed by the UE is a hybrid cell with a different CSG from the source cell or the source cell does not have a CSG ID, the MME shall send the PATH SWITCH REQUEST FAILURE message to the eNB.

If the *CSG Membership Status* IE is not included in the PATH SWITCH REQUEST ACKNOWLEDGE message and the cell accessed by the UE is a hybrid cell with a different CSG from the source cell or the source cell does not have a CSG ID, the eNB shall consider the procedure as unsuccessfully terminated and initiate local error handling.

8.4.5 Handover Cancellation

8.4.5.1 General

The purpose of the Handover Cancel procedure is to enable a source eNB to cancel an ongoing handover preparation or an already prepared handover.

The procedure uses UE-associated signalling.

8.4.5.2 Successful Operation

The source eNB initiates the procedure by sending a HANDOVER CANCEL message to the EPC.
The HANDOVER CANCEL message shall indicate the reason for cancelling the handover with the appropriate value of the Cause IE.

Upon reception of a HANDOVER CANCEL message, the EPC shall terminate the ongoing Handover Preparation procedure, release any resources associated with the handover preparation and send a HANDOVER CANCEL ACKNOWLEDGE message to the source eNB.

Transmission and reception of a HANDOVER CANCEL ACKNOWLEDGE message terminate the procedure in the EPC and in the source eNB. After this, the source eNB does not have a prepared handover for that UE-associated logical S1-connection.

8.4.5.3 Unsuccessful Operation

Not applicable.

8.4.5.4 Abnormal Conditions

If the source eNB becomes aware of the fact that an expected HANDOVER CANCEL ACKNOWLEDGE message is missing, the source eNB shall consider the Handover Cancellation as successfully terminated.

8.4.6 eNB Status Transfer

8.4.6.1 General

The purpose of the eNB Status Transfer procedure is to transfer the uplink PDCP-SN and HFN receiver status and the downlink PDCP-SN and HFN transmitter status from the source to the target eNB via the MME during an intra LTE S1 handover for each respective E-RAB for which PDCP-SN and HFN status preservation applies.

8.4.6.2 Successful Operation

The source eNB initiates the procedure by stopping assigning PDCP-SNs to downlink SDUs and sending the eNB STATUS TRANSFER message to the MME at the point in time when it considers the transmitter/receiver status to be frozen.

- For each E-RAB for which PDCP-SN and HFN status preservation applies the source eNB shall include the E-RAB ID IE, the UL COUNT value IE and the DL COUNT value IE within the E-RABs Subject to Status Transfer Item IE in the eNB Status Transfer Transparent Container IE of the eNB STATUS TRANSFER message.

- In case of 15 bit long PDCP-SN, for each E-RAB for which PDCP-SN and HFN status preservation applies, the source eNB shall additionally include the UL COUNT Value Extended IE and the DL COUNT Value Extended IE within the E-RABs Subject to Status Transfer Item IE.

- In case of 18 bit long PDCP-SN, for each E-RAB for which PDCP-SN and HFN status preservation applies, the source eNB shall additionally include the UL COUNT Value for PDCP SN Length 18 IE and the DL COUNT Value for PDCP SN Length 18 IE within the E-RABs Subject to Status Transfer Item IE.

The source eNB may also include in the eNB STATUS TRANSFER message the missing and the received uplink SDUs in the Receive Status Of UL PDCP SDUs IE, or in the Receive Status Of UL PDCP SDUs Extended IE in case of 15 bit long PDCP-SN, or in the Receive Status Of UL PDCP SDUs for PDCP SN Length 18 IE in case of 18 bit long PDCP-SN.
PDCP-SN, for each bearer for which the source eNB has accepted the request from the target eNB for uplink forwarding.

8.4.6.3 Unsuccessful Operation
Not applicable.

8.4.6.4 Abnormal Conditions
Not applicable.

8.4.7 MME Status Transfer

8.4.7.1 General
The purpose of the MME Status Transfer procedure is to transfer the uplink PDCP-SN and HFN receiver status and the downlink PDCP-SN and HFN transmitter status from the source to the target eNB via the MME during an S1 handover for each respective E-RAB for which PDCP-SN and HFN status preservation applies.

8.4.7.2 Successful Operation

The MME initiates the procedure by sending the MME STATUS TRANSFER message to the eNB. The target eNB using Full Configuration for this handover as per TS 36.300 [14] shall ignore the information received in this message.

For each bearer within the E-RABs Subject to Status Transfer List IE within the eNB Status Transfer Transparent Container IE for which the UL COUNT value IE is received in the MME STATUS TRANSFER message, the target eNB shall apply the contained information and shall not deliver any uplink packet which has a PDCP-SN lower than the value contained in the PDCP-SN IE of this IE. If the UL COUNT Value Extended IE or UL COUNT Value for PDCP SN Length 18 IE is included in the E-RABs Subject to Status Transfer Item IE, the target eNB shall, if supported, use the value contained in the PDCP-SN Extended IE in the UL COUNT Value Extended IE or PDCP-SN Length 18 IE of the UL COUNT Value for PDCP SN Length 18 IE instead of the value contained in the PDCP-SN IE of the UL COUNT value IE.

For each bearer in E-RABs Subject to Status Transfer List IE within the eNB Status Transfer Transparent Container IE received in the MME STATUS TRANSFER message, the target eNB shall use DL COUNT value IE for the first downlink packet for which there is no PDCP-SN yet assigned. If the DL COUNT Value Extended IE or DL COUNT Value for PDCP SN Length 18 IE is included in the E-RABs Subject to Status Transfer Item IE, the target eNB shall, if supported, use the DL COUNT Value Extended IE or DL COUNT Value for PDCP SN Length 18 IE instead of the DL COUNT value IE.

If the Receive Status Of UL PDCP SDUs IE or the Receive Status Of UL PDCP SDUs Extended IE or the Receive Status Of UL PDCP SDUs for PDCP SN Length 18 IE is included for at least one bearer in the eNB Status Transfer Transparent Container IE of the MME STATUS TRANSFER message, the target eNB may use it in a Status Report message sent to the UE over the radio interface.

8.4.7.3 Unsuccessful Operation
Not applicable.
8.4.7.4 Abnormal Conditions

If the target eNB receives this message for a UE for which no prepared handover exists at the target eNB, the target eNB shall ignore the message.

8.5 Paging

8.5.1 General

The purpose of the Paging procedure is to enable the MME to page a UE in the specific eNB.

8.5.2 Successful Operation

![Figure 8.5.2-1: Paging procedure](image)

The MME initiates the paging procedure by sending the PAGING message to the eNB.

At the reception of the PAGING message, the eNB shall perform paging of the UE in cells which belong to tracking areas as indicated in the List of TAIs IE.

The CN Domain IE shall be transferred transparently to the UE.

The Paging DRX IE may be included in the PAGING message, and if present the eNB shall use it according to TS 36.304 [20].

A list of CSG IDs may be included in the PAGING message.

If included, the E-UTRAN may use the list of CSG IDs to avoid paging the UE at CSG cells whose CSG ID does not appear in the list.

For each cell that belongs to any of the TAs indicated in the List of TAIs IE, the eNB shall generate one page on the radio interface.

The Paging Priority IE may be included in the PAGING message, and if present the eNB may use it according to TS 23.401 [11] and TS 23.272 [17].

If the UE Radio Capability for Paging IE is included in the PAGING message, the eNB may use it to apply specific paging schemes. If the Enhanced Coverage Restricted IE is included in the PAGING message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

If the Assistance Data for Recommended Cells IE is included in the Assistance Data for Paging IE it may be used, together with the Paging Attempt Information IE if also present according to TS 36.300 [14].

If the Assistance Data for CE capable UEs IE is included in the Assistance Data for Paging IE, it may be used for paging the indicated CE capable UE, together with the Paging Attempt Information IE according to TS 36.300 [14].

If the Next Paging Area Scope IE is included in the Paging Attempt Information IE it may be used for paging the UE according to TS 36.300 [14].
If the Paging eDRX Information IE is included in the PAGING message, the eNB shall, if supported, use it according to TS 36.304 [20]. If the Paging Time Window IE is included in the Paging eDRX Information IE, the eNB shall take this information into account to determine the UE’s paging occasion according to TS 36.304 [20]. The eNB should take into account the reception time of the PAGING message on the S1-MME interface to determine when to page the UE.

If the Extended UE Identity Index Value IE is included in the PAGING message, the eNB shall, if supported, use it to identify the paging resources to be used according to TS 36.304 [20]. The MME shall, if supported, include the Extended UE Identity Index Value IE in the PAGING message.

If the NB-IoT Paging eDRX Information IE is included in the PAGING message, the eNB shall, if supported, use it according to TS 36.304 [20]. If the NB-IoT Paging Time Window IE is included in the NB-IoT Paging eDRX Information IE, the eNB shall take this information into account to determine the UE’s paging occasion according to TS 36.304 [20]. The eNB should take into account the reception time of the PAGING message on the S1-MME interface to determine when to page the UE.

If the NB-IoT UE Identity Index Value IE is included in the PAGING message, the eNB shall, if supported, use it to identify the paging resources to be used according to TS 36.304 [20].

If the CE-Mode-B Restricted IE is included in the PAGING message and the Enhanced Coverage Restricted IE is not set to restricted, the eNB shall use it as defined in TS 23.401 [11].

8.5.3 Unsuccessful Operation

Not applicable.

8.5.4 Abnormal Conditions

Not applicable.

8.6 NAS transport

8.6.1 General

The purpose of the NAS Transport procedure is to carry UE – MME signalling over the S1 Interface. The NAS messages are not interpreted by the eNB, and their content is outside the scope of this specification. The procedure may use an existing UE-associated logical S1-connection. If no UE-associated logical S1-connection exists, the establishment of the UE-associated logical S1-connection is initiated (and may be established) as part of the procedure.

The NAS messages are transported in an IE of the INITIAL UE MESSAGE, DOWNLINK NAS TRANSPORT, UPLINK NAS TRANSPORT or REROUTE NAS REQUEST messages.

8.6.2 Successful Operations

8.6.2.1 Initial UE Message

![Figure 8.6.2.1-1: Initial UE Message procedure](image-url)
When the eNB has received from the radio interface the first UL NAS message transmitted via RRC message to be forwarded to an MME, the eNB shall invoke the NAS Transport procedure and send the INITIAL UE MESSAGE message to the MME including the NAS message as a NAS-PDU IE. The eNB shall allocate a unique eNB UE S1AP ID to be used for the UE and the eNB shall include this identity in the INITIAL UE MESSAGE message. In case of network sharing, the selected PLMN is indicated by the PLMN Identity IE within the TAI IE included in the INITIAL UE MESSAGE message. When the eNB has received from the radio interface the S-TMSI IE, it shall include it in the INITIAL UE MESSAGE message. If the eNB does not support NNSF and the eNB has received from the radio interface the GUMMEI IE, the eNB may include it in the INITIAL UE MESSAGE message. If the eNB does not support NNSF and the eNB has received from the radio interface the GUMMEI Type IE, the eNB may include it in the INITIAL UE MESSAGE message.

If the establishment of the UE-associated logical S1-connection towards the CN is performed due to an RRC connection establishment originating from a CSG cell, the CSG Id IE shall be included in the INITIAL UE MESSAGE message.

If the establishment of the UE-associated logical S1-connection towards the CN is performed due to an RRC connection establishment originating from a Hybrid cell, the CSG Id IE and the Cell Access Mode IE shall be included in the INITIAL UE MESSAGE message.

If the establishment of the UE-associated logical S1-connection towards the CN is performed due to an RRC connection establishment triggered by a Relay Node as defined in TS 36.300 [14], the GW Transport Layer Address IE and the Relay Node Indicator IE shall be included in the INITIAL UE MESSAGE message.

If the eNB has a L-GW function for LIPA operation, it shall include the GW Transport Layer Address IE in the INITIAL UE MESSAGE message.

If the SIPTO L-GW Transport Layer Address IE is received in the INITIAL UE MESSAGE message, the MME shall, if supported, use it for SIPTO@LN operation as specified in TS 23.401 [11].

If the LHN ID IE is included in the INITIAL UE MESSAGE message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the Tunnel Information for BBF IE is received in the INITIAL UE MESSAGE message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

If the MME Group ID IE is included in the INITIAL UE MESSAGE message this indicates that the message is a rerouted message and the MME shall, if supported, use the IE as described in TS 23.401 [11].

If the UE Usage Type IE is included in the INITIAL UE MESSAGE message, the MME shall, if supported, use it when initiating UE Application Layer Measurement.

If the EDT Session IE set to “true” is included in the INITIAL UE MESSAGE message, the MME shall, if supported, consider that the message has been received as a result of an EDT session initiated by the UE as described in TS 36.300 [14].
8.6.2.2 DOWNLINK NAS TRANSPORT

If the MME only needs to send a NAS message transparently via the eNB to the UE and a UE-associated logical S1-connection exists for the UE or if the MME has received the eNB UE S1AP ID IE in an INITIAL UE MESSAGE message, the MME shall send a DOWNLINK NAS TRANSPORT message to the eNB including the NAS message as a NAS-PDU IE. If the UE-associated logical S1-connection is not established, the MME shall allocate a unique MME UE S1AP ID to be used for the UE and include that in the DOWNLINK NAS TRANSPORT message; by receiving the MME UE S1AP ID IE in the DOWNLINK NAS TRANSPORT, the eNB establishes the UE-associated logical S1-connection.

The NAS-PDU IE contains an MME – UE message that is transferred without interpretation in the eNB.

The DOWNLINK NAS TRANSPORT message may contain the Handover Restriction List IE, which may contain roaming or access restrictions.

If the Handover Restriction List IE is contained in the DOWNLINK NAS TRANSPORT message, the eNB shall store this information in the UE context.

The eNB shall use the information in Handover Restriction List IE if present in the DOWNLINK NAS TRANSPORT message to:

- determine a target for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE;
- select a proper SCG during dual connectivity operation.

If the Handover Restriction List IE is not contained in the DOWNLINK NAS TRANSPORT message and there is no previously stored Handover restriction information, the eNB shall consider that no roaming and no access restriction apply to the UE.

If the Subscriber Profile ID for RAT/Frequency priority IE is included in DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, use it as defined in TS 36.300 [14].

If the SRVCC Operation Possible IE is included in DOWNLINK NAS TRANSPORT message, the eNB shall store it in the UE context and, if supported, use it as defined in TS 23.216 [9].

If the UE Radio Capability IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall store this information in the UE context, use it as defined in TS 36.300 [14].

If the Enhanced Coverage Restricted IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the CE-Mode-B Restricted IE is included in the DOWNLINK NAS TRANSPORT message and the Enhanced Coverage Restricted IE is not set to restricted and the Enhanced Coverage Restricted information stored in the UE context is not set to restricted, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the NR UE Security Capabilities IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].
If the End Indication IE is included in the DOWNLINK NAS TRANSPORT message and set to "no further data", the eNB shall consider that besides the included NAS PDU in this message, there are no further NAS PDUs to be transmitted for this UE.

If the Pending Data Indication IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall use it as defined in TS 23.401 [11].

If the Subscription Based UE Differentiation Information IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

Interaction with the NAS Delivery Indication procedure:

If the DL NAS PDU Delivery Acknowledgment Request IE set to "requested" was included in the DOWNLINK NAS TRANSPORT message (see 23.401 [11]), the eNB shall trigger the NAS Delivery Indication procedure, if the downlink NAS PDU was successfully delivered to the UE.

Interaction with the UE Capability Info Indication procedure:

If the UE Capability Info Request IE set to “requested” is included in the DOWNLINK NAS TRANSPORT message, the eNB shall trigger the UE Capability Info Indication procedure if UE capability related information was successfully retrieved from the UE.

8.6.2.3 UPLINK NAS TRANSPORT

When the eNB has received from the radio interface a NAS message to be forwarded to the MME to which a UE-associated logical S1-connection for the UE exists, the eNB shall send the UPLINK NAS TRANSPORT message to the MME including the NAS message as a NAS-PDU IE. The eNB shall include the TAI and ECGI of the current cell in every S1-AP UPLINK NAS TRANSPORT message.

The NAS-PDU IE contains a UE – MME message that is transferred without interpretation in the eNB.

If the GW Transport Layer Address IE is received in the UPLINK NAS TRANSPORT message, the MME shall, if supported, use it for LIPA operation as specified in TS 23.401 [11].

If the SIPTO L-GW Transport Layer Address IE is received in the UPLINK NAS TRANSPORT message, the MME shall, if supported, use it for SIPTO@LN operation as specified in TS 23.401 [11].

If the LHN ID IE is included in the UPLINK NAS TRANSPORT message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the UE is configured with EN-DC radio resources and the PSCell information is available, the PSCell Information IE shall be included in the UPLINK NAS TRANSPORT message.
8.6.2.4 NAS NON DELIVERY INDICATION

Figure 8.6.2.4-1: NAS NON DELIVERY INDICATION Procedure

When the eNB decides not to start the delivery of a NAS message that has been received over a UE-associated logical S1-connection or the eNB is unable to ensure that the message has been received by the UE, it shall report the non-delivery of this NAS message by sending a NAS NON DELIVERY INDICATION message to the MME including the non-delivered NAS message within the NAS-PDU IE and an appropriate cause value within an appropriate Cause IE, e.g., “S1 intra system Handover Triggered”, “S1 inter system Handover Triggered” or “X2 Handover Triggered”.

8.6.2.4a NAS DELIVERY INDICATION

Figure 8.6.2.4a-1: NAS DELIVERY INDICATION Procedure

If the eNB has been requested by the MME to provide an indication upon successful delivery of a downlink NAS PDU the eNB sends the NAS DELIVERY INDICATION message to the MME upon successful delivery of the downlink NAS PDU to the UE, see TS 23.401 [11].

8.6.2.5 Reroute NAS Request

Figure 8.6.2.5-1: Reroute NAS Request Procedure

The purpose of the Reroute NAS Request procedure is to enable the MME to request for a rerouting of the INITIAL UE MESSAGE message to the MME in the indicated DCN.
The MME initiates the procedure by sending a REROUTE NAS REQUEST message to the eNB. The eNB shall, if supported, reroute the INITIAL UE MESSAGE message to the MME in the DCN indicated by the MME Group ID IE as described in TS 23.401 [11].

If the Additional GUTI IE is included in the REROUTE NAS REQUEST message, then the eNB shall, if supported, use it when selecting the MME in the DCN as defined in TS 23.401 [11].

If the UE Usage Type IE is included in the REROUTE NAS REQUEST message, then the eNB shall, if supported, include it towards the selected MME in the DCN as defined in TS 23.401 [48].

8.6.3 Unsuccessful Operation

Not applicable.

8.6.4 Abnormal Conditions

If the S-TMSI is not received by the MME in the INITIAL UE MESSAGE message whereas expected, the MME shall consider the procedure as failed.

The behaviour of an eNB that has been requested by the MME to provide an indication upon successful delivery of a downlink NAS PDU to the UE and that receives a DOWNLINK NAS TRANSPORT message before it has reported to the MME either successful or unsuccessful delivery of the NAS PDU to the UE, is not specified.

8.7 Management procedures

8.7.1 Reset

8.7.1.1 General

The purpose of the Reset procedure is to initialise or re-initialise the E-UTRAN, or part of E-UTRAN S1AP UE-related contexts, in the event of a failure in the EPC or vice versa. This procedure does not affect the application level configuration data exchanged during, e.g., the S1 Setup procedure.

The procedure uses non-UE associated signalling.

8.7.1.2 Successful Operation

8.7.1.2.1 Reset Procedure Initiated from the MME

![Diagram](image)

Figure 8.7.1.2.1-1: Reset procedure initiated from the MME. Successful operation.
In the event of a failure at the MME, which has resulted in the loss of some or all transaction reference information, a
RESET message shall be sent to the eNB.

At reception of the RESET message the eNB shall release all allocated resources on S1 and Uu related to the UE
association(s) indicated explicitly or implicitly in the RESET message and remove the indicated UE contexts including
S1AP ID.

After the eNB has released all assigned S1 resources and the UE S1AP IDs for all indicated UE associations which can
be used for new UE-associated logical S1-connections over the S1 interface, the eNB shall respond with the RESET
ACKNOWLEDGE message. The eNB does not need to wait for the release of radio resources to be completed before
returning the RESET ACKNOWLEDGE message.

If the RESET message contains the *UE-associated logical S1-connection list IE*, then:

- The eNB shall use the *MME UE SIAP ID* IE and/or the *eNB UE SIAP ID* IE to explicitly identify the UE
  association(s) to be reset.
- The eNB shall include in the RESET ACKNOWLEDGE message, for each UE association to be reset, the *UE-
  associated logical S1-connection Item IE* in the *UE-associated logical S1-connection list IE*. The *UE-associated
  logical S1-connection Item IE*s shall be in the same order as received in the RESET message and shall include
  also unknown UE-associated logical S1-connections. Empty *UE-associated logical S1-connection Item IE*s,
  received in the RESET message, may be omitted in the RESET ACKNOWLEDGE message.
- If the *MME UE SIAP ID* IE is included in the *UE-associated logical S1-connection Item IE* for a UE association,
  the eNB shall include the *MME UE SIAP ID* IE in the corresponding *UE-associated logical S1-connection Item IE*
  in the RESET ACKNOWLEDGE message.
- If the *eNB UE SIAP ID* IE is included in the *UE-associated logical S1-connection Item IE* for a UE association,
  the eNB shall include the *eNB UE SIAP ID* IE in the corresponding *UE-associated logical S1-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 S1
interface related to a UE association, indicated explicitly or implicitly in the RESET message, shall be aborted.

### 8.7.1.2.2 Reset Procedure Initiated from the E-UTRAN

![Diagram](image)

**Figure 8.7.1.2.2-1**: Reset procedure initiated from the E-UTRAN. Successful operation.

In the event of a failure at the eNB, which has resulted in the loss of some or all transaction reference information, a
RESET message shall be sent to the MME.

At reception of the RESET message the MME shall release all allocated resources on S1 related to the UE
association(s) indicated explicitly or implicitly in the RESET message and remove the SIAP ID for the indicated UE
associations.
After the MME has released all assigned S1 resources and the UE S1AP IDs for all indicated UE associations which can be used for new UE-associated logical S1-connections over the S1 interface, the MME shall respond with the RESET ACKNOWLEDGE message.

If the RESET message contains the **UE-associated logical S1-connection list** IE, then:

- The MME shall use the **MME UE S1AP ID** IE and/or the **eNB UE S1AP ID** IE to explicitly identify the UE association(s) to be reset.

- The MME shall include in the RESET ACKNOWLEDGE message, for each UE association to be reset, the **UE-associated logical S1-connection Item** IE in the **UE-associated logical S1-connection list** IE. The **UE-associated logical S1-connection Item** IEs shall be in the same order as received in the RESET message and shall include also unknown UE-associated logical S1-connections. Empty **UE-associated logical S1-connection Item** IEs, received in the RESET message, may be omitted in the RESET ACKNOWLEDGE message.

- If the **MME UE S1AP ID** IE is included in the **UE-associated logical S1-connection Item** IE for a UE association, the MME shall include the **MME UE S1AP ID** IE in the corresponding **UE-associated logical S1-connection Item** IE in the RESET ACKNOWLEDGE message.

- If the **eNB UE S1AP ID** IE is included in a **UE-associated logical S1-connection Item** IE for a UE association, the MME shall include the **eNB UE S1AP ID** IE in the corresponding **UE-associated logical S1-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 S1 interface related to a UE association, indicated explicitly or implicitly in the RESET message, shall be aborted.

### 8.7.1.3 Abnormal Conditions

#### 8.7.1.3.1 Abnormal Condition at the EPC

If the RESET message includes the **UE-associated logical S1-connection list** IE, but neither the **MME UE S1AP ID** IE nor the **eNB UE S1AP ID** IE is present for a **UE-associated logical S1-connection Item** IE, then the MME shall ignore the **UE-associated logical S1-connection Item** IE. The MME may return the empty **UE-associated logical S1-connection Item** IE in the **UE-associated logical S1-connection list** IE in the RESET ACKNOWLEDGE message.

#### 8.7.1.3.2 Abnormal Condition at the E-UTRAN

If the RESET message includes the **UE-associated logical S1-connection list** IE, but neither the **MME UE S1AP ID** IE nor the **eNB UE S1AP ID** IE is present for a **UE-associated logical S1-connection Item** IE, then the eNB shall ignore the **UE-associated logical S1-connection Item** IE. The eNB may return the empty **UE-associated logical S1-connection Item** IE in the **UE-associated logical S1-connection list** IE in the RESET ACKNOWLEDGE message.

#### 8.7.1.3.3 Crossing of Reset Messages

If a Reset procedure is ongoing in the eNB and the eNB receives a RESET message from the peer entity on the same S1 interface related to one or several UE associations previously requested to be reset, indicated explicitly or implicitly in the received RESET message, the eNB shall respond with the RESET ACKNOWLEDGE message as described in 8.7.1.2.1.

If a Reset procedure is ongoing in the MME and the MME receives a RESET message from the peer entity on the same S1 interface related to one or several UE associations previously requested to be reset, indicated explicitly or implicitly in the received RESET message, the MME shall respond with the RESET ACKNOWLEDGE message as described in 8.7.1.2.2.
8.7.2 Error Indication

8.7.2.1 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.

8.7.2.2 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 MME UE S1AP ID IE and the eNB UE S1AP ID IE shall be included in the ERROR INDICATION message. If one or both of MME UE S1AP ID IE and the eNB UE S1AP ID IE are not correct, the cause shall be set to appropriate value, e.g., “Unknown or already allocated MME UE S1AP ID”, “Unknown or already allocated eNB UE S1AP ID” or “Unknown or inconsistent pair of UE S1AP ID”.

8.7.2.3 Abnormal Conditions

Not applicable.

8.7.3 S1 Setup

8.7.3.1 General

The purpose of the S1 Setup procedure is to exchange application level data needed for the eNB and the MME to correctly interoperate on the S1 interface. This procedure shall be the first S1AP procedure triggered after the TNL association has become operational. 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 and clears MME overload state information at the eNB. If the eNB and MME do not agree on retaining the UE Contexts this procedure also re-initialises the E-UTRAN S1AP UE-related contexts (if any) and erases all related signalling connections in the two nodes like a Reset procedure would do. If the eNB initiating the S1 Setup procedure supports a CSG cell, the procedure shall report the CSG ID(s) of the supported CSGs.
8.7.3.2 Successful Operation

The eNB initiates the procedure by sending a S1 Setup REQUEST message including the appropriate data to the MME. The MME responds with a S1 Setup RESPONSE message including the appropriate data.

The exchanged data shall be stored in respective node and used for the duration of the TNL association. When this procedure is finished, the S1 interface is operational and other S1 messages can be exchanged.

If the eNB initiating the S1 Setup procedure supports one (or more) CSG cell(s), the S1 Setup REQUEST message shall contain the CSG ID(s) of the supported CSG(s).

If the S1 Setup REQUEST message contains the eNB Name IE the MME may use this IE as a human readable name of the eNB.

If the S1 Setup RESPONSE message contains the MME Name IE the eNB may use this IE as a human readable name of the MME.

If the MME Relay Support Indicator IE is included in the S1 Setup RESPONSE message, the eNB shall consider this information when selecting an appropriate MME for the Relay Node.

If the UE Retention Information IE set to “ues-retained” was included in the S1 Setup REQUEST message, then the MME may accept the proposal to retain the existing UE related contexts and signalling connections by including the UE Retention Information IE set to “ues-retained” in the S1 Setup RESPONSE message.

If the NB-IoT Default Paging DRX IE is included in the S1 Setup REQUEST message, the MME will take it into account as specified in TS 36.300 [14].

If the Connected en-gNB List IE is included in the S1 Setup REQUEST message, the MME shall take it into account as specified in TS 36.300 [14].

If the S1 Setup RESPONSE message contains the ServedDCNs IE then the eNB shall, if supported, use it as defined in TS 23.401 [48].

8.7.3.3 Unsuccessful Operation

If the MME cannot accept the setup, it should respond with a S1 Setup FAILURE and appropriate cause value.
If the S1 SETUP FAILURE message includes the Time To Wait IE, the eNB shall wait at least for the indicated time before reinitiating the S1 setup towards the same MME.

### 8.7.3.4 Abnormal Conditions

If the eNB initiates the procedure by sending a S1 SETUP REQUEST message including the PLMN Identity IEs and none of the PLMNs provided by the eNB is identified by the MME, then the MME shall reject the eNB S1 Setup Request procedure with the appropriate cause value, e.g., “Unknown PLMN”.

### 8.7.4 eNB Configuration Update

#### 8.7.4.1 General

The purpose of the eNB Configuration Update procedure is to update application level configuration data needed for the eNB and the MME to interoperate correctly on the S1 interface. This procedure does not affect existing UE-related contexts, if any.

#### 8.7.4.2 Successful Operation

![ENB Configuration Update procedure: Successful Operation](image)

The eNB initiates the procedure by sending an ENB CONFIGURATION UPDATE message to the MME including an appropriate set of updated configuration data that it has just taken into operational use. The MME responds with ENB CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data. If information element(s) is/are not included in the ENB CONFIGURATION UPDATE message, the MME shall interpret that the corresponding configuration data is/are not changed and shall continue to operate the S1 with the existing related configuration data.

If the supported TA(s) is/are to be updated, the whole list of supported TAs, including those that are not to be updated, shall be included in the Supported TAs IE. The MME shall overwrite the whole list of TAs.

If the supported CSG ID(s) is/are to be updated, the whole list of supported CSG IDs, including those that are not to be updated, shall be included in the CSG Id List IE. The MME shall overwrite the whole list of CSG Ids.

If the ENB CONFIGURATION UPDATE message contains the eNB Name IE, the MME may use this IE as a human readable name of the eNB.

If the Default Paging DRX IE is included, the MME shall overwrite any previously stored default paging DRX value for the eNB.

If the NB-IoT Default Paging DRX IE is included in the ENB CONFIGURATION UPDATE message, the MME shall overwrite any previously stored NB-IoT default paging DRX value for the eNB.

If the Connected en-gNB to be Added List IE is included in the ENB CONFIGURATION UPDATE message, the MME shall replace, if applicable, any previously received information for the concerned en-gNBs and take it into account as specified in TS 36.300 [14].

If the Connected en-gNB to be Removed List IE is included in the ENB CONFIGURATION UPDATE message, the MME shall remove any stored information for the concerned en-gNBs.
The updated configuration data shall be stored in both the eNB and the MME and used for the duration of the TNL association or until any further update is triggered by the eNB.

The eNB may initiate a further eNB Configuration Update procedure only after a previous eNB Configuration Update procedure has been completed.

8.7.4.3 Unsuccessful Operation

If the MME cannot accept the update, it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the Time To Wait IE, the eNB shall wait at least for the indicated time before reinitiating the ENB Configuration Update procedure towards the same MME. Both nodes shall continue to operate the S1 with their respective configuration data.

8.7.4.4 Abnormal Conditions

If the eNB after initiating eNB Configuration Update procedure receives neither an ENB CONFIGURATION UPDATE ACKNOWLEDGE nor an ENB CONFIGURATION UPDATE FAILURE message, the eNB may reinitiate a further eNB Configuration Update procedure towards the same MME, provided that the content of the new ENB CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged ENB CONFIGURATION UPDATE message.

8.7.5 MME Configuration Update

8.7.5.1 General

The purpose of the MME Configuration Update procedure is to update application level configuration data needed for the eNB and MME to interoperate correctly on the S1 interface. This procedure does not affect existing UE-related contexts, if any.

8.7.5.2 Successful Operation

If the MME cannot accept the update, it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the Time To Wait IE, the eNB shall wait at least for the indicated time before reinitiating the ENB Configuration Update procedure towards the same MME. Both nodes shall continue to operate the S1 with their respective configuration data.

8.7.4.3 Unsuccessful Operation

If the MME cannot accept the update, it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the Time To Wait IE, the eNB shall wait at least for the indicated time before reinitiating the ENB Configuration Update procedure towards the same MME. Both nodes shall continue to operate the S1 with their respective configuration data.

8.7.4.4 Abnormal Conditions

If the eNB after initiating eNB Configuration Update procedure receives neither an ENB CONFIGURATION UPDATE ACKNOWLEDGE nor an ENB CONFIGURATION UPDATE FAILURE message, the eNB may reinitiate a further eNB Configuration Update procedure towards the same MME, provided that the content of the new ENB CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged ENB CONFIGURATION UPDATE message.

8.7.5 MME Configuration Update

8.7.5.1 General

The purpose of the MME Configuration Update procedure is to update application level configuration data needed for the eNB and MME to interoperate correctly on the S1 interface. This procedure does not affect existing UE-related contexts, if any.

8.7.5.2 Successful Operation

If the MME cannot accept the update, it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the Time To Wait IE, the eNB shall wait at least for the indicated time before reinitiating the ENB Configuration Update procedure towards the same MME. Both nodes shall continue to operate the S1 with their respective configuration data.

8.7.4.3 Unsuccessful Operation

If the MME cannot accept the update, it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the Time To Wait IE, the eNB shall wait at least for the indicated time before reinitiating the ENB Configuration Update procedure towards the same MME. Both nodes shall continue to operate the S1 with their respective configuration data.

8.7.4.4 Abnormal Conditions

If the eNB after initiating eNB Configuration Update procedure receives neither an ENB CONFIGURATION UPDATE ACKNOWLEDGE nor an ENB CONFIGURATION UPDATE FAILURE message, the eNB may reinitiate a further eNB Configuration Update procedure towards the same MME, provided that the content of the new ENB CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged ENB CONFIGURATION UPDATE message.
The MME initiates the procedure by sending an MME CONFIGURATION UPDATE message including the appropriate updated configuration data to the eNB. The eNB responds with an MME CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data. If information element(s) is/are not included in the MME CONFIGURATION UPDATE message, the eNB shall interpret that the corresponding configuration data is not changed and shall continue to operate the S1 with the existing related configuration data.

If the served PLMNs is/are to be updated, the eNB shall overwrite the whole list of PLMNs.

If the MME CONFIGURATION UPDATE message contains the *MME Name* IE, the eNB may use this IE as a human readable name of the MME.

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

The MME may initiate a further MME Configuration Update procedure only after a previous MME Configuration Update procedure has been completed.

If the MME CONFIGURATION UPDATE message contains the *ServedDCNs* IE then the eNB shall, if supported, use it as defined in TS 23.401 [48].

### 8.7.5.3 Unsuccessful Operation

![MME Configuration Update: Unsuccessful Operation](image)

If the eNB cannot accept the update, it shall respond with an MME CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the MME CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE the MME shall wait at least for the indicated time before reinitiating the MME Configuration Update procedure towards the same eNB. Both nodes shall continue to operate the S1 with the existing configuration data.

### 8.7.5.4 Abnormal Conditions

If the MME neither receives an MME CONFIGURATION UPDATE ACKNOWLEDGE nor an MME CONFIGURATION UPDATE FAILURE message, the MME may reinitiate MME Configuration Update procedure towards the same eNB provided that the content of the new MME CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged MME CONFIGURATION UPDATE message.

### 8.7.6 Overload Start

#### 8.7.6.1 General

The purpose of the Overload Start procedure is to inform an eNB to reduce the signalling load towards the concerned MME.

The procedure uses non-UE associated signalling.
8.7.6.2 Successful Operation

The eNB receiving the OVERLOAD START message shall assume the MME from which it receives the message as being in an overloaded state.

If the Overload Action IE in the Overload Response IE within the OVERLOAD START message is set to

- "reject RRC connection establishments for non-emergency mobile originated data transfer" (i.e., reject traffic corresponding to RRC cause "mo-data", "mo-VoiceCall" and "delayTolerantAccess" in TS 36.331 [16]), or
- "reject RRC connection establishments for signalling" (i.e., reject traffic corresponding to RRC cause "mo-data", "mo-signalling", "mo-VoiceCall" and "delayTolerantAccess" in TS 36.331 [16]), or
- "only permit RRC connection establishments for emergency sessions and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "emergency" and "mt-Access" in TS 36.331 [16]), or
- "only permit RRC connection establishments for high priority sessions and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "highPriorityAccess" and "mt-Access" in TS 36.331 [16]), or
- "reject only RRC connection establishment for delay tolerant access" (i.e., only reject traffic corresponding to RRC cause "delayTolerantAccess" in TS 36.331 [16]), or
- "not accept RRC connection requests for data transmission from UEs that only support Control Plane CIoT EPS Optimisation" (i.e. not accept traffic corresponding to RRC cause "mo-data" or "delayTolerantAccess" in TS36.331 [16] for those UEs), or
- "only permit RRC connection establishments for high priority sessions, exception reporting and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "highPriorityAccess", "mo-ExceptionData" and "mt-Access" in TS 36.331 [16]),

the eNB shall:

- if the Traffic Load Reduction Indication IE is included in the OVERLOAD START message and, if supported, reduce the signalling traffic indicated as to be rejected by the indicated percentage,
- otherwise ensure that only the signalling traffic not indicated as to be rejected/not accepted is sent to the MME.

NOTE: When the Overload Action IE is set to "only permit RRC connection establishments for emergency sessions and mobile terminated services", emergency calls with RRC cause "highPriorityAccess" from high priority users are rejected (see TS 24.301 [24]).

If the GUMMEI List IE is present, the eNB shall, if supported, use this information to identify to which traffic the above defined rejections shall be applied.

If an overload action is ongoing and the eNB receives a further OVERLOAD START message, the eNB shall replace the ongoing overload action with the newly requested one. If the GUMMEI List IE is present, the eNB replaces applicable ongoing actions according to TS 36.300 [14], clauses 4.6.2, 4.7.4 and 19.2.2.12.
8.7.6.3 Unsuccessful Operation

Not applicable.

8.7.7 Overload Stop

8.7.7.1 General

The purpose of the Overload Stop procedure is to signal to an eNB the MME is connected to that the overload situation at the MME has ended and normal operation shall resume.

The procedure uses non-UE associated signalling.

8.7.7.2 Successful Operation

![Figure 8.7.7.2.-1: Overload Stop procedure](image)

The eNB receiving the OVERLOAD STOP message shall assume that the overload situation at the MME from which it receives the message has ended and shall resume normal operation for the applicable traffic towards this MME.

If the GUMMEI List IE is present, the eNB shall, if supported, use this information to identify which traffic to cease rejecting, and proceed according to TS 36.300 [14], clauses 4.6.2, 4.7.4 and 19.2.2.12. If no particular overload action is ongoing for a particular GUMMEI value, the eNB shall ignore this value.

8.7.7.3 Unsuccessful Operation

Not applicable.

8.8 S1 CDMA2000 Tunnelling Procedures

8.8.1 General

The purpose of S1 CDMA2000 Tunnelling procedures is to carry CDMA2000 signalling between UE and CDMA2000 RAT over the S1 Interface. This includes signalling for pre-registration of UE with CDMA2000 HRPD network, signalling for handover preparation for handover from E-UTRAN to CDMA2000 HRPD/1xRTT and pre-registration and paging of UE with CDMA2000 1xRTT CS system. The CDMA2000 messages are not interpreted by the eNB, and their content is outside the scope of this specification, however, additional information may be sent along with the tunnelled CDMA2000 message to assist the eNB and the MME in the tunnelling procedure. These procedures use an established UE-associated logical S1-connection.

The CDMA2000 messages are transported in an IE of the DOWNLINK S1 CDMA2000 TUNNELLING or UPLINK S1 CDMA2000 TUNNELLING messages.
8.8.2 Successful Operations

8.8.2.1 Downlink S1 CDMA2000 Tunnelling

If a CDMA2000 message needs to be sent from the MME to a given UE and a UE-associated logical S1-connection exists for that given UE, the MME should send a DOWNLINK S1 CDMA2000 TUNNELLING message to the eNB including the CDMA2000 message in the CDMA2000-PDU IE. The eNB forwards the received CDMA2000-PDU IE to the UE along with an indication of the RAT Type associated with the CDMA2000 RAT Type IE.

If the MME receives handover status information along with the tunnelled downlink CDMA2000 message, the MME should include the handover status information in the CDMA2000 HO Status IE in the DOWNLINK S1 CDMA2000 TUNNELLING message.

If the DOWNLINK S1 CDMA2000 TUNNELLING message contains the E-RABs Subject to Forwarding List IE, it indicates that DL forwarding is available for the indicated E-RABs towards the tunnel endpoint identified by the DL GTP-TEID IE for those E-RABs.

8.8.2.2 Uplink S1 CDMA2000 Tunnelling

When the eNB has received from the radio interface a CDMA2000 message to be forwarded to the MME in which a UE-associated logical S1-connection for a given UE exists, the eNB shall send the UPLINK S1 CDMA2000 TUNNELLING message to the MME including the CDMA2000 message in the CDMA2000-PDU IE.

If the MME receives the CDMA2000 HO Required Indication IE set to “true” in UPLINK S1 CDMA2000 TUNNELLING message, the MME shall send the necessary handover preparation information to the CDMA2000 target RAT.

If the MME receives any of the CDMA2000 1xRTT SRVCC Info IE, or the CDMA2000 1xRTT RAND IE in the UPLINK S1 CDMA2000 TUNNELLING message, the MME shall forward the received information to the CDMA2000 1xRTT RAT.
If the MME receives the *E-UTRAN Round Trip Delay Estimation Info* IE in the UPLINK S1 CDMA2000 TUNNELLING message, the MME shall forward the received information to the target HRPD access. The MME shall forward the received *CDMA2000 Sector ID* IE and *CDMA2000-PDU* IE to the proper destination node in the CDMA2000 RAT.

**Interactions with E-RAB Management procedures:**

If, after an UPLINK S1 CDMA2000 TUNNELLING message with *CDMA2000 HO Required Indication* IE set to "true" is sent before the DOWNLINK S1 CDMA2000 TUNNELLING message with *CDMA2000 HO Status* IE is received, the source eNB receives an MME initiated E-RAB Management procedure on the same UE associated signalling connection, the source eNB shall terminate the MME initiated E-RAB Management procedure by sending the appropriate response message with an appropriate cause value, e.g., “S1 inter system Handover Triggered”, to the MME.

### 8.8.3 Unsuccessful Operation

Not applicable

### 8.8.4 Abnormal Conditions

If the eNB receives at least one E-RAB ID included in the *E-RABs Subject to Forwarding Items* IE without any associated DL GTP-TEID and DL Transport Layer Address pair in the DOWNLINK S1 CDMA2000 TUNNELLING message, the eNB shall consider it as a logical error and act as described in subclause 10.4.

The eNB shall ignore the *UL GTP-TEID* IE and/or *UL Transport Layer Address* IE in the *E-RABs Subject to Forwarding Items* IE, when the IEs are included in the DOWNLINK S1 CDMA2000 TUNNELLING message.

### 8.9 UE Capability Info Indication

#### 8.9.1 General

The purpose of the UE Capability Info Indication procedure is to enable the eNB to provide to the MME UE capability-related information.

#### 8.9.2 Successful Operation

![Figure 8.9.2-1: UE Capability Info Indication procedure. Successful operation.](image)

The eNB controlling a UE-associated logical S1-connection initiates the procedure by sending a *UE CAPABILITY INFO INDICATION* message to the MME including the UE capability information. The *UE CAPABILITY INFO INDICATION* message may also include paging specific UE capability information within the *UE Radio Capability for Paging* IE. The UE capability information received by the MME shall replace previously stored corresponding UE capability information in the MME for the UE, as described in TS 23.401 [11].

If *UE CAPABILITY INFO INDICATION* message contains the *LTE-M indication* IE, the MME shall, if supported, use it according to TS 23.401 [11].
If the UE indicates the support for UE Application Layer Measurement, the eNB shall, if supported include the UE Application Layer Measurement Capability IE in the UE CAPABILITY INFO INDICATION message. The MME shall, if supported, store and use this information when initiating UE Application Layer Measurement.

8.10 Trace Procedures

8.10.1 Trace Start

8.10.1.1 General

The purpose of the Trace Start procedure is to allow the MME to request the eNB to initiate a trace function for a UE. The procedure uses UE-associated signalling. If no UE-associated logical S1-connection exists, the UE-associated logical S1-connection shall be established as part of the procedure.

8.10.1.2 Successful Operation

The MME initiates the procedure by sending a TRACE START message. On receipt of a TRACE START message, the eNB shall initiate the requested trace function as described in TS 32.422 [10].

If the Trace Activation IE is included in the TRACE START message which includes the MDT Activation IE set to “Immediate MDT and Trace”, the eNB shall, if supported, initiate the requested trace session and MDT session as described in TS 32.422 [10].

If the Trace Activation IE is included in the TRACE START message which includes the MDT Activation IE set to “Immediate MDT Only”, “Logged MDT only” or “Logged MBSFN MDT”, the target eNB shall, if supported, initiate the requested MDT session as described in TS 32.422 [10] and the target eNB shall ignore Interfaces To Trace IE, and Trace Depth IE.

If the Trace Activation IE includes the MDT Location Information IE, within the MDT Configuration IE, the eNB shall, if supported, store this information and take it into account in the requested MDT session.

If the Trace Activation IE is included in the TRACE START message which includes the MDT Activation IE set to “Immediate MDT Only”, “Logged MDT only” or “Logged MBSFN MDT” and if the Signalling based MDT PLMN List IE is included in the MDT Configuration IE, the MBE may use it to propagate the MDT Configuration as described in TS 37.320 [31].

If the Trace Activation IE includes the MBSFN-ResultToLog IE, within the MDT Configuration IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].

If the Trace Activation IE includes the MBSFN-AreaId IE in the MBSFN-ResultToLog IE, within the MDT Configuration IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].

If the Trace Activation IE includes the UE Application layer measurement configuration IE, the eNB shall, if supported, initiate the requested trace session and QoE Measurement Collection function as described in TS 36.300 [14].

If the Trace Activation IE includes the Bluetooth Measurement Configuration IE, within the MDT Configuration IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].

If the Trace Activation IE includes the WLAN Measurement Configuration IE, within the MDT Configuration IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].
Interactions with other procedures:
If the eNB is not able to initiate the trace session due to ongoing handover of the UE to another eNB, the eNB shall initiate a Trace Failure Indication procedure with the appropriate cause value.

8.10.2 Trace Failure Indication

8.10.2.1 General
The purpose of the Trace Failure Indication procedure is to allow the eNB to inform the MME that a Trace Start procedure or a Deactivate Trace procedure has failed due to an interaction with a handover procedure. The procedure uses UE-associated signalling.

8.10.2.2 Successful Operation

![Figure 8.10.2.2-1: Trace Failure Indication procedure.](image)

The eNB initiates the procedure by sending a TRACE FAILURE INDICATION message. Upon reception of the TRACE FAILURE INDICATION message, the MME shall take appropriate actions based on the failure reason indicated by the Cause IE.

8.10.3 Deactivate Trace

8.10.3.1 General
The purpose of the Deactivate Trace procedure is to allow the MME to request the eNB to stop the trace session, for the indicated trace reference.

8.10.3.2 Successful Operation

![Figure 8.10.3.2-1: Deactivate Trace procedure. Successful operation.](image)

The MME invokes the Deactivate Trace procedure by sending a DEACTIVATE TRACE message to the eNB as described in TS 32.422 [10].

Upon reception of this message, the eNB shall stop the trace session for the indicated trace reference in the E-UTRAN Trace ID IE.

Interactions with other procedures:
If the eNB is not able to stop the trace session due to ongoing handover of the UE to another eNB, the eNB shall initiate a Trace Failure Indication procedure with the appropriate cause value.
8.10.4  Cell Traffic Trace

8.10.4.1  General

The purpose of the Cell Traffic Trace procedure is to send the allocated Trace Recording Session Reference and the Trace Reference to MME. The procedure uses UE-associated signalling.

8.10.4.2  Successful Operation

![Diagram of Cell Traffic Trace procedure]

The procedure is initiated with a CELL TRAFFIC TRACE message sent from the eNB to the MME.

If the Privacy Indicator IE is included in the message, the MME shall take the information into account for anonymisation of MDT data (TS 32.422 [10]).

8.11  Location Reporting Procedures

8.11.1  Location Reporting Control

8.11.1.1  General

The purpose of Location Reporting Control procedure is to allow the MME to request the eNB to report where the UE is currently located. The procedure uses UE-associated signalling.

8.11.1.2  Successful Operation

![Diagram of Location Reporting Control procedure]

The MME initiates the procedure by sending a LOCATION REPORTING CONTROL message. On receipt of a LOCATION REPORTING CONTROL message the eNB shall perform the requested location reporting control action for the UE.

The Request Type IE indicates to the eNB whether:
- to report directly;
- to report upon change of serving cell, or...
- to stop reporting at change of serving cell.

If reporting upon change of serving cell is requested, the eNB shall report whenever the UE changes its serving cell to another cell belonging to the eNB or, if EN-DC is activated, whenever the UE changes the PCell.

The Request Type IE also indicates what type of location information the eNB shall report. The location information is E-UTRAN CGI and TAI, or E-UTRAN CGI, PSCell and TAI.

8.11.1.3 Abnormal Conditions

Not applicable.

8.11.2 Location Report Failure Indication

8.11.2.1 General

The Location Report Failure Indication procedure is initiated by an eNB in order to inform the MME that a Location Reporting Control procedure has failed due to an interaction with a handover procedure. The procedure uses UE-associated signalling.

8.11.2.2 Successful Operation

![Figure 8.11.2.2-1: Location Report Failure Indication procedure.](image)

Upon reception of the LOCATION REPORT FAILURE INDICATION message the MME shall take appropriate actions based on the failure reason indicated by the Cause IE.

8.11.3 Location Report

8.11.3.1 General

The purpose of Location Report procedure is to provide the UE’s current location to the MME. The procedure uses UE-associated signalling.

8.11.3.2 Successful Operation

![Figure 8.11.3.2-1: Location Report procedure. Successful operation.](image)

The eNB initiates the procedure by generating a LOCATION REPORT message. The LOCATION REPORT message may be used as a response to a LOCATION REPORTING CONTROL message.
In case reporting at change of serving cell has been requested, the eNB shall send a LOCATION REPORT message whenever the information given to the EPC in any S1AP message is not anymore valid.

If the *PSCell Information* IE is included in the LOCATION REPORT message, then the MME may consider both *E-UTRAN CGI* IE and *PSCell Information* IE to determine the UE’s location.

### 8.11.3.3 Abnormal Conditions

Not applicable.

## 8.12 Warning Message Transmission Procedures

### 8.12.1 Write-Replace Warning

#### 8.12.1.1 General

The purpose of Write-Replace Warning procedure is to start or overwrite the broadcasting of warning messages.

The procedure uses non UE-associated signalling.

#### 8.12.1.2 Successful Operation

![Diagram of Write-Replace Warning procedure. Successful operation.](image)

The MME initiates the procedure by sending a WRITE-REPLACE WARNING REQUEST message to the eNB.

Upon receipt of the WRITE-REPLACE WARNING REQUEST, eNB shall prioritise its resources to process the warning message.

If, in a certain area, broadcast of a warning message is already ongoing and the eNB receives a WRITE-REPLACE WARNING REQUEST message with *Message Identifier* IE and/or *Serial Number* IE which are different from those in the warning message being broadcast, and if the *Concurrent Warning Message Indicator* IE is not present, the eNB shall replace the warning message being broadcast with the newly received one for that area.

If the eNB receives a WRITE-REPLACE WARNING REQUEST message with a warning message identified by the *Message Identifier* IE and *Serial Number* IE and if there are no prior warning messages being broadcast in any of warning areas indicated in the *Warning Area List* IE, the eNB shall broadcast the received warning message for those area(s).

If, in a certain area, broadcast of one or more warning messages are already ongoing and the eNB receives a WRITE-REPLACE WARNING REQUEST message with a *Message Identifier* IE and/or *Serial Number* IE which are different from those in any of the warning messages being broadcast, and if the *Concurrent Warning Message Indicator* IE is present, the eNB shall schedule the received warning message for broadcast, for that area.

If the *Concurrent Warning Message Indicator* IE is present and if a value “0” is received in the *Number of Broadcast Requested* IE, the eNB shall broadcast the received warning message indefinitely until requested otherwise to stop broadcasting, except if the *Repetition Period* IE is set to “0”.

If, in a certain area, broadcast of one or more warning messages are already ongoing and the eNB receives a WRITE-REPLACE WARNING REQUEST message with *Message Identifier* IE and *Serial Number* IE which correspond to one of the warning messages already being broadcast in that area, the eNB shall not start a new broadcast or replace an
existing one but it shall still reply by sending a WRITE-REPLACE WARNING RESPONSE message which includes the Broadcast Completed Area List IE set according to the ongoing broadcast.

If Warning Area List IE is not included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall broadcast the indicated message in all of the cells within the eNB.

If Warning Type IE is included in WRITE-REPLACE WARNING REQUEST message, the eNB shall broadcast the Primary Notification irrespective of the setting of the Repetition Period IE and the Number of Broadcasts Requested IE, and process the Primary Notification according to TS 36.331 [16].

If the Warning Security Information IE is included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall include this information together with the warning type in the Primary Notification.

If the Data Coding Scheme IE and the Warning Message Contents IE are both included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall schedule a broadcast of the warning message according to the value of the Repetition Period IE and Number of Broadcasts Requested IE and process the warning message according to TS 36.331 [16].

If the Warning Area Coordinates IE is included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall include this information together with the warning message being broadcast according to TS 36.331 [16].

The eNB acknowledges the WRITE-REPLACE WARNING REQUEST message by sending a WRITE-REPLACE WARNING RESPONSE message to the MME.

If the Broadcast Completed Area List IE is not included in the WRITE-REPLACE WARNING RESPONSE message, the MME shall consider that the broadcast is unsuccessful in all the cells within the eNB.

If the Extended Repetition Period IE is included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall ignore the value in the Repetition Period IE.

8.12.1.3 Abnormal Conditions

If the Concurrent Warning Message Indicator IE is not present and if a value “0” is received in the Number of Broadcast Requested IE, the eNB shall not broadcast the received secondary notification.

If Concurrent Warning Message Indicator IE is included and if a value “0” is received in the Repetition Period IE, the eNB shall not broadcast the received warning message except if the Number of Broadcast Requested IE is set to “1”.

If Concurrent Warning Message Indicator IE is not included and if a value “0” is received in the Repetition Period IE, the eNB shall not broadcast the received secondary notification except if the Number of Broadcast Requested IE is set to “1”.

8.12.2 Kill

8.12.2.1 General

The purpose of Kill procedure is to cancel an already ongoing broadcast of a warning message.

The procedure uses non UE-associated signalling.

8.12.2.2 Successful Operation
The MME initiates the procedure by sending a KILL REQUEST message to the eNB.

If the eNB receives a KILL REQUEST message and broadcast of the warning message identified by the Message Identifier and Serial Number IE is ongoing in an area indicated within the Warning Area List IE, the eNB shall stop broadcasting the warning message within that area and discard the warning message for that area.

If the Warning Area List IE is not included in the KILL REQUEST message, the eNB shall stop broadcasting and discard the warning message identified by the Message Identifier IE and the Serial Number IE in all of the cells in the eNB.

The eNB shall acknowledge the KILL REQUEST message by sending the KILL RESPONSE message, with the Message Identifier IE and the Serial Number IE copied from the KILL REQUEST message and shall, if there is an area to report where an ongoing broadcast was stopped successfully, include the Broadcast Cancelled Area List IE.

If an area included in the Warning Area List IE in the KILL REQUEST message does not appear in the Broadcast Cancelled Area List IE, the MME shall consider that the eNB had no ongoing broadcast to stop for the same Message Identifier and Serial Number in that area.

If the Broadcast Cancelled Area List IE is not included in the KILL RESPONSE message, the MME shall consider that the eNB had no ongoing broadcast to stop for the same Message Identifier and Serial Number.

If the Kill-all Warning Messages Indicator IE is present in the KILL REQUEST message, then the eNB shall stop broadcasting and discard all warning messages for the area as indicated in the Warning Area List IE or in all the cells of the eNB if the Warning Area List IE is not included. The eNB shall acknowledge the KILL REQUEST message by sending the KILL RESPONSE message, with the Message Identifier IE and the Serial Number IE copied from the KILL REQUEST message and shall, if there is area to report where an ongoing broadcast was stopped successfully, include the Broadcast Cancelled Area List IE with the Number of Broadcasts IE set to 0.

8.12.3 PWS Restart Indication

8.12.3.1 General

The purpose of PWS Restart Indication procedure is to inform the MME that PWS information for some or all cells of the eNB are available for reloading from the CBC if needed. The procedure uses non UE-associated signalling.

8.12.3.2 Successful Operation

The MME shall initiate the procedure by sending the PWS RESTART INDICATION message to the eNB.

If the eNB receives the PWS RESTART INDICATION message, it shall acknowledge the message by sending the PWS RESPONSE message, with the Message Identifier IE and the Serial Number IE copied from the PWS RESTART INDICATION message and shall, if there is an area to report where PWS information was available for reloading, include the Broadcast Available Area List IE.

If the Broadcast Available Area List IE is not included in the PWS RESPONSE message, the MME shall consider that the eNB had no area to report where PWS information was available for reloading.

If the Kill-all PWS Messages Indicator IE is present in the PWS RESTART INDICATION message, then the eNB shall discard all PWS information for the area as indicated in the Warning Area List IE or in all the cells of the eNB if the Warning Area List IE is not included. The eNB shall acknowledge the PWS RESTART INDICATION message by sending the PWS RESPONSE message, with the Message Identifier IE and the Serial Number IE copied from the PWS RESTART INDICATION message and shall, if there is an area to report where PWS information was available for reloading, include the Broadcast Available Area List IE with the Number of Broadcasts IE set to 0.
The eNB initiates the procedure by sending a PWS RESTART INDICATION message to the MME. On receipt of a PWS RESTART INDICATION message, the MME shall act as defined in TS 23.007 [38].

If the Emergency Area ID is available, the eNB shall also include it in the Emergency Area ID List for Restart IE.

8.12.4 PWS Failure Indication

8.12.4.1 General

The purpose of PWS Failure Indication procedure is to inform the MME that ongoing PWS operation for one or more cells of the eNB has failed. The procedure uses non UE-associated signalling.

8.12.4.2 Successful Operation

![Diagram of PWS Failure Indication procedure]

Figure 8.12.4.2-1: PWS Failure Indication procedure. Successful operation.

The eNB initiates the procedure by sending a PWS FAILURE INDICATION message to the MME. On receipt of a PWS FAILURE INDICATION message, the MME shall act as defined in TS 23.041 [29].

8.13 eNB Direct Information Transfer

8.13.1 General

The purpose of the eNB Direct Information Transfer procedure is to transfer RAN information from the eNB to the MME in unacknowledged mode. The MME does not interpret the transferred RAN information.

This procedure uses non-UE associated signalling.

8.13.2 Successful Operation

8.13.2.1 eNB Direct Information Transfer

![Diagram of ENB Direct Information Transfer procedure]

Figure 8.13.1.2-1: ENB Direct Information Transfer procedure. Successful operation.

The procedure is initiated with an ENB DIRECT INFORMATION TRANSFER message sent from the eNB to the MME.

The RIM Transfer IE within the Inter-system Information Transfer Type IE shall contain the RIM Routing Address IE that identifies the final RAN destination node where the RIM information needs to be transferred to by the core.
network. In case of transfer to UTRAN the source eNB shall include the RAC IE in the Target RNC-ID IE within the RIM Routing Address IE.

8.13.3 Abnormal Conditions
Not applicable.

8.14 MME Direct Information Transfer

8.14.1 General
The purpose of the MME Direct Information Transfer procedure is to transfer RAN information from the MME to the eNB in unacknowledged mode.
This procedure uses non-UE associated signalling.

8.14.2 Successful Operation

8.14.2.1 MME Direct Information Transfer

![Diagram of MME Direct Information Transfer](image)

Figure 8.14.1.2-1: MME Direct Information Transfer procedure. Successful operation.

The procedure is initiated with a MME DIRECT INFORMATION TRANSFER message sent from the MME to the eNB.
The Inter-system Information Transfer Type IE indicates the nature of the transferred information. When the transferred information is of RIM nature, the RIM Information IE within the RIM Transfer IE shall contain a BSSGP RIM PDU.
The RIM Routing Address IE shall not be present since the eNB is the final destination node.

8.14.3 Abnormal Conditions
Not applicable.

8.15 eNB Configuration Transfer

8.15.1 General
The purpose of the eNB Configuration Transfer procedure is to transfer RAN configuration information from the eNB to the MME in unacknowledged mode. The MME does not interpret the transferred RAN configuration information.
This procedure uses non-UE associated signalling.
8.15.2 Successful Operation

8.15.2.1 eNB Configuration Transfer

![Diagram: ENB CONFIGURATION TRANSFER from eNB to MME]

**Figure 8.15.2.1-1: eNB Configuration Transfer procedure. Successful operation.**

The procedure is initiated with an ENB CONFIGURATION TRANSFER message sent from the eNB to the MME.

If the MME receives the SON Configuration Transfer IE, it shall transparently transfer the SON Configuration Transfer IE towards the eNB indicated in the Target eNB-ID IE which is included in the SON Configuration Transfer IE.

If the MME receives the EN-DC SON Configuration Transfer IE, it shall transparently transfer the EN-DC SON Configuration Transfer IE either towards the eNB indicated in the Target eNB-ID IE or towards an eNB connected to the en-gNB indicated in the Target en-gNB-ID IE which is included in the EN-DC SON Configuration Transfer IE. The EN-DC SON Configuration Transfer IE may also contain, if available,

- the Target eNB ID IE,
- the Associated TAI IE,
- the Broadcast 5GS TAI IE,

for purposes described in TS 36.300 [14].

8.15.3 Abnormal Conditions

Not applicable.

8.16 MME Configuration Transfer

8.16.1 General

The purpose of the MME Configuration Transfer procedure is to transfer RAN configuration information from the MME to the eNB in unacknowledged mode.

This procedure uses non-UE associated signalling.
8.16.2 Successful Operation

8.16.2.1 MME Configuration Transfer

![Diagram](image.png)

Figure 8.16.2.1-1: MME Configuration Transfer procedure. Successful operation.

The procedure is initiated with an MME CONFIGURATION TRANSFER message sent from the MME to the eNB.

If the eNB receives, in the SON Configuration Transfer IE or the EN-DC SON Configuration Transfer IE, the SON Information IE containing the SON Information Request IE, it may transfer back the requested information either towards the eNB indicated in the Source eNB-ID IE of the SON Configuration Transfer IE or towards an eNB connected to the en-gNB indicated in the Source en-gNB-ID IE of the EN-DC SON Configuration Transfer IE by initiating the eNB Configuration Transfer procedure. If the X2 TNL Configuration Info IE contains the eNB Indirect X2 Transport Layer Addresses IE, the eNB may use it for the X2 TNL establishment, and may transfer back the received eNB Indirect X2 Transport Layer Addresses towards the eNB indicated in the Source eNB-ID IE of the SON Configuration Transfer IE by initiating the eNB Configuration Transfer procedure or towards the eNB connected to the en-gNB indicated in the Source en-gNB-ID IE of the EN-DC SON Configuration Transfer IE by initiating the eNB Configuration Transfer procedure.

If the eNB receives, in the SON Configuration Transfer IE, the X2 TNL Configuration Info IE containing the eNB X2 Extended Transport Layer Addresses IE, it may use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

If the eNB receives, in the SON Configuration Transfer IE, the SON Information IE containing the SON Information Reply IE including the X2 TNL Configuration Info IE as an answer to a former request, it may use it to initiate the X2 TNL establishment. If the X2 TNL Configuration Info IE contains the eNB Indirect X2 Transport Layer Addresses IE, the eNB may use it for the X2 TNL establishment.

In case the IP-Sec Transport Layer Address IE is present and the GTP Transport Layer Addresses IE within the eNB X2 Extended Transport Layer Addresses IE is not empty, GTP traffic is conveyed within an IP-Sec tunnel terminated at the IP-Sec tunnel end point given in by the IP-Sec Transport Layer Address IE.

In case the IP-Sec Transport Layer Address IE is not present, GTP traffic is terminated at the end points given by the list of addresses in eNB GTP Transport Layer Addresses IE within the eNB X2 Extended Transport Layer Addresses IE.

In case the eNB GTP Transport Layer Addresses IE is empty and the IP-Sec Transport Layer Address IE is present, SCTP traffic is conveyed within an IP-Sec tunnel terminated at the IP-Sec tunnel end point given in the IP-Sec Transport Layer Address IE, within the eNB X2 Extended Transport Layer Addresses IE.

If the eNB is configured to use one IPsec tunnel for all S1 and X2 traffic (IPsec star topology) then the traffic to the peer eNB shall be routed through this IPsec tunnel and the IP-Sec Transport Layer Address IE shall be ignored.

If the eNB receives the SON Information IE containing the SON Information Reply IE including the Time Synchronisation Info IE as an answer to a former request, it may use it for over-the-air synchronisation by means of network listening and for triggering muting activation request.

If the eNB receives the SON Information IE containing the SON Information Report IE it may use it as specified in TS 36.300 [14].

If the eNB receives the SON Information IE containing the SON Information Request IE set to “Activate Muting”, the eNB should consider activating for over-the-air synchronisation by means of network listening, taking into account information on the selected source of synchronisation cell and the cells as indicated by the Aggressor E-CGI List IE. In case the Aggressor E-CGI List IE is not present, the eNB may consider the request applicable to all cells.
If the eNB receives the SON Information IE containing the SON Information Reply IE including the Muting Pattern Information IE as an answer to a former request, it may use it for over-the-air synchronisation by means of network listening. The Muting Pattern Information IE may apply to all cells that were requested to mute.

If the eNB receives the SON Information IE containing the SON Information Request IE set to “Deactivate Muting”, the eNB may consider deactivating muting for over-the-air synchronisation that was activated by a former muting request from the corresponding eNB.

8.16.3 Abnormal Conditions

Not applicable.

8.17 LPPa transport

8.17.1 General

The purpose of the LPPa Transport procedure is to carry LPPa signalling (defined in TS 36.455 [34]) between eNB and E-SMLC over the S1 Interface as defined in TS 36.455 [34]. The procedure may use UE-associated signalling or non-UE associated signalling. The UE-associated signalling is used to support E-CID and UTDOA positioning of a specific UE. The non-UE associated signalling is used to obtain assistance data from an eNB to support OTDOA positioning for any UE.

8.17.2 Successful Operations

8.17.2.1 DOWNLINK UE ASSOCIATED LPPA TRANSPORT

![Figure 8.17.2.1-1: DOWNLINK UE ASSOCIATED LPPA Transport Procedure](image)

The MME initiates the procedure by sending the DOWNLINK UE ASSOCIATED LPPA TRANSPORT message to eNB.

8.17.2.2 UPLINK UE ASSOCIATED LPPA TRANSPORT

![Figure 8.17.2.2-1: UPLINK UE ASSOCIATED LPPA TRANSPORT Procedure](image)
The eNB initiates the procedure by sending the UPLINK UE ASSOCIATED LPPA TRANSPORT message to MME.

### 8.17.2.3 DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT

![Downlink Non UE Associated LPPA Transport Procedure](image)

Figure 8.17.2.3-1: DOWNLINK NON UE ASSOCIATED LPPA Transport Procedure

The MME initiates the procedure by sending the DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT message to eNB.

### 8.17.2.4 UPLINK NON UE ASSOCIATED LPPA TRANSPORT

![Uplink Non UE Associated LPPA Transport Procedure](image)

Figure 8.17.2.4-1: UPLINK NON UE ASSOCIATED LPPA TRANSPORT Procedure

The eNB initiates the procedure by sending the UPLINK NON UE ASSOCIATED LPPA TRANSPORT message to MME.

### 8.17.3 Unsuccessful Operation

Not applicable

### 8.17.4 Abnormal Conditions

If an MME receives an UPLINK UE ASSOCIATED LPPA TRANSPORT message with an unknown Routing ID for the UE, the MME shall ignore the message.

If an MME receives an UPLINK NON UE ASSOCIATED LPPA TRANSPORT message indicating an unknown or unreachable Routing ID, the MME shall ignore the message.

### 8.18 Secondary RAT Data Usage Report

#### 8.18.1 General

The purpose of the Secondary RAT Data Usage Report procedure is to provides information on the used resources of the secondary RAT (e.g. NR resources during EN-DC operation) as specified in TS 23.401 [11].
8.18.2 Successful Operations

8.18.2.1 SECONDARY RAT DATA USAGE REPORT

The eNB initiates the procedure by sending the SECONDARY RAT DATA USAGE REPORT message to MME.

8.18.3 Unsuccessful Operation

Not applicable

8.18.4 Abnormal Conditions

Not applicable
9 Elements for S1AP Communication

9.1 Message Functional Definition and Content

9.1.1 General

9.1.2 Message Contents

9.1.2.1 Presence

All information elements in the message descriptions below are marked mandatory, optional or conditional according to table 4.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>IEs marked as Mandatory (M) shall always be included in the message.</td>
</tr>
<tr>
<td>O</td>
<td>IEs marked as Optional (O) may or may not be included in the message.</td>
</tr>
<tr>
<td>C</td>
<td>IEs marked as Conditional (C) shall be included in a message only if the condition is satisfied. Otherwise the IE shall not be included.</td>
</tr>
</tbody>
</table>

9.1.2.2 Criticality

Each Information Element or Group of Information Elements may have criticality information applied to it. Following cases are possible:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>No criticality information is applied explicitly.</td>
</tr>
<tr>
<td>YES</td>
<td>Criticality information is applied. This is usable only for non-repeatable IEs</td>
</tr>
<tr>
<td>GLOBAL</td>
<td>The IE and all its repetitions together have one common criticality information. This is usable only for repeatable IEs.</td>
</tr>
<tr>
<td>EACH</td>
<td>Each repetition of the IE has its own criticality information. It is not allowed to assign different criticality values to the repetitions. This is usable only for repeatable IEs.</td>
</tr>
</tbody>
</table>

9.1.2.3 Range

The Range column indicates the allowed number of copies of repetitive IEs/IE groups.

9.1.2.4 Assigned Criticality

This column provides the actual criticality information as defined in subclause 10.3.2, if applicable.
### 9.1.3 E-RAB Management Messages

#### 9.1.3.1 E-RAB SETUP REQUEST

This message is sent by the MME and is used to request the eNB to assign resources on Uu and S1 for one or several E-RABs.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>O</td>
<td></td>
<td>9.2.1.20</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-RAB to be Setup List</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

**>E-RAB To Be Setup Item IEs**

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
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<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB Level QoS Parameters</td>
<td>M</td>
<td>9.2.1.15</td>
<td>Includes necessary QoS parameters.</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td>9.2.2.1</td>
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<td></td>
</tr>
<tr>
<td>&gt;&gt;GTP-TEID</td>
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<td>9.2.2.2</td>
<td>EPC TEID.</td>
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<td>&gt;&gt;NAS-PDU</td>
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<td>9.2.3.5</td>
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<td></td>
</tr>
<tr>
<td>&gt;&gt;Correlation ID</td>
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<td>9.2.1.80</td>
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</tr>
<tr>
<td>&gt;&gt;SIPTO Correlation ID</td>
<td>O</td>
<td>Correlation ID 9.2.1.80</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;Bearer Type</td>
<td>O</td>
<td>9.2.1.116</td>
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<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>
9.1.3.2 E-RAB SETUP RESPONSE

This message is sent by the eNB and is used to report the outcome of the request from the E-RAB SETUP REQUEST message.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Setup List</td>
<td>0..1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-RAB Setup Item IEs</td>
<td></td>
<td>EACH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;GTP-TEID</td>
<td>M</td>
<td>9.2.2.2</td>
<td>eNB TEID.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed to Setup List</td>
<td>O</td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RAB Setup List IE and in E-RAB Failed to Setup List IE.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>
9.1.3.3 E-RAB MODIFY REQUEST

This message is sent by the MME and is used to request the eNB to modify the Data Radio Bearers and the allocated resources on Uu and S1 for one or several E-RABs or to change the S-GW as defined in TS 23.401 [11].

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>MME UE STAP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB UE STAP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>O</td>
<td></td>
<td>9.2.1.20</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td><strong>E-RAB to be Modified</strong></td>
<td>1</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>&gt;E-RAB To Be Modified Item IEs</td>
<td>1 .. &lt;maxnoofE-RABs&gt;</td>
<td>EACH</td>
<td>9.2.1.2</td>
<td>Include necessary QoS parameters.</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.2</td>
<td>Include necessary QoS parameters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB Level QoS Parameters</td>
<td>M</td>
<td></td>
<td>9.2.1.15</td>
<td>Include necessary QoS parameters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;NAS-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.5</td>
<td>Include necessary QoS parameters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Information</td>
<td>O</td>
<td></td>
<td>9.2.2.1</td>
<td>Include necessary QoS parameters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td></td>
<td>9.2.2.1</td>
<td>Include necessary QoS parameters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;UL GTP TEID</td>
<td>M</td>
<td></td>
<td>GTP-TEID</td>
<td>Include necessary QoS parameters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary RAT Data Usage Request</td>
<td>O</td>
<td></td>
<td>ENUMERATED (requested, ...)</td>
<td>Include necessary QoS parameters.</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>
9.1.3.4 E-RAB MODIFY RESPONSE

This message is sent by the eNB and is used to report the outcome of the request from the E-RAB MODIFY REQUEST message.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Modify List</td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;E-RAB Modify item IEs</td>
<td>1..&lt;maxnofE-RABs&gt;</td>
<td>EACH</td>
<td>ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed to Modify List</td>
<td>O</td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RAB Modify List IE and E-RAB Failed to Modify List IE.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Secondary RAT Usage Report List</td>
<td>O</td>
<td>9.2.1.124</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnofE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>

9.1.3.5 E-RAB RELEASE COMMAND

This message is sent by the MME and is used to request the eNB to release allocated resources on Uu and S1 for one or several E-RABs.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>O</td>
<td>9.2.1.20</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB To Be Released List</td>
<td>M</td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RAB To Be Released List IE.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>NAS-PDU</td>
<td>O</td>
<td>9.2.3.5</td>
<td>YES</td>
<td>ignore</td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnofE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>
9.1.3.6 E-RAB RELEASE RESPONSE

This message is sent by the eNB and is used to report the outcome of the request from the E-RAB RELEASE COMMAND message.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Release List</td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;E-RAB Release Item IEs</td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td>9.2.1.26</td>
<td>EACH</td>
<td>YES</td>
<td>ignore</td>
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<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed to Release List</td>
<td>O</td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RAB Release List IE and E-RAB Failed to Release List IE.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Location Information</td>
<td>O</td>
<td>9.2.1.93</td>
<td>YES</td>
<td>ignore</td>
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<td></td>
</tr>
<tr>
<td>Secondary RAT Usage Report List</td>
<td>O</td>
<td>9.2.1.124</td>
<td>Yes</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range bound | Explanation
---|--------------------------------------------------
maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.

9.1.3.7 E-RAB RELEASE INDICATION

This message is sent by the eNB and is used to indicate the MME to release one or several E-RABs for one UE.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Released List</td>
<td>M</td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RAB Released List IE.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>User Location Information</td>
<td>O</td>
<td>9.2.1.93</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary RAT Usage Report List</td>
<td>O</td>
<td>9.2.1.124</td>
<td>Yes</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range bound | Explanation
---|--------------------------------------------------
maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.
### 9.1.3.8 E-RAB MODIFICATION INDICATION

This message is sent by the eNB and is used to request the MME to apply the indicated modification for one or several E-RABs.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>E-RAB to be Modified List</strong></td>
<td>1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td>9.2.2.1</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL GTP TEID</td>
<td>M</td>
<td>GTP-TEID</td>
<td>9.2.2.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>E-RAB not to be Modified List</strong></td>
<td>0..1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB not to Be Modified Item IEs</td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td>EACH</td>
<td>reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td>9.2.2.1</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL GTP TEID</td>
<td>M</td>
<td>GTP-TEID</td>
<td>9.2.2.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSG Membership Info</strong></td>
<td>0..1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;CSG Membership Status</td>
<td>M</td>
<td>9.2.1.73</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;CSG Id</td>
<td>M</td>
<td>9.2.1.62</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Access Mode</td>
<td>O</td>
<td>9.2.1.74</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;PLMN Identity</td>
<td>O</td>
<td>9.2.3.8</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tunnel Information for BBF</strong></td>
<td>O</td>
<td>Tunnel Information 9.2.2.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary RAT Usage Report List</td>
<td>O</td>
<td>9.2.1.124</td>
<td>Yes</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

| maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256. |
9.1.3.9  E-RAB MODIFICATION CONFIRM

This message is sent by the MME and is used to report the outcome of the request from the E-RAB MODIFICATION INDICATION message.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>E-RAB Modify List</td>
<td></td>
<td>0..1</td>
<td>9.2.1.2</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;E-RAB Modify Item IEs</td>
<td></td>
<td>1 .. &lt;maxnoofE-RABs&gt;</td>
<td>EACH ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed to Modify List</td>
<td>O</td>
<td></td>
<td>E-RAB List 9.2.1.36</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>E-RAB To Be Released List</td>
<td>O</td>
<td></td>
<td>E-RAB List 9.2.1.36</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td></td>
<td>9.2.1.73</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>

9.1.4  Context Management Messages

9.1.4.1  INITIAL CONTEXT SETUP REQUEST

This message is sent by the MME to request the setup of a UE context.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES reject</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES reject</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>M</td>
<td></td>
<td>9.2.1.20</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>E-RAB to Be Setup List</td>
<td></td>
<td>1</td>
<td></td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>&gt;E-RAB to Be Setup Item IEs</td>
<td></td>
<td>1 .. &lt;maxnoofE-RABs&gt;</td>
<td>EACH reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.2</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;E-RAB Level QoS Parameters</td>
<td>M</td>
<td></td>
<td>9.2.1.15</td>
<td>includes necessary QoS parameters.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td></td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;GTP-TEID</td>
<td>M</td>
<td></td>
<td>9.2.2.2</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;NAS-PDU</td>
<td>O</td>
<td></td>
<td>9.2.3.5</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Correlation ID</td>
<td>O</td>
<td></td>
<td>9.2.1.80</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
</tbody>
</table>
### Table 1: IE/Group Name, Presence, Range, IE type and reference, Semantics description, Criticality, Assigned Criticality

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt;SIPTO Correlation ID</td>
<td>O</td>
<td></td>
<td>9.2.1.80</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;Bearer Type</td>
<td>O</td>
<td></td>
<td>9.2.1.116</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>UE Security Capabilities</td>
<td>M</td>
<td></td>
<td>9.2.1.40</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Security Key</td>
<td>M</td>
<td></td>
<td>9.2.1.41</td>
<td>The KeNB is provided after the key-generation in the MME, see TS 33.401 [15].</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Trace Activation</td>
<td>O</td>
<td></td>
<td>9.2.1.4</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Handover Restriction List</td>
<td>O</td>
<td></td>
<td>9.2.1.22</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Radio Capability</td>
<td>O</td>
<td></td>
<td>9.2.1.27</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Subscriber Profile ID for RAT/Frequency priority</td>
<td>O</td>
<td></td>
<td>9.2.1.39</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CS Fallback Indicator</td>
<td>O</td>
<td></td>
<td>9.2.3.21</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>SRVCC Operation Possible</td>
<td>O</td>
<td></td>
<td>9.2.1.58</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td></td>
<td>9.2.1.73</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Registered LAI</td>
<td>O</td>
<td></td>
<td>9.2.3.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>GUMMEI</td>
<td>O</td>
<td></td>
<td>9.2.3.9</td>
<td>This IE indicates the MME serving the UE.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE STAP ID 2</td>
<td>O</td>
<td></td>
<td>9.2.3.3</td>
<td>This IE indicates the MME UE S1AP ID assigned by the MME.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Management Based MDT Allowed</td>
<td>O</td>
<td></td>
<td>9.2.1.83</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Management Based MDT PLMN List</td>
<td>O</td>
<td></td>
<td>MDT PLMN List 9.2.1.89</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Additional CS Fallback Indicator</td>
<td>C- ifCSFBhighpriority</td>
<td>O</td>
<td>9.2.3.37</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Masked IMEISV</td>
<td>O</td>
<td></td>
<td>9.2.3.38</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Expected UE Behaviour</td>
<td>O</td>
<td></td>
<td>9.2.7.96</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>ProSe Authorized</td>
<td>O</td>
<td></td>
<td>9.2.1.99</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE User Plane CIoT Support Indicator</td>
<td>O</td>
<td></td>
<td>9.2.1.113</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>V2X Services Authorized</td>
<td>O</td>
<td></td>
<td>9.2.1.120</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Sidelink Aggregate Maximum Bit Rate</td>
<td>O</td>
<td></td>
<td>9.2.1.122</td>
<td>This IE applies only if the UE is authorized for V2X services.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Enhanced Coverage Restricted</td>
<td>O</td>
<td></td>
<td>9.2.1.123</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>NR UE Security Capabilities</td>
<td>O</td>
<td></td>
<td>9.2.1.127</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CE-mode-B Restricted</td>
<td>O</td>
<td></td>
<td>9.2.1.129</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Aerial UE subscription information</td>
<td>O</td>
<td></td>
<td>9.2.1.136</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Pending Data Indication</td>
<td>O</td>
<td></td>
<td>9.2.3.55</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Subscription Based UE Differentiation Information</td>
<td>O</td>
<td></td>
<td>9.2.1.140</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### Range bound

| maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256. |
9.1.4.2 Void

9.1.4.3 INITIAL CONTEXT SETUP RESPONSE

This message is sent by the eNB to confirm the setup of a UE context.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Setup List</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;E-RAB Setup Item IEs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EACH</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;GTP-TEID</td>
<td>M</td>
<td>9.2.2.2</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed to Setup List</td>
<td>O</td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RAB Setup List IE and E-RAB Failed to Setup List IE.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximumE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>

9.1.4.4 INITIAL CONTEXT SETUP FAILURE

This message is sent by the eNB to indicate that the setup of the UE context was unsuccessful.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>
9.1.4.5  UE CONTEXT RELEASE REQUEST

This message is sent by the eNB to request the release of the UE-associated S1-logical connection over the S1 interface.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>GW Context Release Indication</td>
<td>O</td>
<td></td>
<td>9.2.1.84</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Secondary RAT Usage Report List</td>
<td>O</td>
<td></td>
<td>9.2.1.124</td>
<td>Yes</td>
<td>Yes</td>
<td>ignore</td>
</tr>
</tbody>
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9.1.4.6  UE CONTEXT RELEASE COMMAND

This message is sent by the MME to request the release of the UE-associated S1-logical connection over the S1 interface.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CHOICE UE S1AP IDs</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>&gt;&gt;UE S1AP ID pair</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>&gt;&gt;MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.4.7  UE CONTEXT RELEASE COMPLETE

This message is sent by the eNB to confirm the release of the UE-associated S1-logical connection over the S1 interface.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>User Location Information</td>
<td>O</td>
<td></td>
<td>9.2.1.93</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Information on Recommended Cells</td>
<td>O</td>
<td></td>
<td>9.2.1.105</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>and eNBs for Paging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell Identifier and Coverage</td>
<td>O</td>
<td></td>
<td>9.2.1.109</td>
<td>YES</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Enhancement Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary RAT Usage Report List</td>
<td>O</td>
<td></td>
<td>9.2.1.124</td>
<td>Yes</td>
<td>Yes</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.4.8  UE CONTEXT MODIFICATION REQUEST

This message is sent by the MME to provide UE Context information changes to the eNB.
### Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
</tr>
<tr>
<td>Security Key</td>
<td>O</td>
<td>9.2.1.41</td>
<td>A fresh KeNB is provided after performing a key-change on the fly procedure in the MME, see TS 33.401 [15].</td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Subscriber Profile ID for RAT/Frequency priority</td>
<td>O</td>
<td>9.2.1.39</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>O</td>
<td>9.2.1.20</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS Fallback Indicator</td>
<td>O</td>
<td>9.2.3.21</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>UE Security Capabilities</td>
<td>O</td>
<td>9.2.1.40</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td>9.2.1.73</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registered LAI</td>
<td>O</td>
<td>9.2.3.1</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional CS Fallback Indicator</td>
<td>O</td>
<td>9.2.3.37</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProSe Authorized</td>
<td>O</td>
<td>9.2.1.99</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRVCC Operation Possible</td>
<td>O</td>
<td>9.2.1.58</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRVCC Operation Not Possible</td>
<td>O</td>
<td>9.2.1.119</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2X Services Authorized</td>
<td>O</td>
<td>9.2.1.120</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Sidelink Aggregate Maximum Bit Rate</td>
<td>O</td>
<td>9.2.1.122</td>
<td>This IE applies only if the UE is authorized for V2X services.</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR UE Security Capabilities</td>
<td>O</td>
<td>9.2.1.127</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerial UE subscription information</td>
<td>O</td>
<td>9.2.1.136</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifCSFBhighpriority</td>
<td>This IE shall be present if the CS Fallback Indicator IE is set to “CS Fallback High Priority”.</td>
</tr>
</tbody>
</table>

### 9.1.4.9 UE CONTEXT MODIFICATION RESPONSE

This message is sent by the eNB to confirm the performed UE context updates.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.4.10 UE CONTEXT MODIFICATION FAILURE

This message is sent by the eNB in case the performed UE context update is not successful.

Direction: eNB → MME
### 9.1.4.11 UE RADIO CAPABILITY MATCH REQUEST

This message is sent by the MME to request the compatibility between the UE radio capabilities and network configuration.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.4.12 UE RADIO CAPABILITY MATCH RESPONSE

This message is sent by the eNB to report the compatibility between the UE radio capabilities and network configuration.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Voice Support Match Indicator</td>
<td>M</td>
<td></td>
<td>9.2.1.85</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.4.13 UE CONTEXT MODIFICATION INDICATION

This message is sent by the eNB to request the MME to modify the UE Context information.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CSG Membership Info</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>&gt;CSG Membership Status</td>
<td>M</td>
<td></td>
<td>9.2.1.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;CSG Id</td>
<td>M</td>
<td></td>
<td>9.2.1.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Cell Access Mode</td>
<td>O</td>
<td></td>
<td>9.2.1.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>O</td>
<td></td>
<td>9.2.3.8</td>
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<td></td>
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</table>

### 9.1.4.14 UE CONTEXT MODIFICATION CONFIRM

This message is sent by the MME to confirm the modification of the UE Context information.
Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
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<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td></td>
<td>9.2.1.73</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.4.15 UE CONTEXT SUSPEND REQUEST

This message is sent by the eNB to request the MME to suspend the UE context and the related bearer contexts.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Information on Recommended Cells and eNBs for Paging</td>
<td>O</td>
<td>9.2.1.105</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell Identifier and Coverage Enhancement Level</td>
<td>O</td>
<td>9.2.1.109</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary RAT Usage Report List</td>
<td>O</td>
<td>9.2.1.124</td>
<td>Yes</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.1.4.16 UE CONTEXT SUSPEND RESPONSE

This message is sent by the MME to indicate to the eNB the UE context and the related bearer contexts have been suspended.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Security Context</td>
<td>O</td>
<td></td>
<td>9.2.1.26</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

### 9.1.4.17 UE CONTEXT RESUME REQUEST

This message is sent by the eNB to request the MME to indicate that the suspended RRC connection has been resumed, or the UE accesses for early data transmission.

Direction: eNB → MME
### 9.1.4.18 UE CONTEXT RESUME RESPONSE

This message is sent by the MME to indicate to the eNB that the UE context and the related bearer contexts have been resumed in the EPC.

**Direction:** MME → eNB

#### Table 1: IE/Group Name, Presence, Range, IE type and reference, Semantics description, Criticality, Assigned Criticality

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed To Resume List</td>
<td></td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>&gt;E-RAB Failed To Resume Item IEs</td>
<td></td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td></td>
<td></td>
<td>EACH</td>
<td>reject</td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cause</td>
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<td>9.2.1.3</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRC Resume Cause</td>
<td>O</td>
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<td>RRC Establishment Cause 9.2.1.3a</td>
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<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

#### Table 2: Range bound, Explanation

| maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256. |

### 9.1.4.19 UE CONTEXT RESUME FAILURE

This message is sent by the MME to indicate to the eNB that resumption of the UE context and the related bearer contexts has failed in the EPC.

**Direction:** MME → eNB

#### Table 3: IE/Group Name, Presence, Range, IE type and reference, Semantics description, Criticality, Assigned Criticality

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed To Resume List</td>
<td></td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>&gt;E-RAB Failed To Resume Item IEs</td>
<td></td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td></td>
<td></td>
<td>EACH</td>
<td>reject</td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Context</td>
<td>O</td>
<td>9.2.1.26</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pending Data Indication</td>
<td>O</td>
<td>9.2.3.55</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Table 4: Range bound, Explanation

| maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256. |

ETSII
9.1.4.20 CONNECTION ESTABLISHMENT INDICATION

This message is sent by the MME to complete the establishment of the UE-associated logical S1-connection.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.4.21 RETRIEVE UE INFORMATION

The message is sent by the eNB to request UE information over the S1 interface.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>S-TMSI</td>
<td>M</td>
<td></td>
<td>9.2.3.6</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

9.1.4.22 UE INFORMATION TRANSFER

The message is sent by the MME to transfer UE information over the S1 interface.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>S-TMSI</td>
<td>M</td>
<td></td>
<td>9.2.3.6</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>UE Level QoS Parameters</td>
<td>O</td>
<td></td>
<td>9.2.1.15</td>
<td>E-RAB Level QoS Parameters</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Radio Capability</td>
<td>O</td>
<td></td>
<td>9.2.1.27</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Subscription Based UE</td>
<td>O</td>
<td></td>
<td>9.2.1.140</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Differentiation Information</td>
<td>O</td>
<td></td>
<td>9.2.3.55</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>
9.1.4.23  eNB CP RELOCATION INDICATION

This message is sent by the eNB to initiate the establishment of a UE-associated logical S1-connection, following the reception of re-establishment request as described in TS. 36.300 [14].

Direction: eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>S-TMSI</td>
<td>M</td>
<td></td>
<td>9.2.3.6</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UL CP Security Information</td>
<td>M</td>
<td></td>
<td>9.2.3.50</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

9.1.4.24  MME CP RELOCATION INDICATION

This message is sent by the MME to inform the eNB that the UE is to be relocated as described in TS. 36.300 [14].

Direction: MME → eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>
9.1.5 Handover Signalling Messages

9.1.5.1 HANDOVER REQUIRED

This message is sent by the source eNB to the MME to request the preparation of resources at the target.

Direction: eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Handover Type</td>
<td>M</td>
<td></td>
<td>9.2.1.13</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Target ID</td>
<td>M</td>
<td></td>
<td>9.2.1.6</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Direct Forwarding PathAvailability</td>
<td>O</td>
<td></td>
<td>9.2.3.15</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>SRVCC HO Indication</td>
<td>O</td>
<td></td>
<td>9.2.1.59</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Source to Target Transparent Container</td>
<td>M</td>
<td></td>
<td>9.2.1.56</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Source to Target Transparent Container Secondary</td>
<td>O</td>
<td></td>
<td>Source to Target Transparent Container 9.2.1.56</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>MS Classmark 2</td>
<td>C-</td>
<td></td>
<td>9.2.1.64</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>MS Classmark 3</td>
<td>C-</td>
<td></td>
<td>9.2.1.65</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>CSG Id</td>
<td>O</td>
<td></td>
<td>9.2.1.62</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Cell Access Mode</td>
<td>O</td>
<td></td>
<td>9.2.1.74</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>PS Service Not Available</td>
<td>O</td>
<td></td>
<td>9.2.1.77</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

**Condition** | **Explanation**
--- | ---
ifSRVCCtoGERAN | This IE shall be present if the Handover Type IE is set to the “Value” LTEtoGERAN and the SRVCC HO Indication IE is present.
9.1.5.2 HANDOVER COMMAND

This message is sent by the MME to inform the source eNB that resources for the handover have been prepared at the target side.

Direction: MME → eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE STAP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE STAP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Handover Type</td>
<td>M</td>
<td></td>
<td>9.2.1.13</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>NAS Security Parameters from E-UTRAN</td>
<td></td>
<td></td>
<td></td>
<td>9.2.3.30</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The eNB shall use this IE as specified in TS 33.401 [15].</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**E-RABs Subject to Forwarding List**

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

**>E-RABs Subject to Forwarding Item IEs**

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.2</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL Transport Layer Address</td>
<td>O</td>
<td></td>
<td>9.2.2.1</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL GTP-TEID</td>
<td>O</td>
<td></td>
<td>9.2.2.2</td>
<td>To deliver forwarded DL PDCP SDUs.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UL Transport Layer Address</td>
<td>O</td>
<td></td>
<td>9.2.2.1</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UL GTP-TEID</td>
<td>O</td>
<td></td>
<td>9.2.2.2</td>
<td>To deliver forwarded UL PDCP SDUs.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>E-RABs to Release List</td>
<td>O</td>
<td></td>
<td>E-RAB List 9.2.1.36</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Target to Source Transparent Container</td>
<td>M</td>
<td></td>
<td>9.2.1.57</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Target to Source Transparent Container Secondary</td>
<td>O</td>
<td></td>
<td>Target to Source Transparent Container 9.2.1.57</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>iftoUTRANGERAN</td>
<td>This IE shall be present if the Handover Type IE is set to the value “LTEtoUTRAN” or “LTEtoGERAN”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofE-RABs</td>
<td>Maximum no. of E-RABs for one UE. Value is 256.</td>
</tr>
</tbody>
</table>
9.1.5.3 HANDOVER PREPARATION FAILURE

This message is sent by the MME to inform the source eNB that the Handover Preparation has failed.

Direction: MME → eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.1.5.4  HANOVER REQUEST

This message is sent by the MME to the target eNB to request the preparation of resources.

Direction: MME → eNB.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Handover Type</td>
<td>M</td>
<td></td>
<td>9.2.1.13</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>M</td>
<td></td>
<td>9.2.1.20</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

**E-RABS To Be Setup List**

1. YES reject

**>E-RABS To Be Setup Item IEs**

1.. <maxnoofE-RABs>

- EACH reject

| >>E-RAB ID                                        | M        | 9.2.1.2 |                       |                       |             |                       |
| >>Transport Layer Address                        | M        | 9.2.2.1 |                       |                       |             |                       |
| >>GTP-TEID                                       | M        | 9.2.2.2 | To deliver UL PDUs.  |                       |             |                       |
| >>E-RAB Level QoS Parameters                     | M        | 9.2.1.15| Includes necessary QoS parameters. | |             |                       |
| >>Data Forwarding Not Possible                   | O        | 9.2.1.76|                       |                       | YES         | ignore                |
| >>Bearer Type                                    | O        | 9.2.1.116|                       |                       | YES         | reject                |
| Source to Target Transparent Container           | M        | 9.2.1.56|                       |                       | YES         | reject                |
| UE Security Capabilities                         | M        | 9.2.1.40|                       |                       | YES         | reject                |
| Handover Restriction List                        | O        | 9.2.1.22|                       |                       | YES         | ignore                |
| Trace Activation                                 | O        | 9.2.1.4 |                       |                       | YES         | ignore                |
| Request Type                                     | O        | 9.2.1.34|                       |                       | YES         | ignore                |
| SRVCC Operation Possible                         | O        | 9.2.1.58|                       |                       | YES         | ignore                |
| Security Context                                 | M        | 9.2.1.26|                       |                       | YES         | reject                |
| NAS Security Parameters to E-UTRAN               | C-      | 9.2.3.31|                       | The eNB shall use this IE as specified in TS 33.401 [15]. | YES         | reject                |
| CSG Id                                           | O        | 9.2.1.62|                       |                       | YES         | reject                |
| CSG Membership Status                            | O        | 9.2.1.73|                       |                       | YES         | ignore                |
| GUMMEI                                           | O        | 9.2.3.9 |                       | This IE indicates the MME serving the UE. | YES         | ignore                |
| MME UE S1AP ID 2                                 | O        | 9.2.3.3 |                       | This IE indicates the MME UE S1AP ID assigned by the MME. | YES         | ignore                |
| Management Based MDT Allowed                    | O        | 9.2.1.83|                       |                       | YES         | ignore                |
| Management Based MDT PLMN List                   | O        | MDT PLMN List 9.2.1.89|                       |                       | YES         | ignore                |
| Masked IMEI SV                                   | O        | 9.2.3.38|                       |                       | YES         | ignore                |
| Expected UE Behaviour                            | O        | 9.2.1.96|                       |                       | YES         | ignore                |
| ProSe Authorized                                 | O        | 9.2.1.99|                       |                       | YES         | ignore                |
| UE User Plane CIoT Support Indicator             | O        | 9.2.1.113|                       |                       | YES         | ignore                |
| V2X Services Authorized                         | O        | 9.2.1.120|                       |                       | YES         | ignore                |
| UE Sidelink Aggregate Maximum Bit Rate           | O        | 9.2.1.122|                       | This IE applies only if the UE is authorized for V2X services. | YES         | ignore                |
| Enhanced Coverage Restricted                     | O        | 9.2.1.123|                       |                       | YES         | ignore                |
| NR UE Security Capabilities                      | O        | 9.2.1.127|                       |                       | YES         | ignore                |
| CE-mode-B Restricted                             | O        | 9.2.1.129|                       |                       | YES         | ignore                |
| Aerial UE subscription information               | O        | 9.2.1.136|                       |                       | YES         | ignore                |
| Pending Data Indication                          | O        | 9.2.3.55|                       |                       | YES         | ignore                |
| Subscription Based UE Differentiation Information | O       | 9.2.1.140|                       |                       | YES         | ignore                |
### Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-iffromUTRANGERAN</td>
<td>This IE shall be present if the Handover Type IE is set to the value &quot;UTRANtoLTE&quot; or &quot;GERANtoLTE&quot;.</td>
</tr>
</tbody>
</table>

### Range bound

| maxnoofE-RABs | Maximum no. of E-RABs for one UE. Value is 256. |

### 9.1.5.5 HANDOVER REQUEST ACKNOWLEDGE

This message is sent by the target eNB to inform the MME about the prepared resources at the target.

**Direction:** eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES reject</td>
<td></td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>Allocated at the target eNB.</td>
<td>YES</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>E-RABs Admitted List</td>
<td>1</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
<td></td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;GTP-TEID</td>
<td>M</td>
<td>9.2.2.2</td>
<td>To deliver DL PDUs.</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;DL Transport Layer Address</td>
<td>O</td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;DL GTP-TEID</td>
<td>O</td>
<td>9.2.2.2</td>
<td>To deliver forwarded DL PDCP SDUs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UL Transport Layer Address</td>
<td>O</td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;UL GTP-TEID</td>
<td>O</td>
<td>9.2.2.2</td>
<td>To deliver forwarded UL PDCP SDUs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RABs Failed to Setup List</td>
<td>O</td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RABs Admitted List IE and E-RABs Failed to Setup List IE.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Target to Source Transparent Container</td>
<td>M</td>
<td>9.2.1.57</td>
<td></td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>CSG Id</td>
<td>O</td>
<td>9.2.1.62</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Cell Access Mode</td>
<td>O</td>
<td>9.2.1.74</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>CE-mode-B Support Indicator</td>
<td>O</td>
<td>9.2.1.118</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

### Range bound

| maxnoofE-RABs | Maximum no. of E-RABs for one UE. Value is 256. |
9.1.5.6    HANOVER FAILURE

This message is sent by the target eNB to inform the MME that the preparation of resources has failed.

Direction: eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

9.1.5.7    HANOVER NOTIFY

This message is sent by the target eNB to inform the MME that the UE has been identified in the target cell and the S1 handover has been completed.

Direction: eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>E-UTRAN CGI</td>
<td>M</td>
<td>9.2.1.38</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>TAI</td>
<td>M</td>
<td>9.2.3.16</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Tunnel Information for BBF</td>
<td>O</td>
<td>Tunnel Information 9.2.2.3</td>
<td>Indicating HeNB’s Local IP Address assigned by the broadband access provider, UDP port Number.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>LHN ID</td>
<td>O</td>
<td>9.2.1.92</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>PSCell Information</td>
<td>O</td>
<td>9.2.1.141</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>
9.1.5.8  PATH SWITCH REQUEST

This message is sent by the eNB to request the MME to switch DL GTP tunnel termination point(s) from one end-point to another.

Direction: eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td><strong>E-RAB To Be Switched in Downlink List</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-RABs Switched in Downlink Item IEs</td>
<td></td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td></td>
<td>EACH</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.2</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer address</td>
<td>M</td>
<td></td>
<td>9.2.2.1</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;GTP-TEID</td>
<td>M</td>
<td></td>
<td>9.2.2.2</td>
<td>To deliver DL PDUs.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Source MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>UE Security Capabilities</td>
<td>M</td>
<td></td>
<td>9.2.1.40</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>CSG Id</td>
<td>O</td>
<td></td>
<td>9.2.1.62</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Cell Access Mode</td>
<td>O</td>
<td></td>
<td>9.2.1.74</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Source MME GUMMEI</td>
<td>O</td>
<td></td>
<td>9.2.3.9</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td></td>
<td>9.2.1.73</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Tunnel Information for BBF</td>
<td>O</td>
<td></td>
<td>9.2.2.3</td>
<td>Tunnel Information</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.2.2.3</td>
<td>Indicating HeNB's Local IP Address assigned by the broadband access provider, UDP port Number.</td>
<td></td>
</tr>
<tr>
<td>LHN ID</td>
<td>O</td>
<td></td>
<td>9.2.1.92</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>RRC Resume Cause</td>
<td>O</td>
<td></td>
<td>9.2.1.3a</td>
<td>RRC Establishment Cause</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>NR UE Security Capabilities</td>
<td>O</td>
<td></td>
<td>9.2.1.127</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>PSCell Information</td>
<td>O</td>
<td></td>
<td>9.2.1.141</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

Range bound:  

maxnoofE-RABs  
Maximum no. of E-RABs for one UE. Value is 256.
9.1.5.9 PATH SWITCH REQUEST ACKNOWLEDGE

This message is sent by the MME to inform the eNB that the path switch has been successfully completed in the EPC.

Direction: MME → eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td></td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>O</td>
<td>9.2.1.20</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB To Be Switched in Uplink List</td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RABs Switched in Uplink Item IEs</td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td></td>
<td></td>
<td>EACH ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Transport Layer Address</td>
<td>M</td>
<td>9.2.2.1</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;GTP-TEID</td>
<td>M</td>
<td>9.2.2.2</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB To Be Released List</td>
<td>O</td>
<td></td>
<td>E-RAB List 9.2.1.36</td>
<td>A value for E-RAB ID shall only be present once in E-RAB To Be Switched in Uplink List IE and E-RAB to Be Released List IE.</td>
<td>YES ignore</td>
<td></td>
</tr>
<tr>
<td>Security Context</td>
<td>M</td>
<td>9.2.1.26</td>
<td>One pair of {NCC, NH} is provided.</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID 2</td>
<td>O</td>
<td>9.2.3.3</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td>9.2.1.73</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProSe Authorized</td>
<td>O</td>
<td>9.2.1.199</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE User Plane CIoT Support Indicator</td>
<td>O</td>
<td>9.2.1.113</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V2X Services Authorized</td>
<td>O</td>
<td>9.2.1.120</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Sidelink Aggregate Maximum Bit Rate</td>
<td>O</td>
<td>9.2.1.122</td>
<td>This IE applies only if the UE is authorized for V2X services.</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhanced Coverage Restricted</td>
<td>O</td>
<td>9.2.1.123</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR UE Security Capabilities</td>
<td>O</td>
<td>9.2.1.127</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE-mode-B Restricted</td>
<td>O</td>
<td>9.2.1.129</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerial UE subscription information</td>
<td>O</td>
<td>9.2.1.136</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pending Data Indication</td>
<td>O</td>
<td>9.2.3.55</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscription Based UE Differentiation Information</td>
<td>O</td>
<td>9.2.1.140</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range bound | Explanation
--- | ---
maxnoofE-RABs | Maximum no. of E-RABs for one UE. Value is 256.
9.1.5.10 PATH SWITCH REQUEST FAILURE

This message is sent by the MME to inform the eNB that a failure has occurred in the EPC during the Path switch request procedure.

Direction: MME → eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.5.11 HANDOVER CANCEL

This message is sent by the source eNB to the MME to request the cancellation of an ongoing handover.

Direction: eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.5.12 HANDOVER CANCEL ACKNOWLEDGE

This message is sent by the MME to the source eNB to confirm that the ongoing handover was cancelled.

Direction: MME → eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.5.13 eNB STATUS TRANSFER

This message is sent by the source eNB to transfer the PDCP SN receiver and transmitter status.

Direction: eNB → MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB Status Transfer Transparent Container</td>
<td>M</td>
<td>9.2.1.31</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.5.14 MME STATUS TRANSFER

This message is sent by the MME to transfer the PDCP-SN receiver and transmitter status.

Direction: MME → eNB
9.1.6 PAGING

This message is sent by the MME and is used to page a UE in one or several tracking areas.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td>reject</td>
</tr>
<tr>
<td>eNB Status Transfer</td>
<td>M</td>
<td></td>
<td>9.2.1.31</td>
<td>YES</td>
<td>reject</td>
<td>reject</td>
</tr>
</tbody>
</table>

### List of TAI s

- >TAI List Item
  - 1..<maxnoofTAIs>

- >>TAI
  - M
  - 9.2.3.16

### CSG Id List

- >CSG Id
  - 1..<maxnoofCSGId>

- Paging Priority
  - O
  - 9.2.1.78

- UE Radio Capability for Paging
  - O
  - 9.2.1.98

- Assistance Data for Paging
  - O
  - 9.2.1.103

- Paging eDRX Information
  - O
  - 9.2.1.111

- Extended UE Identity Index Value
  - O
  - 9.2.3.46

- NB-IoT Paging eDRX Information
  - O
  - 9.2.1.115

- NB-IoT UE Identity Index Value
  - O
  - 9.2.3.47

- Enhanced Coverage Restricted
  - O
  - 9.2.1.123

- CE-Mode-B Restricted
  - O
  - 9.2.1.129

### Range bound

<table>
<thead>
<tr>
<th>maxnoofTAIs</th>
<th>Maximum no. of TAs. Value is 256.</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCSGIds</td>
<td>Maximum no. of CSG Ids within the CSG Id List. Value is 256.</td>
</tr>
</tbody>
</table>

**Explanation**

- maxnoofTAIs: Maximum no. of TAIs. Value is 256.
- maxnoofCSGIds: Maximum no. of CSG Ids within the CSG Id List. Value is 256.
9.1.7 NAS Transport Messages

9.1.7.1 INITIAL UE MESSAGE

This message is sent by the eNB to transfer the initial layer 3 message to the MME over the S1 interface.

Direction: eNB → MME
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>NAS-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.5</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td>Indicating the Tracking Area from which the UE has sent the NAS message.</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td>Indicating the E-UTRAN CGI from which the UE has sent the NAS message.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>RRC Establishment Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3a</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>S-TMSI</td>
<td>O</td>
<td></td>
<td>9.2.3.6</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>CSG Id</td>
<td>O</td>
<td></td>
<td>9.2.1.62</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>GUMMEI</td>
<td>O</td>
<td></td>
<td>9.2.3.9</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>Cell Access Mode</td>
<td>O</td>
<td></td>
<td>9.2.1.74</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>GW Transport Layer Address</td>
<td>O</td>
<td></td>
<td>Transport Layer Address 9.2.2.1</td>
<td>Indicating GW Transport Layer Address if the GW is collocated with eNB.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Relay Node Indicator</td>
<td>O</td>
<td></td>
<td>9.2.1.79</td>
<td>Indicating a relay node.</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>GUMMEI Type</td>
<td>O</td>
<td></td>
<td>ENUMERATE D (native, mapped, ..., mappedFrom5G)</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Tunnel Information for BBF</td>
<td>O</td>
<td></td>
<td>Tunnel Information 9.2.2.3</td>
<td>Indicating HeNB’s Local IP Address assigned by the broadband access provider, UDP port Number.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>SIPTO L-GW Transport Layer Address</td>
<td>O</td>
<td></td>
<td>Transport Layer Address 9.2.2.1</td>
<td>Indicating SIPTO L-GW Transport Layer Address if the SIPTO L-GW is collocated with eNB.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>LHN ID</td>
<td>O</td>
<td></td>
<td>9.2.1.92</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>MME Group ID</td>
<td>O</td>
<td></td>
<td>9.2.3.44</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>UE Usage Type</td>
<td>O</td>
<td></td>
<td>INTEGER (0..255)</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>CE-mode-B Support Indicator</td>
<td>O</td>
<td></td>
<td>9.2.1.118</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>DCN ID</td>
<td>O</td>
<td></td>
<td>INTEGER (0..65535)</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Coverage Level</td>
<td>O</td>
<td></td>
<td>ENUMERATE D (extendedcoverage, ...)</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
</tbody>
</table>
9.1.7.2 DOWNLINK NAS TRANSPORT

This message is sent by the MME and is used for carrying NAS information over the S1 interface.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>NAS-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.5</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Handover Restriction List</td>
<td>O</td>
<td></td>
<td>9.2.1.22</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Subscriber Profile ID for RAT/Frequency priority</td>
<td>O</td>
<td></td>
<td>9.2.1.39</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>SRVCC Operation Possible</td>
<td>O</td>
<td></td>
<td>9.2.1.58</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Radio Capability</td>
<td>O</td>
<td></td>
<td>9.2.1.27</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>DL NAS PDU Delivery Acknowledgment Request</td>
<td>O</td>
<td></td>
<td>9.2.3.48</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Enhanced Coverage Restricted</td>
<td>O</td>
<td></td>
<td>9.2.1.123</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CE-mode-B Restricted</td>
<td>O</td>
<td></td>
<td>9.2.1.129</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>NR UE Security Capabilities</td>
<td>O</td>
<td></td>
<td>9.2.1.127</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Capability Info Request</td>
<td>O</td>
<td></td>
<td>9.2.3.51</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>End Indication</td>
<td>O</td>
<td></td>
<td>9.2.3.54</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Pending Data Indication</td>
<td>O</td>
<td></td>
<td>9.2.3.55</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Subscription Based UE Differentiation Information</td>
<td>O</td>
<td></td>
<td>9.2.1.140</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.7.3 UPLINK NAS TRANSPORT

This message is sent by the eNB and is used for carrying NAS information over the S1 interface.

Direction: eNB → MME
### 9.1.7.4 NAS NON DELIVERY INDICATION

This message is sent by the eNB and is used for reporting the non delivery of a NAS PDU previously received within a DOWNLINK NAS TRANSPORT message over the S1 interface.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>NAS-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.5</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>GW Transport Layer Address</td>
<td>O</td>
<td></td>
<td>Transport Layer Address 9.2.2.1</td>
<td>Indicating GW Transport Layer Address if the GW is collocated with eNB.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>SIPTO L-GW Transport Layer Address</td>
<td>O</td>
<td></td>
<td>Transport Layer Address 9.2.2.1</td>
<td>Indicating SIPTO L-GW Transport Layer Address if the SIPTO L-GW is collocated with eNB.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>LHN ID</td>
<td>O</td>
<td></td>
<td>9.2.1.92</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>PCell Information</td>
<td>O</td>
<td></td>
<td>9.2.1.141</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.7.4a NAS DELIVERY INDICATION

This message is sent by the eNB and is used for reporting the successful delivery of a NAS PDU to the UE that was previously received within a DOWNLINK NAS TRANSPORT message.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>
9.1.7.5 REROUTE NAS REQUEST

This message is sent by the MME in order to request for a rerouting of the INITIAL UE MESSAGE to a DCN.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>O</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>S1 Message</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the INITIAL UE MESSAGE</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>MME Group ID</td>
<td>M</td>
<td></td>
<td>9.2.3.44</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Additional GUTI</td>
<td>O</td>
<td></td>
<td>9.2.3.45</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Usage Type</td>
<td>O</td>
<td></td>
<td>INTEGER (0..255)</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.8 Management messages

9.1.8.1 RESET

This message is sent by both the MME and the eNB and is used to request that the S1 interface, or parts of the S1 interface, to be reset.

Direction: MME → eNB and eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CHOICE Reset Type</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;S1 interface</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Reset All</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Reset all,...)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Part of S1 interface</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UE-associated logical S1-connection list</td>
<td>M</td>
<td>9.2.3.3</td>
<td>EACH</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;UE-associated logical S1-connection Item</td>
<td>M</td>
<td>9.2.3.4</td>
<td>EACH</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;MME UE S1AP ID</td>
<td>O</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;eNB UE S1AP ID</td>
<td>O</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Range bound | Explanation
---|---
maxnoofIndividualS1ConnectionsToReset | Maximum no. of UE-associated logical S1-connections allowed to reset in one message. Value is 256.

9.1.8.2 RESET ACKNOWLEDGE

This message is sent by both the MME and the eNB as a response to a RESET message.

Direction: eNB → MME and MME → eNB.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>0..1</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td>ignore</td>
</tr>
<tr>
<td>UE-associated logical S1-connection list</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;UE-associated logical S1-connection Item</td>
<td></td>
<td></td>
<td>1..&lt;maxnoofIndividualS1ConnectionsToReset&gt;</td>
<td>EACH</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;MME UE S1AP ID</td>
<td>O</td>
<td></td>
<td>9.2.3.3</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;eNB UE S1AP ID</td>
<td>O</td>
<td></td>
<td>9.2.3.4</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

<table>
<thead>
<tr>
<th>maxnoofIndividualS1ConnectionsToReset</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum no. of UE-associated logical S1-connections allowed to reset in one message. Value is 256.</td>
</tr>
</tbody>
</table>

### 9.1.8.3 ERROR INDICATION

This message is sent by both the MME and the eNB and is used to indicate that some error has been detected in the node.

Direction: MME → eNB and eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>O</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>O</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>O</td>
<td></td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.1.8.4 S1 SETUP REQUEST

This message is sent by the eNB to transfer information for a TNL association.

Direction: eNB → MME
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td></td>
<td></td>
<td>YES reject</td>
<td></td>
</tr>
<tr>
<td>Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td></td>
<td></td>
<td>YES reject</td>
<td></td>
</tr>
<tr>
<td>eNB Name</td>
<td>O</td>
<td></td>
<td>PrintableString(SIZE(1..150,…))</td>
<td></td>
<td>YES ignore</td>
<td></td>
</tr>
<tr>
<td><strong>Supported TAs</strong></td>
<td>1..&lt;maxnoofTACs &gt;</td>
<td></td>
<td>Supported TAs in the eNB.</td>
<td></td>
<td>GLOBAL reject</td>
<td></td>
</tr>
<tr>
<td>&gt;TAC</td>
<td>M</td>
<td>9.2.3.7</td>
<td>Broadcast TAC.</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;Broadcast PLMNs</td>
<td>1..&lt;maxnoofBPLMNs&gt;</td>
<td></td>
<td>Broadcast PLMNs.</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default Paging DRX</td>
<td>M</td>
<td>9.2.1.16</td>
<td></td>
<td></td>
<td>YES ignore</td>
<td></td>
</tr>
<tr>
<td><strong>CSG Id List</strong></td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
<td>GLOBAL reject</td>
<td></td>
</tr>
<tr>
<td>&gt;CSG Id</td>
<td>1..&lt;maxnoofCSGIds &gt;</td>
<td></td>
<td></td>
<td></td>
<td>9.2.1.62</td>
<td></td>
</tr>
<tr>
<td>UE Retention Information</td>
<td>O</td>
<td>9.2.1.112</td>
<td></td>
<td></td>
<td>YES ignore</td>
<td></td>
</tr>
<tr>
<td>NB-IoT Default Paging DRX</td>
<td>O</td>
<td>9.2.1.114</td>
<td></td>
<td></td>
<td>YES ignore</td>
<td></td>
</tr>
<tr>
<td><strong>Connected en-gNB List</strong></td>
<td>&lt;0.. maxnoofConnecteden-gNBs&gt;</td>
<td></td>
<td></td>
<td></td>
<td>GLOBAL ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;en-gNB ID</td>
<td>M</td>
<td>9.2.1.37a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Supported TAs</td>
<td>1..&lt;maxnoofTACs &gt;</td>
<td></td>
<td>Supported (EPS) TAs in the en-gNB.</td>
<td></td>
<td>GLOBAL reject</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Configured TAC</td>
<td>M</td>
<td>TAC 9.2.3.7</td>
<td>This information is used as specified in TS 36.300 [14].</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Broadcast PLMNs</td>
<td>1..&lt;maxnoofBPLMNs&gt;</td>
<td></td>
<td>Broadcast PLMNs.</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Range bound

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofTACs</td>
<td>Maximum no. of TACs. Value is 256.</td>
</tr>
<tr>
<td>maxnoofBPLMNs</td>
<td>Maximum no. of Broadcast PLMNs. Value is 6.</td>
</tr>
<tr>
<td>maxnoofCSGIds</td>
<td>Maximum no. of CSG Ids within the CSG Id List. Value is 256.</td>
</tr>
<tr>
<td>maxnoofConnecteden-gNBs</td>
<td>Maximum no. of en-gNBs connected to the eNB. Value is 256.</td>
</tr>
</tbody>
</table>

### 9.1.8.5 S1 SETUP RESPONSE

This message is sent by the MME to transfer information for a TNL association.

Direction: MME → eNB
<table>
<thead>
<tr>
<th>Message Type</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

| MME Name     | O        |       |                       |                       | YES        | ignore              |

| Served GUMMEIs | 1..<maxnoofRATs> | The LTE related pool configuration is included on the first place in the list. | GLOBAL | reject |

| >Served PLMNs | 1..<maxnoofPLMNsPerMME> | - | |
| >>>PLMN Identity | M | 9.2.3.8 | - |

| >Served GroupIDs | 1..<maxnoofGroupIDs> | - | |
| >>>MME Group ID | M | OCTET STRING (SIZE(2)) | - |

| >Served MMECs | 1..<maxnoofMMECs> | - | |
| >>>MME Code | M | 9.2.3.12 | - |

| Relative MME Capacity | M | 9.2.3.17 | YES | ignore |
| MME Relay Support Indicator | O | 9.2.1.82 | YES | ignore |

| Criticality Diagnostics | O | 9.2.1.21 | YES | ignore |
| UE Retention Information | O | 9.2.1.112 | YES | ignore |

| Served DCNs | 0..<maxnoofDCNs> | GLOBAL | ignore |
| >Served DCNs Items | M | 9.2.1.121 | - |

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofPLMNsPerMME</td>
<td>Maximum no. of PLMNs per MME. Value is 32.</td>
</tr>
<tr>
<td>maxnoofRATs</td>
<td>Maximum no. of RATs. Value is 8.</td>
</tr>
<tr>
<td>maxnoofGroupIDs</td>
<td>Maximum no. of GroupIDs per node per RAT. Value is 65535.</td>
</tr>
<tr>
<td>maxnoofMMECs</td>
<td>Maximum no. of MMECs per node per RAT. Value is 256.</td>
</tr>
<tr>
<td>maxnoofDCNs</td>
<td>Maximum no. of DCNs served by one MME. Value is 32.</td>
</tr>
</tbody>
</table>

### 9.1.8.6 S1 SETUP FAILURE

This message is sent by the MME to indicate S1 Setup failure.

**Direction:** MME \(\rightarrow\) eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to wait</td>
<td>O</td>
<td>9.2.1.61</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.1.8.7 ENB CONFIGURATION UPDATE

This message is sent by the eNB to transfer updated information for a TNL association.

**Direction:** eNB \(\rightarrow\) MME
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB Name</td>
<td>O</td>
<td>PrintableString(SIZE(1..150 ...))</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Supported TAs</td>
<td>0..&lt;maxnoofTACs&gt;</td>
<td>9.2.3.1</td>
<td>Supported TAs in the eNB.</td>
<td>GLOBAL</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>&gt;TAC</td>
<td>M</td>
<td>9.2.3.7</td>
<td>Broadcast TAC.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Broadcast PLMNs</td>
<td>1..&lt;maxnoofBPLMNs&gt;</td>
<td>9.2.3.8</td>
<td>Broadcast PLMNs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;RAT-Type</td>
<td>O</td>
<td>9.2.1.117</td>
<td>RAT Type associated with the TAC of the indicated PLMN(s).</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>CSG Id List</td>
<td>0..1</td>
<td>GLOBAL</td>
<td></td>
<td></td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>&gt;CSG Id</td>
<td>1..&lt;maxnoofCSGId&gt;</td>
<td>9.2.1.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default Paging DRX</td>
<td>O</td>
<td>9.2.1.16</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>NB-IoT Default Paging DRX</td>
<td>O</td>
<td>9.2.1.114</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Connected en-gNB To Be Added List</td>
<td>&lt;0. maxnoofConnecteden-gNBs&gt;</td>
<td>GLOBAL</td>
<td></td>
<td></td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;en-gNB ID</td>
<td>M</td>
<td>9.2.1.37a</td>
<td>Supported TAs in the en-gNB.</td>
<td>GLOBAL</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Supported TAs</td>
<td>1..&lt;maxnoofTACs&gt;</td>
<td>TAC 9.2.3.7</td>
<td>Supported TAs in the en-gNB.</td>
<td>GLOBAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Configured TAC</td>
<td>M</td>
<td>TAC 9.2.3.7</td>
<td>Broadcast PLMNs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Broadcast PLMNs</td>
<td>1..&lt;maxnoofBPLMNs&gt;</td>
<td>9.2.3.8</td>
<td>Broadcast PLMNs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connected en-gNB To Be Removed List</td>
<td>&lt;0. maxnoofConnecteden-gNBs&gt;</td>
<td>GLOBAL</td>
<td></td>
<td></td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;en-gNB ID</td>
<td>M</td>
<td>9.2.1.37a</td>
<td>Supported TAs in the en-gNB.</td>
<td>GLOBAL</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Supported TAs</td>
<td>1..&lt;maxnoofTACs&gt;</td>
<td>TAC 9.2.3.7</td>
<td>Broadcast PLMNs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Configured TAC</td>
<td>M</td>
<td>TAC 9.2.3.7</td>
<td>Broadcast PLMNs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Broadcast PLMNs</td>
<td>1..&lt;maxnoofBPLMNs&gt;</td>
<td>9.2.3.8</td>
<td>Broadcast PLMNs.</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofTACs</td>
<td>Maximum no. of TACs. Value is 256.</td>
</tr>
<tr>
<td>maxnoofBPLMNs</td>
<td>Maximum no. of Broadcast PLMNs. Value is 6.</td>
</tr>
<tr>
<td>maxnoofCSGIds</td>
<td>Maximum no. of CSG Ids within the CSG Id List. Value is 256.</td>
</tr>
<tr>
<td>maxnoofConnecteden-gNBs</td>
<td>Maximum no. of en-gNBs connected to the eNB. Value is 256.</td>
</tr>
</tbody>
</table>

### 9.1.8.8 ENB CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by the MME to acknowledge the eNB transfer updated information for a TNL association.

Direction: MME → eNB
### 9.1.8.9 ENB CONFIGURATION UPDATE FAILURE

This message is sent by the MME to indicate S1 eNB Configuration Update failure.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Explanation

- **maxnoofPLMNsPerMME**: Maximum no. of PLMNs per MME. Value is 32.
- **maxnoofRATs**: Maximum no. of RATs. Value is 8.
- **maxnoofGroupIDs**: Maximum no. of GroupIDs per node per RAT. Value is 65535.
- **maxnoofMMECs**: Maximum no. of MMECs per node per RAT. Value is 256.
- **maxnoofDCNs**: Maximum no. of DCNs served by one MME. Value is 32.

### 9.1.8.10 MME CONFIGURATION UPDATE

This message is sent by the MME to transfer updated information for a TNL association.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME Name</td>
<td>O</td>
<td>PrintableString(SIZE(1..150, …))</td>
<td>YES ignore</td>
<td></td>
<td>Global reject</td>
<td></td>
</tr>
<tr>
<td>Served GUMMEIs</td>
<td>0..&lt;maxnoofRATs&gt;</td>
<td>9.2.1.61</td>
<td>The LTE related pool configuration is included on the first place in the list.</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served PLMNs</td>
<td>1..&lt;maxnoofPLMNsPerMME&gt;</td>
<td>9.2.3.8</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served GroupIDs</td>
<td>1..&lt;maxnoofGroupIDs&gt;</td>
<td>9.2.3.8</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME GroupID</td>
<td>M</td>
<td>OCTET STRING (SIZE(2))</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served MMECs</td>
<td>1..&lt;maxnoofMMECs&gt;</td>
<td>9.2.3.12</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME Code</td>
<td>M</td>
<td>9.2.3.17</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative MME Capacity</td>
<td>O</td>
<td>9.2.3.17</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served DCNs</td>
<td>0..&lt;maxnoofDCNs&gt;</td>
<td>9.2.1.121</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Explanation

- **Range bound Explanation**
  - **maxnoofPLMNsPerMME**: Maximum no. of PLMNs per MME. Value is 32.
  - **maxnoofRATs**: Maximum no. of RATs. Value is 8.
  - **maxnoofGroupIDs**: Maximum no. of GroupIDs per node per RAT. Value is 65535.
  - **maxnoofMMECs**: Maximum no. of MMECs per node per RAT. Value is 256.
  - **maxnoofDCNs**: Maximum no. of DCNs served by one MME. Value is 32.

### 9.1.8.11 MME CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by the eNB to acknowledge the MME transfer updated information for a TNL association.

Direction: eNB → MME
### 9.1.8.12 MME CONFIGURATION UPDATE FAILURE

This message is sent by the eNB to indicate S1 MME Configuration Update failure.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Message 9.1.8.12**

9.1.8.12 MME CONFIGURATION UPDATE FAILURE

This message is sent by the eNB to indicate S1 MME Configuration Update failure.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to wait</td>
<td>O</td>
<td>9.2.1.61</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

<table>
<thead>
<tr>
<th>maxnoofMMECs</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum no. of MMECs per node per RAT. Value is 256.</td>
</tr>
</tbody>
</table>

### 9.1.8.13 OVERLOAD START

This message is sent by the MME and is used to indicate to the eNB that the MME is overloaded.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload Response</td>
<td>M</td>
<td>9.2.3.19</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GUMMEI List</td>
<td>0..1</td>
<td>9.2.3.9</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;GUMMEI List Item</td>
<td>1..&lt;maxnoofMMECs&gt;</td>
<td>EACH</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Load Reduction</td>
<td>O</td>
<td>9.2.3.36</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

<table>
<thead>
<tr>
<th>maxnoofMMECs</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum no. of MMECs per node per RAT. Value is 256.</td>
</tr>
</tbody>
</table>

### 9.1.8.14 OVERLOAD STOP

This message is sent by the MME and is used to indicate that the MME is no longer overloaded.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GUMMEI List</td>
<td>0..1</td>
<td>9.2.3.9</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;GUMMEI List Item</td>
<td>1..&lt;maxnoofMMECs&gt;</td>
<td>EACH</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;GUMMEI</td>
<td>M</td>
<td>9.2.3.9</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

<table>
<thead>
<tr>
<th>maxnoofMMECs</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum no. of MMECs per node per RAT. Value is 256.</td>
</tr>
</tbody>
</table>
9.1.9 S1 CDMA2000 Tunnelling Messages

9.1.9.1 DOWNLINK S1 CDMA2000 TUNNELLING

This message is sent by the MME and is used for carrying CDMA2000 information over the S1 interface.

Direction: MME $\rightarrow$ eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-RABS Subject to Forwarding List</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;E-RABS Subject to Forwarding Item IEs</td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td>EACH</td>
<td></td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;E-RAB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL Transport Layer Address</td>
<td>O</td>
<td></td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL GTP-TEID</td>
<td>O</td>
<td></td>
<td>9.2.2.2</td>
<td>This IE indicates the tunnel endpoint for forwarding of DL data.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UL Transport Layer Address</td>
<td>O</td>
<td></td>
<td>9.2.2.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UL GTP-TEID</td>
<td>O</td>
<td></td>
<td>9.2.2.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDMA2000 HO Status</td>
<td>O</td>
<td></td>
<td>9.2.1.28</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CDMA2000 RAT Type</td>
<td>M</td>
<td></td>
<td>9.2.1.24</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 Sector ID</td>
<td>M</td>
<td></td>
<td>9.2.1.25</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 HO Required Indication</td>
<td>O</td>
<td></td>
<td>9.2.1.29</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CDMA2000 1xRTT SRVCC Indication</td>
<td>O</td>
<td></td>
<td>9.2.1.35</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 1xRTT RAND</td>
<td>O</td>
<td></td>
<td>9.2.1.33</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000-PDU</td>
<td>M</td>
<td></td>
<td>9.2.1.23</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

Range bound | Explanation
maxnoofE-RABs | Maximum no. of E-RABs for one UE. Value is 256.

9.1.9.2 UPLINK S1 CDMA2000 TUNNELLING

This message is sent by the eNB and is used for carrying CDMA2000 information over the S1 interface.

Direction: eNB $\rightarrow$ MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 RAT Type</td>
<td>M</td>
<td></td>
<td>9.2.1.24</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 Sector ID</td>
<td>M</td>
<td></td>
<td>9.2.1.25</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 HO Required Indication</td>
<td>O</td>
<td></td>
<td>9.2.1.29</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CDMA2000 1xRTT SRVCC Indication</td>
<td>O</td>
<td></td>
<td>9.2.1.35</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 1xRTT RAND</td>
<td>O</td>
<td></td>
<td>9.2.1.33</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000-PDU</td>
<td>M</td>
<td></td>
<td>9.2.1.23</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN Round Trip Delay Estimation Info</td>
<td>O</td>
<td></td>
<td>9.2.1.69</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.10 UE CAPABILITY INFO INDICATION

This message is sent by the eNB to provide UE Radio Capability information to the MME.

Direction: eNB $\rightarrow$ MME
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>UE Radio Capability</td>
<td>M</td>
<td></td>
<td>9.2.1.27</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>UE Radio Capability for Paging</td>
<td>O</td>
<td>9.2.1.98</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
</tbody>
</table>
| UE Application Layer Measurement Capability                 | O        |       | BIT STRING (SIZE(8))   | Each bit in the bitmap indicates an UE Application layer measurement capability. Refer to TS 25.331[10].
                                                                 |           |                   | Bit 0 = QoE Measurement for streaming service                                          |             |                      |
                                                                 |           |                   | Bit 1 = QoE Measurement for MTSI service                                                |             |                      |
                                                                 |           |                   | Value ‘1’ indicates “Capable” and value ‘0’ indicates “not Capable”.                   |             |                      |
                                                                 |           |                   | Unused bits are reserved for future use.                                               |             |                      |
| LTE-M Indication                                           | O        | 9.2.1.135 |                            | YES ignore                                                                             |             | ignore               |

### 9.1.11 Trace Messages

#### 9.1.11.1 TRACE START

This message is sent by the MME to initiate trace recording for a UE.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>Trace Activation</td>
<td>M</td>
<td></td>
<td>9.2.1.4</td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
</tbody>
</table>

#### 9.1.11.2 TRACE FAILURE INDICATION

This message is sent by the eNB to indicate that a Trace Start procedure or a Deactivate Trace procedure has failed for a UE.

**Direction:** eNB → MME
### 9.1.11.3 DEACTIVATE TRACE

This message is sent by the MME to deactivate trace.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN Trace ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(8))</td>
<td>As per E-UTRAN Trace ID IE in Trace Activation IE (9.2.1.4).</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.12 Location Reporting Messages

#### 9.1.12.1 LOCATION REPORTING CONTROL

This message is sent by the MME and is used to request the eNB to report where the UE is currently located.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Request Type</td>
<td>M</td>
<td></td>
<td>9.2.1.34</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

#### 9.1.12.2 LOCATION REPORT FAILURE INDICATION

This message is sent by the eNB and is used to indicate the failure of location report.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

#### 9.1.12.3 LOCATION REPORT

This message is sent by the eNB and is used to provide the UE’s location to the MME.
Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Request Type</td>
<td>M</td>
<td></td>
<td>9.2.1.34</td>
<td>The Request Type IE is sent as it has been provided.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>PSCell Information</td>
<td>O</td>
<td></td>
<td>9.2.1.141</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.13 Warning Message Transmission Messages

9.1.13.1 WRITE-REPLACE WARNING REQUEST

This message is sent by the MME to request the start or overwrite of the broadcast of a warning message.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Message Identifier</td>
<td>M</td>
<td></td>
<td>9.2.1.44</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Serial Number</td>
<td>M</td>
<td></td>
<td>9.2.1.45</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Warning Area List</td>
<td>O</td>
<td></td>
<td>9.2.1.46</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Repetition Period</td>
<td>M</td>
<td></td>
<td>9.2.1.48</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Extended Repetition</td>
<td>O</td>
<td></td>
<td>9.2.1.75</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Number of Broadcasts</td>
<td>M</td>
<td></td>
<td>9.2.1.49</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Warning Type</td>
<td>O</td>
<td></td>
<td>9.2.1.50</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Warning Security</td>
<td>O</td>
<td></td>
<td>9.2.1.51</td>
<td>See TS 23.041 [29].</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Coding Scheme</td>
<td>O</td>
<td></td>
<td>9.2.1.52</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Warning Message</td>
<td>O</td>
<td></td>
<td>9.2.1.53</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Contents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concurrent Warning</td>
<td>O</td>
<td></td>
<td>9.2.1.72</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Message Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning Area Coordinates</td>
<td>O</td>
<td></td>
<td>9.2.1.139</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.13.2 WRITE-REPLACE WARNING RESPONSE

This message is sent by the eNB to acknowledge the MME on the start or overwrite request of a warning message.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Message Identifier</td>
<td>M</td>
<td></td>
<td>9.2.1.44</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Serial Number</td>
<td>M</td>
<td></td>
<td>9.2.1.45</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Broadcast Completed Area List</td>
<td>O</td>
<td></td>
<td>9.2.1.54</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.1.13.3 KILL REQUEST

This message is forwarded by the MME to eNB to cancel an already ongoing broadcast of a warning message.
9.1.13.4 KILL RESPONSE

This message is sent by the eNB to indicate the list of warning areas where cancellation of the broadcast of the identified message was successful and unsuccessful.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message Identifier</td>
<td>M</td>
<td>9.2.1.44</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial Number</td>
<td>M</td>
<td>9.2.1.45</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning Area List</td>
<td>O</td>
<td>9.2.1.46</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kill-all Warning Messages Indicator</td>
<td>O</td>
<td>9.2.1.91</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.13.5 PWS RESTART INDICATION

This message is sent by the eNB to inform the MME that PWS information for some or all cells of the eNB are available for reloading from the CBC if needed.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-CGI List for Restart</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-CGI</td>
<td>M</td>
<td>9.2.1.38</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAI List for Restart</td>
<td>M</td>
<td>9.2.3.16</td>
<td>EACH</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;TAI</td>
<td>M</td>
<td>9.2.3.16</td>
<td>EACH</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Area ID List for Restart</td>
<td>M</td>
<td>9.2.1.47</td>
<td>EACH</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range bound

<table>
<thead>
<tr>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCellsforRestart</td>
<td>Maximum no. of Cell ID subject for reloading warning messages broadcast. Value is 256.</td>
</tr>
<tr>
<td>maxnoofRestartTAIs</td>
<td>Maximum no. of TAI subject for reloading warning message broadcast. Value is 2048.</td>
</tr>
<tr>
<td>maxnoofRestartEmergencyAreaIDs</td>
<td>Maximum no. of Emergency Area ID subject for reloading warning message broadcast. Value is 256.</td>
</tr>
</tbody>
</table>
9.1.13.6 PWS FAILURE INDICATION

This message is sent by the eNB to inform the MME that ongoing PWS operation for one or more cells of the eNB has failed.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PWS failed E-CGI List</td>
<td></td>
<td>1..&lt;maxnoofCells ineNB&gt;</td>
<td>EACH</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-CGI</td>
<td>M</td>
<td>9.2.1.38</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range bound | Explanation
maxnoofCells ineNB | Maximum no. of cells that can be served by an eNB. Value is 256.

9.1.14 eNB DIRECT INFORMATION TRANSFER

This message is sent by the eNB in order to transfer specific information.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inter-system Information</td>
<td>M</td>
<td>9.2.1.55</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.15 MME DIRECT INFORMATION TRANSFER

This message is sent by the MME in order to transfer specific information.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inter-system Information</td>
<td>M</td>
<td>9.2.1.55</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.16 eNB CONFIGURATION TRANSFER

This message is sent by the eNB in order to transfer RAN configuration information.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SON Configuration Transfer</td>
<td>O</td>
<td>9.2.3.26</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN-DC SON Configuration Transfer</td>
<td>O</td>
<td>9.2.3.26a</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.17 MME CONFIGURATION TRANSFER

This message is sent by the MME in order to transfer RAN configuration information.
Direction: MME → eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>SON Configuration Transfer</td>
<td>O</td>
<td></td>
<td>9.2.3.26</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>EN-DC SON Configuration Transfer</td>
<td>O</td>
<td></td>
<td>9.2.3.26a</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.18 CELL TRAFFIC TRACE

This message is sent by eNB to transfer specific information.

Direction: eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN Trace ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(8))</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Trace Collection Entity IP Address</td>
<td>M</td>
<td></td>
<td>Transport Layer Address 9.2.2.1</td>
<td>Defined in TS 32.422 [10]</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Privacy Indicator</td>
<td>O</td>
<td></td>
<td>ENUMERATED (Immediate MDT, Logged MDT, ...)</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.1.19 LPPa Transport Messages

#### 9.1.19.1 DOWNLINK UE ASSOCIATED LPPA TRANSPORT

This message is sent by the MME and is used for carrying LPPa message over the S1 interface.

Direction: MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Routing ID</td>
<td>M</td>
<td></td>
<td>9.2.3.33</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>LPPa-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.32</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

#### 9.1.19.2 UPLINK UE ASSOCIATED LPPA TRANSPORT

This message is sent by the eNB and is used for carrying LPPa message over the S1 interface.

Direction: eNB → MME
### 9.1.19.3 DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT

This message is sent by the MME and is used for carrying LPPa message over the S1 interface.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.33</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Routing ID</td>
<td>M</td>
<td></td>
<td>9.2.3.33</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>LPPa-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.32</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
</tbody>
</table>

**Message Type:** 9.1.19.3 DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT

This message is sent by the MME and is used for carrying LPPa message over the S1 interface.

**Direction:** MME → eNB

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Routing ID</td>
<td>M</td>
<td></td>
<td>9.2.3.33</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>LPPa-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.32</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
</tbody>
</table>

### 9.1.19.4 UPLINK NON UE ASSOCIATED LPPA TRANSPORT

This message is sent by the eNB and is used for carrying LPPa message over the S1 interface.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Routing ID</td>
<td>M</td>
<td></td>
<td>9.2.3.33</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>LPPa-PDU</td>
<td>M</td>
<td></td>
<td>9.2.3.32</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
</tbody>
</table>

### 9.1.20 Secondary RAT Report Data Usage Messages

#### 9.1.20.1 SECONDARY RAT DATA USAGE REPORT

This message is sent by the eNB to report Secondary RAT data usage.

**Direction:** eNB → MME

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Type</td>
<td>M</td>
<td></td>
<td>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Secondary RAT Usage Report list</td>
<td>M</td>
<td></td>
<td>9.2.1.124</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Handover Flag</td>
<td>O</td>
<td></td>
<td>9.2.1.125</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2 Information Element Definitions

#### 9.2.0 General

Subclause 9.2 presents the S1AP IE definitions in tabular format. The corresponding ASN.1 definition is presented in subclause 9.3. In case there is contradiction between the tabular format in subclause 9.2 and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.
The messages have been defined in accordance to the guidelines specified in TR 25.921 [40].

When specifying information elements 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;

### 9.2.1 Radio Network Layer Related IEs

#### 9.2.1.1 Message Type

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

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure Code</td>
<td>M</td>
<td>INTEGER (0..255)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Message</td>
<td>M</td>
<td>CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, ...)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 9.2.1.2 E-RAB ID

This element uniquely identifies a radio access bearer for a particular UE, which makes the E-RAB ID unique over one S1 connection. The E-RAB ID shall remain the same for the duration of the E-RAB even if the UE-associated logical S1-connection is released or moved using S1 handover.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-RAB ID</td>
<td>M</td>
<td></td>
<td>INTEGER (0..15, ...)</td>
<td></td>
</tr>
</tbody>
</table>

#### 9.2.1.3 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the S1AP protocol.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Cause Group</td>
<td>M</td>
<td></td>
<td><strong>Radio Network Layer</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;&gt;Radio Network Layer Cause</td>
<td>M  ENUMERATED (Unspecified, TX2RELOCoverall Expiry, Successful Handover, Release due to E-UTRAN Generated Reason, Handover Cancelled, Partial Handover, Handover Failure In Target EPC/eNB Or Target System, Handover Target not allowed, TS1RELOCoverall Expiry, TS1RELOprep Expiry, Cell not available, Unknown Target ID, No Radio Resources Available in Target Cell, Unknown or already allocated MME UE S1AP ID, Unknown or already allocated eNB UE S1AP ID, Unknown or inconsistent pair of UE S1AP ID, Handover desirable for radio reasons, Time critical handover, Resource optimisation handover, Reduce load in serving cell, User inactivity, Radio Connection With UE Lost, Load Balancing TAU Required, CS Fallback Triggered, UE Not Available For PS Service, Radio resources not available, Failure in the Radio Interface Procedure, Invalid QoS combination, Inter-RAT redirection, Interaction with other procedure, Unknown E-RAB ID, Multiple E-RAB ID instances, Encryption and/or integrity protection algorithms not supported, S1 intra system Handover triggered, S1 inter system Handover triggered, ... Redirection towards 1xRTT, Not supported QCI value, invalid CSG Id, Release due to Pre-Emption)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;&gt;Transport Layer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;&gt;Transport Layer Cause</td>
<td>M  ENUMERATED (Transport Resource Unavailable, Unspecified, ...)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;&gt;NAS</td>
<td>M  ENUMERATED (Normal Release, Authentication failure, Detach, Unspecified, ...)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;&gt;Protocol Cause</td>
<td>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, ...)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;&gt;Misc</td>
<td></td>
</tr>
<tr>
<td>Radio Network Layer cause</td>
<td>Meaning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unspecified</td>
<td>Sent for radio network layer cause when none of the specified cause values applies.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TX2RELOCOoverall Expiry</td>
<td>The timer guarding the handover that takes place over X2 has abnormally expired.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successful Handover</td>
<td>Successful handover.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release due to E-UTRAN generated reason</td>
<td>Release is initiated due to E-UTRAN generated reason.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover Cancelled</td>
<td>The reason for the action is cancellation of Handover.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial Handover</td>
<td>Provides a reason for the handover cancellation. The HANDOVER COMMAND message from MME contained E-RABs to Release List IE and the source eNB estimated service continuity for the UE would be better by not proceeding with handover towards this particular target eNB.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover Failure in Target EPC/eNB Or Target System</td>
<td>The handover failed due to a failure in target EPC/eNB or target system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover Target not allowed</td>
<td>Handover to the indicated target cell is not allowed for the UE in question.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TS1RELOCoverall Expiry</td>
<td>The reason for the action is expiry of timer TS1RELOCoverall.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TS1RELOCPREP Expiry</td>
<td>Handover Preparation procedure is cancelled when timer TS1RELOCPREP expires.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell not available</td>
<td>The concerned cell is not available.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown Target ID</td>
<td>Handover rejected because the target ID is not known to the EPC.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No radio resources available in target cell</td>
<td>Load on target cell is too high.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown or already allocated MME UE S1AP ID</td>
<td>The action failed because the MME UE S1AP ID is either unknown, or (for a first message received at the eNB) is known and already allocated to an existing context.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown or already allocated eNB UE S1AP ID</td>
<td>The action failed because the eNB UE S1AP ID is either unknown, or (for a first message received at the MME) is known and already allocated to an existing context.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown or inconsistent pair of UE S1AP ID</td>
<td>The action failed because both UE S1AP IDs are unknown, or are known but do not define a single UE context.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover Desirable for Radio Reasons</td>
<td>The reason for requesting handover is radio related.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Critical Handover</td>
<td>Handover is requested for time critical reason i.e., this cause value is reserved to represent all critical cases where the connection is likely to be dropped if handover is not performed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource Optimisation Handover</td>
<td>The reason for requesting handover is to improve the load distribution with the neighbour cells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce Load in Serving Cell</td>
<td>Load on serving cell needs to be reduced. When applied to handover preparation, it indicates the handover is triggered due to load balancing.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
### User Inactivity
The action is requested due to user inactivity on all E-RABs, e.g., S1 is requested to be released in order to optimise the radio resources.

### Radio Connection With UE Lost
The action is requested due to losing the radio connection to the UE.

### Load Balancing TAU Required
The action is requested for all load balancing and offload cases in the MME.

### CS Fallback triggered
The action is due to a CS fallback that has been triggered. When it is included in UE CONTEXT RELEASE REQUEST message, it indicates the PS service suspension is not required in the EPC.

### UE Not Available for PS Service
The action is requested due to a CS fallback to GERAN that has been triggered. When it is included in the UE CONTEXT RELEASE REQUEST message, it indicates that the PS service suspension is required in the EPC due to the target GERAN cell or the UE has no DTM capability.

### Radio resources not available
No requested radio resources are available.

### Invalid QoS combination
The action was failed because of invalid QoS combination.

### Inter-RAT Redirection
The release is requested due to inter-RAT redirection or intra-LTE redirection. When it is included in UE CONTEXT RELEASE REQUEST message, the behaviour of the EPC is specified in TS 23.401 [11].

### Failure in the Radio Interface Procedure
Radio interface procedure has failed.

### Interaction with other procedure
The action is due to an ongoing interaction with another procedure.

### Unknown E-RAB ID
The action failed because the E-RAB ID is unknown in the eNB.

### Multiple E-RAB ID Instances
The action failed because multiple instances of the same E-RAB had been provided to the eNB.

### Encryption and/or integrity protection algorithms not supported
The eNB is unable to support any of the encryption and/or integrity protection algorithms supported by the UE.

### S1 Intra system Handover triggered
The action is due to a S1 intra system handover that has been triggered.

### S1 Inter system Handover triggered
The action is due to a S1 inter system handover that has been triggered.

### X2 Handover triggered
The action is due to an X2 handover that has been triggered.

### Redirection towards 1xRTT
The release of the UE-associated logical S1 connection is requested due to redirection towards a 1xRTT system e.g., CS fallback to 1xRTT, or SRVCC to 1xRTT, when the PS service suspension is required in the EPC. During this procedure, the radio interface message might but need not include redirection information.

### Not supported QCI Value
The E-RAB setup failed because the requested QCI is not supported.

### Invalid CSG Id
The CSG ID provided to the target eNB was found invalid.

### Release due to Pre-Emption
Release is initiated due to pre-emption.

<table>
<thead>
<tr>
<th>Transport Layer cause</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Resource Unavailable</td>
<td>The required transport resources are not available.</td>
</tr>
<tr>
<td>Unspecified</td>
<td>Sent when none of the above cause values applies but still the cause is Transport Network Layer related.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NAS cause</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Release</td>
<td>The release is normal.</td>
</tr>
<tr>
<td>Authentication Failure</td>
<td>The action is due to authentication failure.</td>
</tr>
<tr>
<td>Detach</td>
<td>The action is due to detach.</td>
</tr>
<tr>
<td>Unspecified</td>
<td>Sent when none of the above cause values applies but still the cause is NAS related.</td>
</tr>
<tr>
<td>CSG Subscription Expiry</td>
<td>The action is due to the UE becoming a non-member of the currently used CSG.</td>
</tr>
</tbody>
</table>
### Protocol cause

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

### Miscellaneous cause

<table>
<thead>
<tr>
<th>Miscellaneous cause</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Processing Overload</td>
<td>Control processing overload.</td>
</tr>
<tr>
<td>Not Enough User Plane Processing Resources Available</td>
<td>No enough resources are available related to user plane processing.</td>
</tr>
<tr>
<td>Hardware Failure</td>
<td>Action related to hardware failure.</td>
</tr>
<tr>
<td>O&amp;M Intervention</td>
<td>The action is due to O&amp;M intervention.</td>
</tr>
<tr>
<td>Unspecified Failure</td>
<td>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.</td>
</tr>
<tr>
<td>Unknown PLMN</td>
<td>The MME does not identify any PLMN provided by the eNB.</td>
</tr>
</tbody>
</table>

#### 9.2.1.3a RRC Establishment Cause

The purpose of the **RRC Establishment Cause** IE is to indicate to the MME the reason for RRC Connection Establishment or RRC Connection Resume as received from the UE in the `EstablishmentCause`, `EstablishmentCause-NB` or `ResumeCause` defined in TS 36.331 [16].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRC Establishment Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED(emergency, highPriorityAccess, mt-Access, mo-Signalling, mo-Data, ...delayTolerantAccess, mo-VoiceCall, mo-ExceptionData)</td>
<td></td>
</tr>
</tbody>
</table>

#### 9.2.1.4 Trace Activation

Defines parameters related to a trace activation.
### 9.2.1.5 Source ID

Void.

### 9.2.1.6 Target ID

The Target ID IE identifies the target for the handover. The target ID may be, e.g., the target Global eNB-ID (for intra SAE/LTE), the RNC-ID (for SAE/LTE-UMTS handover) or the Cell Global ID of the handover target (in case of SAE/LTE to GERAN A/Gb mode handover).
9.2.1.7 Source eNB to Target eNB Transparent Container

The Source eNB to Target eNB Transparent Container IE is an information element that is produced by the source eNB and is transmitted to the target eNB. For inter-system handovers to E-UTRAN, the IE is transmitted from the external handover source to the target eNB.

This IE is transparent to the EPC.
### 9.2.1.8 Target eNB to Source eNB Transparent Container

The **Target eNB to Source eNB Transparent Container** IE is an information element that is produced by the target eNB and is transmitted to the source eNB. For inter-system handovers to E-UTRAN, the IE is transmitted from the target eNB to the external relocation source.

This IE is transparent to EPC.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>RRC Container</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Includes the RRC Handover Preparation Information message as defined in subclause 10.2.2 of TS 36.331 [16].</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.9 Source RNC to Target RNC Transparent Container

This IE is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to UTRAN.
This IE defined in TS 25.413 [19].

### 9.2.1.10 Target RNC to Source RNC Transparent Container

This container is used to transparently pass radio related information between the handover target and the handover source through the EPC. This container is used inter 3GPP RAT handovers from SAE/LTE to UTRAN.

This IE defined in TS 25.413 [19].

### 9.2.1.11 Source BSS to Target BSS Transparent Container

This container is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.018 [18].

### 9.2.1.12 Target BSS to Source BSS Transparent Container

This container is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.018 [18].

### 9.2.1.13 Handover Type

This IE indicates which kind of handover was triggered in the source side.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handover Type</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(IntraLTE, LTEtoUTRAN, LTEtoGERAN, UTRANtoLTE, GERANtoLTE, EPSto5GS, 5GStoEPS)</td>
</tr>
</tbody>
</table>

### 9.2.1.14 Extended RNC-ID

The Extended RNC-ID is used to identify an RNC.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended RNC-ID</td>
<td>M</td>
<td>(4096..65535)</td>
<td>INTEGER</td>
<td>The Extended RNC-ID IE shall be used if the RNC identity has a value larger than 4095.</td>
</tr>
</tbody>
</table>

### 9.2.1.15 E-RAB Level QoS Parameters

This IE defines the QoS to be applied to an E-RAB.
### 9.2.1.16 Paging DRX

This IE indicates the Paging DRX as defined in TS 36.304 [20].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paging DRX</td>
<td>M</td>
<td></td>
<td>ENUMERATED(32, 64, 128, 256, ...)</td>
<td></td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.17 Paging Cause

Void.

### 9.2.1.18 GBR QoS Information

This IE indicates the maximum and guaranteed bit rates of a GBR bearer for downlink and uplink.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-RAB Maximum Bit Rate</td>
<td>M</td>
<td>Bit Rate</td>
<td>9.2.1.19</td>
<td><strong>Desc.:</strong> This IE indicates the maximum downlink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer. If the <em>Extended E-RAB Maximum Bit Rate Downlink</em> IE is included, the <em>E-RAB Maximum Bit Rate Downlink</em> IE shall be ignored.</td>
</tr>
<tr>
<td>Downlink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Maximum Bit Rate</td>
<td>M</td>
<td>Bit Rate</td>
<td>9.2.1.19</td>
<td><strong>Desc.:</strong> This IE indicates the maximum uplink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer. If the <em>Extended E-RAB Maximum Bit Rate Uplink</em> IE is included, the <em>E-RAB Maximum Bit Rate Uplink</em> IE shall be ignored.</td>
</tr>
<tr>
<td>Uplink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Guaranteed Bit Rate</td>
<td>M</td>
<td>Bit Rate</td>
<td>9.2.1.19</td>
<td><strong>Desc.:</strong> This IE indicates the downlink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer. If the <em>Extended E-RAB Guaranteed Bit Rate Downlink</em> IE is included, the <em>E-RAB Guaranteed Bit Rate Downlink</em> IE shall be ignored.</td>
</tr>
<tr>
<td>Downlink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Guaranteed Bit Rate</td>
<td>M</td>
<td>Bit Rate</td>
<td>9.2.1.19</td>
<td><strong>Desc.:</strong> This IE indicates the uplink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer. If the <em>Extended E-RAB Guaranteed Bit Rate Uplink</em> IE is included, the <em>E-RAB Guaranteed Bit Rate Uplink</em> IE shall be ignored.</td>
</tr>
<tr>
<td>Uplink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended E-RAB Maximum</td>
<td>O</td>
<td>Extended Bit Rate</td>
<td>9.2.1.126</td>
<td><strong>Desc.:</strong> This IE indicates the maximum downlink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer.</td>
</tr>
<tr>
<td>Bit Rate Downlink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended E-RAB Maximum</td>
<td>O</td>
<td>Extended Bit Rate</td>
<td>9.2.1.126</td>
<td><strong>Desc.:</strong> This IE indicates the maximum uplink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer.</td>
</tr>
<tr>
<td>Bit Rate Uplink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended E-RAB Guaranteed</td>
<td>O</td>
<td>Extended Bit Rate</td>
<td>9.2.1.126</td>
<td><strong>Desc.:</strong> This IE indicates the downlink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer.</td>
</tr>
<tr>
<td>Bit Rate Downlink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended E-RAB Guaranteed</td>
<td>O</td>
<td>Extended Bit Rate</td>
<td>9.2.1.126</td>
<td><strong>Desc.:</strong> This IE indicates the uplink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer.</td>
</tr>
<tr>
<td>Bit Rate Uplink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.19 Bit Rate

This IE indicates the number of bits delivered by E-UTRAN in UL or to E-UTRAN in DL or by UE in sidelink 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 bearer, or an aggregated maximum bit rate.
9.2.1.20 UE Aggregate Maximum Bit Rate

The UE Aggregate Maximum Bitrate is applicable for all Non-GBR bearers per UE which is defined for the Downlink and the Uplink direction and provided by the MME to the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td></td>
<td></td>
<td>INTEGER</td>
<td>The unit is: bit/s.</td>
</tr>
</tbody>
</table>

**UE Aggregate Maximum Bit Rate Downlink**

This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the downlink direction. If the Extended UE Aggregate Maximum Bit Rate Downlink IE is included, the UE Aggregate Maximum Bit Rate Downlink IE shall be ignored.

**UE Aggregate Maximum Bit Rate Uplink**

This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the uplink direction. Receiving both the UE Aggregate Maximum Bit Rate Downlink IE and the UE Aggregate Maximum Bit Rate Uplink IE equal to value zero shall be considered as a logical error by the eNB. If the Extended UE Aggregate Maximum Bit Rate Uplink IE is included, the UE Aggregate Maximum Bit Rate Uplink IE shall be ignored.

**Extended UE Aggregate Maximum Bit Rate Downlink**

This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the downlink direction.

**Extended UE Aggregate Maximum Bit Rate Uplink**

This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the uplink direction.

9.2.1.21 Criticality Diagnostics

The Criticality Diagnostics IE is sent by the eNB or the MME 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).
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure Code</td>
<td>O</td>
<td></td>
<td>INTEGER (0..255)</td>
<td>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.</td>
</tr>
<tr>
<td>Triggering Message</td>
<td>O</td>
<td></td>
<td>ENUMERATED(Initiating message, successful outcome, unsuccessful outcome)</td>
<td>The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.</td>
</tr>
<tr>
<td>Procedure Criticality</td>
<td>O</td>
<td></td>
<td>ENUMERATED(reject, ignore, notify)</td>
<td>This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).</td>
</tr>
<tr>
<td>Information Element</td>
<td></td>
<td>0..&lt;maxnoofErrors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td></td>
<td></td>
<td>ENUMERATED(reject, ignore, notify)</td>
<td>The IE Criticality is used for reporting the criticality of the triggering IE. The value 'ignore' shall not be used.</td>
</tr>
<tr>
<td>&gt;IE Criticality</td>
<td>M</td>
<td></td>
<td>ENUMERATED(reject, ignore, notify)</td>
<td>The IE Criticality is used for reporting the criticality of the triggering IE. The value 'ignore' shall not be used.</td>
</tr>
<tr>
<td>&gt;IE ID</td>
<td>M</td>
<td></td>
<td>INTEGER (0..65535)</td>
<td>The IE ID of the not understood or missing IE.</td>
</tr>
<tr>
<td>&gt;Type of Error</td>
<td>M</td>
<td></td>
<td>ENUMERATED(not understood, missing, …)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofErrors</td>
<td>Maximum no. of IE errors allowed to be reported with a single message. The value for maxnoofErrors is 256.</td>
</tr>
</tbody>
</table>

### 9.2.1.22 Handover Restriction List

This IE defines roaming or access restrictions for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE, e.g., handover and CCO, or for SCG selection during dual connectivity operation. If the eNB receives the Handover Restriction List IE, it shall overwrite previously received restriction information.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving PLMN</td>
<td>M</td>
<td>9.2.3.8</td>
<td>Allowed PLMNs in addition to Serving PLMN. This list corresponds to the list of “equivalent PLMNs” as defined in TS 24.301 [24]. This list is part of the roaming restriction information. Roaming restrictions apply to PLMNs other than the Serving PLMN and Equivalent PLMNs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equivalent PLMNs</td>
<td>0..&lt;maxnoofEPL MNs&gt;</td>
<td>9.2.3.8</td>
<td>Allowed PLMNs in addition to Serving PLMN. This list corresponds to the list of “equivalent PLMNs” as defined in TS 24.301 [24]. This list is part of the roaming restriction information. Roaming restrictions apply to PLMNs other than the Serving PLMN and Equivalent PLMNs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td>The PLMN of forbidden TACs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forbidden TAs</td>
<td>0..&lt;maxnoofEPL MNsPlusOne&gt;</td>
<td>9.2.3.8</td>
<td>Intra LTE roaming restrictions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td>The PLMN of forbidden TACs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;TAC</td>
<td>M</td>
<td>9.2.3.7</td>
<td>The TAC of the forbidden TAI.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forbidden LAs</td>
<td>0..&lt;maxnoofEPL MNsPlusOne&gt;</td>
<td>9.2.3.8</td>
<td>Inter-3GPP RAT roaming restrictions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>M</td>
<td>9.2.3.8</td>
<td>The PLMN of forbidden LACs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;LAC</td>
<td>M</td>
<td>OCTET STRING (SIZE(2))</td>
<td>Inter-3GPP and 3GPP2 RAT access restrictions. “ALL” means that all RATs mentioned in the enumeration of this IE are restricted.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forbidden inter RATs</td>
<td>O</td>
<td>ENUMERATED</td>
<td>Restriction to use NR when the NR is used as secondary RAT in EN-DC. YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR Restriction in EPS as Secondary RAT</td>
<td>O</td>
<td>ENUMERATED</td>
<td>Restriction to use NR when the NR is used as secondary RAT in EN-DC. YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlicensed Spectrum Restriction</td>
<td>O</td>
<td>ENUMERATED</td>
<td>Restriction to use unlicensed spectrum in the form of LAA or LWA/LWIP as described in TS 23.401 [11]. YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Network Type Restrictions</td>
<td>0..&lt;maxnoofEPL MNsPlusOne&gt;</td>
<td>9.2.3.8</td>
<td>Includes any of the Serving PLMN or any PLMN of the Equivalent PLMNs listed in the Mobility Restriction List IE for which Core network type restriction applies as specified in TS 23.501 [46].</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 9.2.1.23 CDMA2000-PDU

This information element contains a CDMA2000 message between the UE and CDMA2000 RAT that is transferred without interpretation in the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000-PDU</td>
<td>M</td>
<td>OCTET</td>
<td>STRING</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.24 CDMA2000 RAT Type

In the uplink, this information element, along with the CDMA2000 Sector ID IE is used for routing the tunnelled CDMA2000 message to the proper destination node in the CDMA2000 RAT and is set by the eNB to the CDMA2000 RAT type received from the UE.

NOTE: In the downlink, this information element is used by the eNB to provide an indication of the RAT Type associated with the tunnelled CDMA2000 message to the UE to help it route the tunnelled downlink CDMA2000 message to the appropriate CDMA upper layer.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000 RAT Type</td>
<td>M</td>
<td>ENUMERATED (HRPD, 1xRTT, ...)</td>
<td>This IE is used to identify which CDMA2000 RAT the tunnelled CDMA2000 signalling is associated with. The source of this information in the uplink is the UE and in the downlink it is the CDMA2000 system.</td>
<td></td>
</tr>
</tbody>
</table>
9.2.1.25 CDMA2000 Sector ID

This information element, along with the RAT Type IE is used for routing the tunnelled CDMA2000 message to the proper destination node in the CDMA2000 RAT.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000 Sector ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>This IE is set to CDMA2000 Reference Cell ID corresponding to the HRPD/1xRTT sector under the HRPD AN/1xBS towards which the signalling is performed. The CDMA2000 Reference Cell ID is statically configured in the eNB. If the RAT type is HRPD, this IE contains the HRPD Sector ID as specified in 3GPP2 C.S0024-B [27]. If the RAT type is 1x RTT, this IE is encoded as the Reference Cell ID IE in 3GPP2 A.S0008-C [25].</td>
</tr>
</tbody>
</table>

9.2.1.26 Security Context

The purpose of the Security Context IE is to provide security related parameters to the eNB which are used to derive security keys for user plane traffic and RRC signalling messages and for security parameter generation for subsequent X2 or intra eNB Handovers, or for the security parameters for the current S1 Handover. For intra LTE S1 Handover one pair of \{NCC, NH\} is provided for 1-hop security, see TS 33.401 [15].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next Hop Chaining Count</td>
<td>M</td>
<td></td>
<td>INTEGER (0..7)</td>
<td>Next Hop Chaining Counter (NCC) defined in TS 33.401 [15]. For inter-RAT Handover into LTE the Next Hop Chaining Count IE takes the value defined for NCC at initial setup, i.e., Next Hop Chaining Count IE = &quot;0&quot;.</td>
</tr>
<tr>
<td>Next-Hop NH</td>
<td>M</td>
<td></td>
<td>9.2.1.41 Security Key</td>
<td>The NH together with the NCC is used to derive the security configuration as defined in TS 33.401 [15]. For inter RAT Handover the Next-Hop NH IE is the KeNB to be used in the new configuration.</td>
</tr>
</tbody>
</table>

9.2.1.27 UE Radio Capability

This IE contains UE Radio Capability information.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Radio Capability</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Includes either the UERadioAccessCapabilityInformation message as defined in 10.2.2 of TS 36.331 [16], or the UERadioAccessCapabilityInformation-NB message as defined in 10.8.2 of TS 36.331 [16].</td>
</tr>
</tbody>
</table>

9.2.1.28 CDMA2000 HO Status

This IE is used to indicate to the eNB which initiated an inter-RAT HO towards CDMA2000 about the outcome of the handover preparation to CDMA2000.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000 HO Status</td>
<td>M</td>
<td></td>
<td>ENUMERATED (HO Success, HO Failure, …)</td>
<td>This IE indicates the status of the handover resource allocation in the CDMA2000 RAT.</td>
</tr>
</tbody>
</table>

### 9.2.1.29 CDMA2000 HO Required Indication

This information element is set by the eNB to provide an indication about whether the UE has initiated the handover preparation with the CDMA2000 RAT.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000 HO Required Indication</td>
<td>M</td>
<td></td>
<td>ENUMERATED (true, …)</td>
<td>This IE indicates to MME that handover preparation to CDMA2000 has been started. It helps MME to decide when to send certain handover preparation information for HRPD (TS 23.402 [8]) and 1xRTT (TS 23.216 [9]) to the CDMA2000 RAT.</td>
</tr>
</tbody>
</table>

### 9.2.1.30 1xRTT MEID

Void.

### 9.2.1.31 eNB Status Transfer Transparent Container

The eNB Status Transfer Transparent Container IE is an information element that is produced by the source eNB and is transmitted to the target eNB. This IE is used for the intra SAE/LTE S1 handover case.

This IE is transparent to the EPC.
## E-RABs Subject to Status Transfer List

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-RABs Subject to Status Transfer Item</td>
<td>I</td>
<td>1</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### >E-RABs Subject to Status Transfer Item

| >>E-RAB ID                             | M        | 9.2.1.2     |                       |                        | -           | -                    |
| >>UL COUNT value                       | M        | COUNT Value 9.2.1.32 | PDCP-SN and HFN of first missing UL PDCP SDU in case of 12 bit long PDCP-SN. | -           | -                    |
| >>DL COUNT value                       | M        | COUNT Value 9.2.1.32 | PDCP-SN and HFN that the target eNB should assign for the next DL SDU not having an SN yet in case of 12 bit long PDCP-SN. | -           | -                    |

### Receive Status Of UL PDCP SDUs

| >>Receive Status Of UL PDCP SDUs       | O        | BIT STRING (SIZE(4096)) | PDCP Sequence Number = (First Missing SDU Number + bit position) modulo 4096. 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly. | YES         | ignore               |

### Receive Status Of UL PDCP SDUs Extended

| >>Receive Status Of UL PDCP SDUs Extended | O        | BIT STRING (SIZE(1..16384 )) | The IE is used in case of 15 bit long PDCP-SN in this release. The first bit indicates the status of the SDU after the First Missing UL PDCP SDU. The Nth bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN); 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly. | YES         | ignore               |

### UL COUNT Value for PDCP SN Length 18

| >>UL COUNT Value for PDCP SN Length 18 | O        | COUNT Value for PDCP SN Length 18 9.2.1.100 | PDCP-SN and HFN of first missing UL PDCP SDU in case of 18 bit long PDCP-SN. | YES         | ignore               |
9.2.1.100  PDCP-SN and HFN that the target eNB should assign for the next DL SDU not having an SN yet in case of 18 bit long PDCP-SN.

9.2.1.101  The IE is used in case of 18 bit long PDCP-SN.

9.2.1.102  The first bit indicates the status of the SDU after the First Missing UL PDCP SDU.

9.2.1.103  The Nth bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN).

0: PDCP SDU has not been received.
1: PDCP SDU has been received correctly.

9.2.1.32  COUNT Value

This IE contains a PDCP sequence number and a hyper frame number in case of 12 bit long PDCP-SN.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP-SN</td>
<td>M</td>
<td></td>
<td>INTEGER (0..4095)</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HFN</td>
<td>M</td>
<td></td>
<td>INTEGER (0..1048575)</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

9.2.1.33  CDMA2000 1xRTT RAND

This information element is a random number generated by the eNB and tunnelled to the 1xCS IWS (TS 23.402 [8]) and is transparent to MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000 1xRTT RAND</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>This IE is a Random Challenge that is used for authentication of UE during 1xCS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>registration, eCSFB to 1xRTT or handover from E-UTRAN to CDMA2000 1xRTT RAT.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>This IE is coded as the RAND (32bits) of the Authentication Challenge Parameter (RAND)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>in 3GPP2 A.S0008-C [25].</td>
</tr>
</tbody>
</table>

9.2.1.34  Request Type

The purpose of the Request Type IE is to indicate the type of location request to be handled by the eNB.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Event Type</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>ENUMERATED(Direct, Change of service cell, Stop Change of service cell, …)</td>
</tr>
<tr>
<td>&gt;Report Area</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>ENUMERATED (ECGI, …)</td>
</tr>
</tbody>
</table>

### 9.2.1.35 CDMA2000 1xRTT SRVCC Info

This IE defines SRVCC related information elements that are assembled by the MME to be tunnelled transparently to the 1xCS IWS (TS 23.402 [8]) system.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000 1xRTT SRVCC Info</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;CDMA2000 1xRTT MEID</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>This information element is the Mobile Equipment Identifier or Hardware ID that is tunnelled from the UE and is transparent to the eNB. This IE is used to derive a MEID-based PLCM that is used for channelization in CDMA2000 1xRTT network.</td>
</tr>
<tr>
<td>&gt;CDMA2000 1xRTT Mobile Subscription Information</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>This IE provides the list of UE supported 1x RTT Band classes and Band Subclasses. It is provided by the UE to the eNB as part of the UE capability. It is transparent to the eNB.</td>
</tr>
<tr>
<td>&gt;CDMA2000 1xRTT Pilot List</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>This IE provides the measured pilot information. Encoded as the Pilot List IE from the A21-1x air interface signalling message in 3GPP2 A.S0008-C [25].</td>
</tr>
</tbody>
</table>

### 9.2.1.36 E-RAB List

This IE contains a list of E-RAB IDs with a cause value. It is used for example to indicate failed bearers or bearers to be released.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-RAB List Item</td>
<td></td>
<td></td>
<td></td>
<td>EACH</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;E-RAB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.2</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;Cause</td>
<td>M</td>
<td></td>
<td>9.2.1.3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofE-RABs</td>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
</tr>
</tbody>
</table>
9.2.1.37  Global eNB ID

This information element is used to globally identify an eNB (see TS 36.401 [2]).

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>CHOICE eNB ID</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Macro eNB ID</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(20))</td>
<td>Equal to the 20 leftmost bits of the Cell Identity IE contained in the E-UTRAN CGI IE (see subclause 9.2.1.38) of each cell served by the eNB.</td>
</tr>
<tr>
<td>&gt;&gt;&gt;Home eNB ID</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(28))</td>
<td>Equal to the Cell Identity IE contained in the E-UTRAN CGI IE (see subclause 9.2.1.38) of the cell served by the eNB.</td>
</tr>
<tr>
<td>&gt;&gt;&gt;Short Macro eNB ID</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(18))</td>
<td>Equal to the 18 leftmost bits of the Cell Identity IE (see subclause 9.2.1.38) of each cell served by the eNB.</td>
</tr>
<tr>
<td>&gt;&gt;&gt;Long Macro eNB ID</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(21))</td>
<td>Equal to the 21 leftmost bits of the Cell Identity IE (see subclause 9.2.1.38) of each cell served by the eNB.</td>
</tr>
</tbody>
</table>

9.2.1.37a  Global en-gNB ID

This information element is used to globally identify an en-gNB (see TS 36.401 [2]).

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>en-gNB ID</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(22..32))</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.38  E-UTRAN CGI

This information element is used to globally identify a cell (see TS 36.401 [2]).

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>Cell Identity</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(28))</td>
<td>The leftmost bits of the Cell Identity correspond to the eNB ID (defined in subclause 9.2.1.37).</td>
</tr>
</tbody>
</table>

9.2.1.39  Subscriber Profile ID for RAT/Frequency priority

The Subscriber Profile ID IE for RAT/Frequency Selection Priority is used to define camp priorities in Idle mode and to control inter-RAT/inter-frequency handover in Active mode TS 36.300 [14].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscriber Profile ID for RAT/Frequency Priority</td>
<td>M</td>
<td></td>
<td>INTEGER (1..256)</td>
<td></td>
</tr>
</tbody>
</table>
9.2.1.40  UE Security Capabilities

The UE Security Capabilities IE defines the supported algorithms for encryption and integrity protection in the UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Security Capabilities</td>
<td></td>
<td></td>
<td>BIT STRING (SIZE(16, ...))</td>
<td>Each position in the bitmap represents an encryption algorithm: “all bits equal to 0” – UE supports no other algorithm than EEA0, “first bit” – 128-EEA1, “second bit” – 128-EEA2, “third bit” – 128-EEA3, other bits reserved for future use. Value ‘1’ indicates support and value ‘0’ indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].</td>
</tr>
<tr>
<td>&gt;Encryption Algorithms</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Integrity Protection Algorithms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Integrity Protection Algorithms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.41  Security Key

The Security Key IE is used to apply security in the eNB for different scenarios as defined in TS 33.401 [15].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Key</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(256))</td>
<td>Key material for KeNB or Next Hop Key as defined in TS 33.401 [15]</td>
</tr>
</tbody>
</table>

9.2.1.42  UE History Information

The UE History Information IE contains information about cells that a UE has been served by in active state prior to the target cell.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics Description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Visited Cell List</td>
<td></td>
<td>1..</td>
<td>9.2.1.43</td>
<td>Most recent information is added to the top of this list.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;Last Visited Cell Information</td>
<td>M</td>
<td></td>
<td>9.2.1.43</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoOfCellsInUEHistoryInfo</td>
<td>Maximum length of the list. Value is 16.</td>
</tr>
</tbody>
</table>
### 9.2.1.43 Last Visited Cell Information

The Last Visited Cell Information may contain cell specific information.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Last Visited Cell Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; E-UTRAN Cell</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Last Visited E-UTRAN Cell</td>
<td>M</td>
<td></td>
<td>9.2.1.43a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; UTRAN Cell</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Last Visited UTRAN Cell</td>
<td>M</td>
<td></td>
<td>OCTET</td>
<td>Defined in TS 25.413 [19]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; GERAN Cell</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Last Visited GERAN Cell</td>
<td>M</td>
<td></td>
<td>9.2.1.43b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; NG-RAN Cell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Last Visited NG-RAN Cell</td>
<td>M</td>
<td></td>
<td>OCTET</td>
<td>Defined in TS 38.413 [44] (see subclause 9.3.1.97).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 9.2.1.43a Last Visited E-UTRAN Cell Information

The Last Visited E-UTRAN Cell Information contains information about a cell that is to be used for RRM purposes.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Cell ID</td>
<td>M</td>
<td></td>
<td>E-UTRAN CGI</td>
<td>9.2.1.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell Type</td>
<td>M</td>
<td></td>
<td>9.2.1.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time UE stayed in Cell</td>
<td>M</td>
<td></td>
<td>INTEGER (0..4095)</td>
<td>The duration of the time the UE stayed in the cell in seconds. If the UE stays in a cell more than 4095s, this IE is set to 4095.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time UE stayed in Cell Enhanced Granularity</td>
<td>O</td>
<td></td>
<td>INTEGER (0..40950)</td>
<td>The duration of the time the UE stayed in the cell in 1/10 seconds. If the UE stays in a cell more than 4095s, this IE is set to 40950.</td>
<td>YES ignore</td>
<td></td>
</tr>
<tr>
<td>HO Cause Value</td>
<td>O</td>
<td></td>
<td>9.2.1.3</td>
<td>The cause for the handover from the E-UTRAN cell.</td>
<td>YES ignore</td>
<td></td>
</tr>
</tbody>
</table>

#### 9.2.1.43b Last Visited GERAN Cell Information

The Last Visited Cell Information for GERAN is currently undefined.

**NOTE:** If in later Releases this is defined, the choice type may be extended with the actual GERAN specific information.
### 9.2.1.44 Message Identifier

The purpose of the *Message Identifier* IE is to identify the warning message. Message Identifier IE is set by the EPC and transferred to the UE by the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Last Visited</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GERAN Cell Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Undefined</td>
<td>M</td>
<td></td>
<td>NULL</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.45 Serial Number

The *Serial Number* IE identifies a particular message from the source and type indicated by the Message Identifier and is altered every time the message with a given Message Identifier is changed.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Number</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(16))</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.46 Warning Area List

The *Warning Area List* IE indicates the areas where the warning message needs to be broadcast or cancelled.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Cell ID List</td>
<td></td>
<td>1 .. &lt;maxnoofCellID&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; E-CGI</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; TAI List for Warning</td>
<td></td>
<td>1 .. &lt;maxnoofTAIforWarning&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; TAI</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Emergency Area ID List</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Emergency Area ID</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

- **maxnoofCellID**: Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.
- **maxnoofTAIforWarning**: Maximum no. of TAI subject for warning message broadcast. Value is 65535.
- **maxnoofEmergencyAreaID**: Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.

9.2.1.47 Emergency Area ID

The *Emergency Area ID* IE is used to indicate the area which has the emergency impact.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Area ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(3))</td>
<td>Emergency Area ID may consist of several cells. Emergency Area ID is defined by the operator.</td>
</tr>
</tbody>
</table>

### 9.2.1.48 Repetition Period

The Repetition Period IE indicates the periodicity of the warning message to be broadcast.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetition Period</td>
<td>M</td>
<td></td>
<td>INTEGER (0..4095)</td>
<td>The unit of value 1 to 4095 is [second].</td>
</tr>
</tbody>
</table>

### 9.2.1.49 Number of Broadcasts Requested

The Number of Broadcast Requested IE indicates the number of times a message is to be broadcast.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Broadcasts Requested</td>
<td>M</td>
<td></td>
<td>INTEGER (0..65535)</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.50 Warning Type

The Warning Type IE indicates types of the disaster. This IE also indicates that a Primary Notification is included. This IE can be used by the UE to differentiate the type of alert according to the type of disaster.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning Type</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.51 Warning Security Information

The Warning Security Information IE provides the security information needed for securing the Primary Notification.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning Security Information</td>
<td>M</td>
<td></td>
<td>OCTET STRING(SIZE(50))</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.52 Data Coding Scheme

The Data Coding Scheme IE identifies the alphabet or coding employed for the message characters and message handling at the UE (it is passed transparently from the EPC to the UE).

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Coding Scheme</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(8))</td>
<td></td>
</tr>
</tbody>
</table>
9.2.1.53 Warning Message Contents

The Warning Message Content IE contains user information, e.g., the message with warning contents, and will be broadcast over the radio interface.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning Message Contents</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(1..9600))</td>
<td>The length of this IE varies between 1 to 9600 bytes.</td>
</tr>
</tbody>
</table>

9.2.1.54 Broadcast Completed Area List

The Broadcast Completed Area List IE indicates the areas where either resources are available to perform the broadcast or where broadcast is performed successfully.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Broadcast Completed Area</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Broadcast Completed Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell ID Broadcast</td>
<td></td>
<td>1 .. &lt;maxnoofCellID&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;E-CGI</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;TAI Broadcast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;TAI Broadcast</td>
<td></td>
<td>1 .. &lt;maxnoofTAIforWarning&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;TAI</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Completed Cell in TAI List</td>
<td></td>
<td>1 .. &lt;maxnoofCellinTAI&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;E-CGI</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Emergency Area ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Emergency Area ID Broadcast</td>
<td></td>
<td>1 .. &lt;maxnoofEmergencyAreaID&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Emergency Area ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Completed Cell in Emergency Area ID List</td>
<td></td>
<td>1 .. &lt;maxnoofCellinEAI&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;E-CGI</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

- maxnoofCellID: Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.
- maxnoofTAIforWarning: Maximum no. of TAI subject for warning message broadcast. Value is 65535.
- maxnoofEmergencyAreaID: Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.
- maxnoofCellinTAI: Maximum no. of Cell ID within a TAI. Value is 65535.
- maxnoofCellinEAI: Maximum no. of Cell ID within an Emergency Area. Value is 65535.

9.2.1.55 Inter-system Information Transfer Type

The Inter-system Information Type IE indicates the type of information that the eNB requests to transfer.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Inter-system Information Transfer Type</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;RIM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;RIM Transfer</td>
<td>M</td>
<td></td>
<td>9.2.3.23</td>
<td></td>
</tr>
</tbody>
</table>
9.2.1.56  Source To Target Transparent Container

The Source to Target Transparent Container IE is an information element that is used to transparently pass radio related information from the handover source to the handover target through the EPC; it is produced by the source RAN node and is transmitted to the target RAN node.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source to Target Transparent Container</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>This IE includes a transparent container from the source RAN node to the target RAN node. The octets of the OCTET STRING are encoded according to the specifications of the target system. Note: in the current version of the specification, this IE may either carry the Source eNB to Target eNB Transparent Container IE or the Source RNC to Target RNC Transparent Container IE as defined in TS 25.413 [19] or the Source BSS to Target BSS Transparent Container Contents of the Source BSS to Target BSS Transparent Container IE as defined in TS 48.018 [18] or the Old BSS to New BSS information elements field of the Old BSS to New BSS information IE as defined in TS 48.008 [23], or the Source NG-RAN Node to Target NG-RAN Node Transparent Container IE as defined in TS 38.413 [44].</td>
</tr>
</tbody>
</table>

9.2.1.57  Target To Source Transparent Container

The Target to Source Transparent Container IE is an information element that is used to transparently pass radio related information from the handover target to the handover source through the EPC; it is produced by the target RAN node and is transmitted to the source RAN node.
### Target to Source Transparent Container

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target to Source</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>This IE includes a transparent container from the target RAN node to the source RAN node. The octets of the OCTET STRING are coded according to the specifications of the target system. Note: in the current version of the specification, this IE may either carry the Target eNB to Source eNB Transparent Container IE, or the Target RNC to Source RNC Transparent Container IE as defined in TS 25.413 [19] or the Target BSS to Source BSS Transparent Container Contents of the Target BSS to Source BSS Transparent Container IE as defined in TS 48.018 [18] or the Layer 3 Information field of the Layer 3 Information IE as defined in TS 48.008 [23], or the Target NG-RAN Node to Source NG-RAN Node Transparent Container IE as defined in TS 38.413 [44].</td>
</tr>
</tbody>
</table>

#### 9.2.1.58 SRVCC Operation Possible

This element indicates that both UE and MME are SRVCC-capable. E-UTRAN behaviour on receipt of this IE is specified in TS 23.216 [9].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRVCC operation possible</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Possible, ...)</td>
</tr>
</tbody>
</table>

#### 9.2.1.59 SRVCC HO Indication

This information element is set by the source eNB to provide an indication that E-RAB may be subjected to handover via SRVCC means.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRVCC HO Indication</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(PS and CS, CS only, ...)</td>
</tr>
</tbody>
</table>

#### 9.2.1.60 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.
9.2.1.61 Time to wait

This IE defines the minimum allowed waiting times.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to wait</td>
<td>M</td>
<td></td>
<td>ENUMERATED(1s, 2s, 5s, 10s, 20s, 60s)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.62 CSG Id

This information element indicates the identifier of the Closed Subscriber Group, as defined in TS 23.003 [21].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSG Id</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE (27))</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.63 CSG Id List

Void.
9.2.1.64  MS Classmark 2

The coding of this element is described in TS 48.008 [23].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS Classmark 2</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Coded as the value part of the Classmark Information Type 2 IE defined in TS 48.008 [23].</td>
</tr>
</tbody>
</table>

9.2.1.65  MS Classmark 3

The coding of this element is described in TS 48.008 [23].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS Classmark 3</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Coded as the value part of the Classmark Information Type 3 IE defined in TS 48.008 [23].</td>
</tr>
</tbody>
</table>

9.2.1.66  Cell Type

The cell type provides the cell coverage area.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Size</td>
<td>M</td>
<td></td>
<td>ENUMERATED (verysmall, small, medium, large, …)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

9.2.1.67  Old BSS to New BSS Information

This container is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.008 [23].

9.2.1.68  Layer 3 Information

This container is used to transparently pass radio related information between the handover target and the handover source through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.008 [23].

9.2.1.69  E-UTRAN Round Trip Delay Estimation Info

This IE contains the information to assist target HRPD access with the acquisition of the UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-UTRAN Round Trip Delay Estimation Info</td>
<td>M</td>
<td></td>
<td>INTEGER (0..2047)</td>
<td>Includes the Round Trip Delay between the eNB and the UE. The unit is 16Tc (see subclause 4.2.3 in TS 36.213 [26]).</td>
</tr>
</tbody>
</table>

9.2.1.70  Broadcast Cancelled Area List

The Broadcast Cancelled Area List IE indicates the areas where broadcast was stopped successfully.
### IE/Group Name

<table>
<thead>
<tr>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>1 .. &lt;maxnoofCellID&gt;</td>
<td>9.2.1.38</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1 .. &lt;maxnoofTAIforWarning&gt;</td>
<td>9.2.3.16</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1 .. &lt;maxnoofCellinTAI&gt;</td>
<td>9.2.1.71</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1 .. &lt;maxnoofEmergencyAreaID&gt;</td>
<td>9.2.1.47</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1 .. &lt;maxnoofCellinEAI&gt;</td>
<td>9.2.1.71</td>
<td></td>
</tr>
</tbody>
</table>

### Range Bound

<table>
<thead>
<tr>
<th>Range Bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCellID</td>
<td>Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.</td>
</tr>
<tr>
<td>maxnoofTAIforWarning</td>
<td>Maximum no. of TAI subject for warning message broadcast. Value is 65535.</td>
</tr>
<tr>
<td>maxnoofEmergencyAreaID</td>
<td>Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.</td>
</tr>
<tr>
<td>maxnoofCellinTAI</td>
<td>Maximum no. of Cell ID within a TAI. Value is 65535.</td>
</tr>
<tr>
<td>maxnoofCellinEAI</td>
<td>Maximum no. of Cell ID within an Emergency Area. Value is 65535.</td>
</tr>
</tbody>
</table>

### 9.2.1.71 Number of Broadcasts

The **Number of Broadcasts** IE indicates the number of times that a particular message has been broadcast in a given warning area.

<table>
<thead>
<tr>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td>INTEGER(0..65535)</td>
<td>This IE is set to '0' if valid results are not known or not available. It is set to 65535 if the counter results have overflown.</td>
</tr>
</tbody>
</table>

### 9.2.1.72 Concurrent Warning Message Indicator

The **Concurrent Warning Message Indicator** IE indicates to eNB that the received warning message is a new message to be scheduled for concurrent broadcast with any other ongoing broadcast of warning messages.

<table>
<thead>
<tr>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td>ENUMERATED(true)</td>
<td>This IE is used to identify a PWS type warning system which allows the broadcast of multiple concurrent warning messages over the radio.</td>
</tr>
</tbody>
</table>
9.2.1.73  CSG Membership Status
This element indicates the membership status of the UE to a particular CSG.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSG Membership Status</td>
<td>M</td>
<td></td>
<td>ENUMERATED (member, not-member)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.74  Cell Access Mode
This element indicates the access mode of the cell accessed by the UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Access Mode</td>
<td>M</td>
<td></td>
<td>ENUMERATED (hybrid, ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.75  Extended Repetition Period
The *Extended Repetition Period* IE indicates the periodicity of the warning message to be broadcast.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended Repetition Period</td>
<td>M</td>
<td></td>
<td>INTEGER (4096..2^{17}.1)</td>
<td>The <em>Extended Repetition Period</em> IE is used if the Repetition Period has a value larger than 4095. Unit [second].</td>
</tr>
</tbody>
</table>

9.2.1.76  Data Forwarding Not Possible
This information element indicates that the MME decided that the corresponding E-RAB bearer will not be subject to data forwarding.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Forwarding Not Possible</td>
<td>M</td>
<td></td>
<td>ENUMERATED (Data forwarding not possible, ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.77  PS Service Not Available
This IE indicates that the UE is not available for the PS service in the target cell in case of SRVCC to GERAN.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS Service Not Available</td>
<td>M</td>
<td></td>
<td>ENUMERATED (PS service not Available, ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.78  Paging Priority
This element indicates the paging priority for paging a UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paging Priority</td>
<td>M</td>
<td></td>
<td>ENUMERATED (PrioLevel1, PrioLevel2, PrioLevel3, PrioLevel4, PrioLevel5, PrioLevel6, PrioLevel7, PrioLevel8, ...)</td>
<td>Lower value codepoint indicates higher priority.</td>
</tr>
</tbody>
</table>
9.2.1.79  Relay Node Indicator

This element indicates a relay node.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay Node Indicator</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(true, …)</td>
</tr>
</tbody>
</table>

9.2.1.80  Correlation ID

This information element is the GTP Tunnel Endpoint Identifier or GRE key to be used for the user plane transport between eNB and the L-GW described in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>(SIZE(4))</td>
</tr>
</tbody>
</table>

9.2.1.81  MDT Configuration

The IE defines the MDT configuration parameters.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assign Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDT Activation</td>
<td>M</td>
<td></td>
<td>ENUMERATED(IImmede ate MDT only, Logged MDT only, Immediate MDT and Trace,..., Logged MBSFN MDT)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CHOICE Area Scope of MDT</td>
<td>M</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;Cell based</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;Cell ID List for MDT</td>
<td></td>
<td></td>
<td>1 .. &lt;maxno ofCellID for MDT &gt;</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;E-CGI</td>
<td>M</td>
<td>9.2.1.38</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;TA based</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;TA List for MDT</td>
<td></td>
<td></td>
<td>1 .. &lt;maxno ofTAfor MDT &gt;</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;TAC</td>
<td>M</td>
<td>9.2.3.7</td>
<td></td>
<td>The TAI is derived using the current serving PLMN.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;PLMN Wide</td>
<td></td>
<td>NULL</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;TAI based</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;TAI List for MDT</td>
<td></td>
<td></td>
<td>1 .. &lt;maxno ofTAfor MDT &gt;</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;TAI</td>
<td>M</td>
<td>9.2.3.16</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CHOICE MDT Mode</td>
<td>M</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;Immediate MDT</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;Measurements to Activate</td>
<td>M</td>
<td></td>
<td>BITSTRING (SIZE(8))</td>
<td>Each position in the bitmap indicates a MDT measurement, as defined in TS 37.320 [31]. First Bit = M1, Second Bit = M2, Third Bit = M3, Fourth Bit = M4, Fifth Bit = M5, Sixth Bit = logging of M1 from event triggered measurement reports according to existing RRM configuration, Seventh Bit = M6, Eighth Bit = M7. Value “1” indicates “activate” and value “0” indicates “do not activate”.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;M1 Reporting Trigger</td>
<td>M</td>
<td></td>
<td>ENUMERATED (periodic, A2event-triggered, ..., A2event-triggered periodic)</td>
<td>This IE shall be ignored if the Measurements to Activate IE has the first bit set to “0”.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;M1 Threshold Event A2</td>
<td>C-IfM1A2trigger</td>
<td></td>
<td></td>
<td>Included in case of event-triggered or event-triggered periodic reporting for measurement M1.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;Choice Threshold</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;RSRP</td>
<td>M</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Field</td>
<td>Type</td>
<td>Description</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;&gt; Threshold RSRP</td>
<td>M</td>
<td>INTEGER (0..97)</td>
<td>This IE is defined in TS 36.331 [16].</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;&gt; Threshold RSRQ</td>
<td>M</td>
<td>INTEGER (0..34)</td>
<td>This IE is defined in TS 36.331 [16].</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-M1 Periodic reporting</td>
<td></td>
<td></td>
<td>Included in case of periodic or event-triggered periodic reporting for measurement M1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Report interval</td>
<td>M</td>
<td>ENUMERATED (ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60)</td>
<td>This IE is defined in TS 36.331 [16].</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Report amount</td>
<td>M</td>
<td>ENUMERATED (1, 2, 4, 8, 16, 32, 64, infinity)</td>
<td>Number of reports.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-M3 Configuration</td>
<td>C-ifM3</td>
<td>9.2.1.86</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-M4 Configuration</td>
<td>C-ifM4</td>
<td>9.2.1.87</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-M5 Configuration</td>
<td>C-ifM5</td>
<td>9.2.1.88</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-MDT Location Information</td>
<td>O</td>
<td>BITSTRING(SIZE(8))</td>
<td>Each position in the bitmap represents requested location information as defined in TS 37.320 [31]. First Bit = GNSS Second Bit = E-CID information. Other bits are reserved for future use and are ignored if received. Value “1” indicates “activate” and value “0” indicates “do not activate”. The eNB shall ignore the first bit unless the Measurements to Activate IE has the first bit or the sixth bit set to “1”.</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-M6 Configuration</td>
<td>C-ifM6</td>
<td>9.2.1.101</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-M7 Configuration</td>
<td>C-ifM7</td>
<td>9.2.1.102</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-Bluetooth Measurement Configuration</td>
<td>O</td>
<td>9.2.1.137</td>
<td>YES Ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-WLAN Measurement Configuration</td>
<td>O</td>
<td>9.2.1.138</td>
<td>YES Ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Logged MDT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-Logging interval</td>
<td>M</td>
<td>ENUMERATED (1.28, 2.56, 5.12, 10.24, 20.48, 30.72, 40.96 and 61.44)</td>
<td>This IE is defined in TS 36.331 [16]. Unit: [second].</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-Logging duration</td>
<td>M</td>
<td>ENUMERATED (10, 20, 40, 60, 90 and 120)</td>
<td>This IE is defined in TS 36.331 [16]. Unit: [minute].</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-Bluetooth Measurement Configuration</td>
<td>O</td>
<td>9.2.1.137</td>
<td>YES Ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;-WLAN Measurement Configuration</td>
<td>O</td>
<td>9.2.1.138</td>
<td>YES Ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Logged MBSFN MDT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Logging interval</td>
<td>M</td>
<td>ENUMERATED (1.28, 2.56, 5.12, 10.24, 20.48, 30.72, 40.96 and 61.44)</td>
<td>This IE is defined in TS 36.331 [16]. Unit: [second].</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Logging duration</td>
<td>M</td>
<td>ENUMERATED (10, 20, 40, 60, 90 and 120)</td>
<td>This IE is defined in TS 36.331 [16]. Unit: [minute].</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;MBSFN-ResultToLog</td>
<td>O</td>
<td>MBSFN-ResultToLog 9.2.1.94</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signalling based MDT PLMN List</td>
<td>O</td>
<td>MDT PLMN List 9.2.1.89</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCellIDforMDT</td>
<td>Maximum no. of Cell ID subject for MDT scope. Value is 32.</td>
</tr>
<tr>
<td>maxnoofTAforMDT</td>
<td>Maximum no. of TA subject for MDT scope. Value is 8.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifM1A2trigger</td>
<td>This IE shall be present if the Measurements to Activate IE has the first bit set to “1” and the M1 Reporting Trigger IE is set to “A2event-triggered” or to “A2event-triggered periodic”.</td>
</tr>
<tr>
<td>ifperiodicMDT</td>
<td>This IE shall be present if the M1 Reporting Trigger IE is set to “periodic”, or to “A2event-triggered periodic”.</td>
</tr>
<tr>
<td>ifM3</td>
<td>This IE shall be present if the Measurements to Activate IE has the third bit set to “1”.</td>
</tr>
<tr>
<td>ifM4</td>
<td>This IE shall be present if the Measurements to Activate IE has the fourth bit set to “1”.</td>
</tr>
<tr>
<td>ifM5</td>
<td>This IE shall be present if the Measurements to Activate IE has the fifth bit set to “1”.</td>
</tr>
<tr>
<td>ifM6</td>
<td>This IE shall be present if the Measurements to Activate IE has the seventh bit set to “1”.</td>
</tr>
<tr>
<td>ifM7</td>
<td>This IE shall be present if the Measurements to Activate IE has the eighth bit set to “1”.</td>
</tr>
</tbody>
</table>

### 9.2.1.82 MME Relay Support Indicator

This element is set by the MME to advertise its support of Relay functionalities.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MME Relay Support Indicator</td>
<td>M</td>
<td>ENUMERATED (true, ...)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.83 Management Based MDT Allowed

This information element is used by the eNB to allow selection of the UE for management based MDT as described in TS 32.422 [10].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Based MDT Allowed</td>
<td>M</td>
<td>ENUMERATED (Allowed, ...)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.2.1.84  GW Context Release Indication
This information element is set by the eNB to provide an indication that the MME may release any resources related to the signalled S1 UE context (see TS 36.300 [14]).

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW Context Release Indicator</td>
<td>M</td>
<td></td>
<td>ENUMERATED (true, ...)</td>
<td>This IE indicates to the MME that the eNB has successfully performed an X2 HO for the UE to a target eNB.</td>
</tr>
</tbody>
</table>

9.2.1.85  Voice Support Match Indicator
This information element is set by the eNB to provide an indication whether the UE radio capabilities are compatible with the network configuration for voice continuity.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice Support Match Indicator</td>
<td>M</td>
<td></td>
<td>ENUMERATED (Supported, Not Supported ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.86  M3 Configuration
This IE defines the parameters for M3 measurement collection.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3 Collection Period</td>
<td>M</td>
<td></td>
<td>ENUMERATED (ms100, ms1000, ms10000, ..., ms1024, ms1280, ms2048, ms2560, ms5120, ms10240, min1)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.87  M4 Configuration
This IE defines the parameters for M4 measurement collection.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4 Collection Period</td>
<td>M</td>
<td></td>
<td>ENUMERATED (ms1024, ms2048, ms5120, ms10240, min1, ...)</td>
<td></td>
</tr>
<tr>
<td>M4 Links to log</td>
<td>M</td>
<td></td>
<td>ENUMERATED (uplink, downlink, both-uplink-and-downlink, ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.88  M5 Configuration
This IE defines the parameters for M5 measurement collection.
### 9.2.1.89 MDT PLMN List

The purpose of the *MDT PLMN List* IE is to provide the list of PLMN allowed for MDT.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDT PLMN List</td>
<td>M</td>
<td>1..&lt;maxnoofMDTPLMNs</td>
<td>ENUMERATED</td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofMDTPLMNs</td>
<td>Maximum no. of PLMNs in the MDT PLMN list. Value is 16.</td>
</tr>
</tbody>
</table>

### 9.2.1.90 COUNT Value Extended

This IE contains a PDCP sequence number and a hyper frame number in case of 15 bit long PDCP-SN.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP-SN Extended</td>
<td>M</td>
<td>INTEGER</td>
<td>(0..32767)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HFN Modified</td>
<td>M</td>
<td>INTEGER</td>
<td>(0..131071)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 9.2.1.91 Kill-all Warning Messages Indicator

The *Kill-all Warning Messages Indicator* IE indicates to the eNB to stop all already ongoing broadcast of warning messages in the eNB or in an area.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kill-all Warning Message Indicator</td>
<td>M</td>
<td></td>
<td>ENUMERATED(true)</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.92 LHN ID

The *LHN ID* IE is used to indicate the LHN ID of the eNB, as defined in TS 23.003 [21].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Home Network ID</td>
<td>M</td>
<td>OCTET STRING (SIZE (32..256))</td>
<td>Identifies the Local Home Network.</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.93 User Location Information

This IE provides location information of a UE.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Location Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PSCell Information</td>
<td>O</td>
<td></td>
<td>9.2.1.141</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.94 MBSFN-ResultToLog

This IE provides information on the MBMS area in which the MBSFN MDT result is logged.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBSFN-ResultToLog</td>
<td></td>
<td>1..&lt;maxnoof MBSFNArea MDT &gt;</td>
<td>9.2.1.95</td>
<td></td>
</tr>
<tr>
<td>&gt;MBSFN-AreaId</td>
<td>O</td>
<td>INTEGER (0..255)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;CarrierFreq</td>
<td>M</td>
<td>EARFCN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PSCell Information</td>
<td>O</td>
<td>9.2.1.141</td>
<td></td>
<td>YES ignore</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofMBSFNAreaMDT</td>
<td>Maximum number of MBSFN areas configured for logged MBSFN MDT. Value is 8.</td>
</tr>
</tbody>
</table>

### 9.2.1.95 EARFCN

The E-UTRA Absolute Radio Frequency Channel Number defines the carrier frequency used in a cell for a given direction (UL or DL) in FDD or for both UL and DL directions in TDD.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARFCN</td>
<td>M</td>
<td>INTEGER (0..maxEARFCN)</td>
<td>The relation between EARFCN and carrier frequency (in MHz) are defined in TS 36.104 [39].</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxEARFCN</td>
<td>Maximum value of EARFCNs. Value is 262143.</td>
</tr>
</tbody>
</table>

### 9.2.1.96 Expected UE Behaviour

This IE defines the behaviour of a UE with predictable activity and/or mobility behaviour, to assist the eNB in determining the optimum RRC connection time.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected UE Activity Behaviour</td>
<td>O</td>
<td></td>
<td>9.2.1.97</td>
<td></td>
</tr>
<tr>
<td>Expected HO Interval</td>
<td>O</td>
<td></td>
<td>ENUMERATED (sec15, sec30, sec60, sec90, sec120, sec180, long-time, ...)</td>
<td>Indicates the expected time interval between inter-eNB handovers. If &quot;long-time&quot; is included, the interval between inter-eNB handovers is expected to be longer than 180 seconds.</td>
</tr>
</tbody>
</table>
9.2.1.97 Expected UE Activity Behaviour

Indicates information about the expected "UE activity behaviour" as defined in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Activity Period</td>
<td>O</td>
<td>INTEGER</td>
<td>(1..30</td>
<td>40</td>
</tr>
<tr>
<td>Expected Idle Period</td>
<td>O</td>
<td>INTEGER</td>
<td>(1..30</td>
<td>40</td>
</tr>
<tr>
<td>Source of UE Activity Behaviour Information</td>
<td>O</td>
<td>ENUMERATED</td>
<td>subscription information, statistics, ...</td>
<td>If &quot;subscription information&quot; is indicated, the information contained in the Expected Activity Period IE and the Expected Idle Period IE, if present, is derived from subscription information. If &quot;statistics&quot; is indicated, the information contained in the Expected Activity Period IE and the Expected Idle Period IE, if present, is derived from statistical information.</td>
</tr>
</tbody>
</table>

9.2.1.98 UE Radio Capability for Paging

This IE contains paging specific UE Radio Capability information.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Radio Capability for Paging</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td>Includes either the UERadioPagingInformation message as defined in 10.2.2 of TS 36.331 [16], or the UERadioPagingInformation-NB message as defined in 10.6.2 of TS 36.331 [16].</td>
</tr>
</tbody>
</table>

9.2.1.99 ProSe Authorized

This IE provides information on the authorization status of the UE for ProSe services.
### 9.2.1.100 COUNT Value for PDCP SN Length 18

This IE contains a PDCP sequence number and a hyper frame number in case of 18 bit long PDCP-SN.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP-SN Length 18</td>
<td>M</td>
<td>INTEGER</td>
<td>(0..262143)</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HFN for PDCP-SN Length 18</td>
<td>M</td>
<td>INTEGER</td>
<td>(0..16383)</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 9.2.1.101 M6 Configuration

This IE defines the parameters for M6 measurement collection.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6 Report Interval</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(ms1024, ms2048, ms5120, ms10240, …)</td>
</tr>
<tr>
<td>M6 Delay Threshold</td>
<td>C-ifUL</td>
<td></td>
<td>ENUMERATED</td>
<td>(ms30, ms40, ms50, ms60, ms70, ms80, ms90, ms100, ms150, ms300, ms500, ms750, …)</td>
</tr>
<tr>
<td>M6 Links to log</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(uplink, downlink, both-uplink-and-downlink, …)</td>
</tr>
</tbody>
</table>

### Condition | Explanation
--- | ---
ifUL | This IE shall be present if the **M6 Links to log** IE is set to “uplink” or to “both-uplink-and-downlink”.

### 9.2.1.102 M7 Configuration

This IE defines the parameters for M7 measurement collection.
### 9.2.1.103 Assistance Data for Paging

This IE provides assistance information for paging optimisation.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assistance Data for Recommended Cells</td>
<td>O</td>
<td></td>
<td>9.2.1.104</td>
<td></td>
</tr>
<tr>
<td>Assistance Data for CE capable UEs</td>
<td>O</td>
<td></td>
<td>9.2.1.108</td>
<td></td>
</tr>
<tr>
<td>Paging Attempt Information</td>
<td>O</td>
<td></td>
<td>9.2.1.110</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.104 Assistance Data for Recommended Cells

This IE provides assistance information for paging in recommended cells.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Cells for Paging</td>
<td>M</td>
<td></td>
<td>9.2.1.106</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.105 Information on Recommended Cells and eNBs for Paging

This IE provides information on recommended cells and eNBs for paging.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Cells for Paging</td>
<td>M</td>
<td></td>
<td>9.2.1.106</td>
<td></td>
</tr>
<tr>
<td>Recommended eNBs for Paging</td>
<td>M</td>
<td></td>
<td>9.2.1.107</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.1.106 Recommended Cells for Paging

This IE contains the recommended cells for paging.

This IE is transparent to the EPC.
### 9.2.1.107 Recommended eNBs for Paging

This IE contains recommended targets for paging.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended eNB List</td>
<td>1 ..</td>
<td>&lt;maxnoofRecommended eNBs&gt;</td>
<td></td>
<td>Includes visited and non-visited eNBs, where visited eNBs are listed in the order the UE visited them with the most recent eNB being the first in the list. Non-visited eNBs are included immediately after the visited eNB they are associated with.</td>
</tr>
<tr>
<td>&gt;Recommended eNB Item IEs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Choice MME Paging Target</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;eNB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td></td>
<td>The MME paging target is either an eNB identity or a TAI as specified in TS 36.300 [14].</td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;TAI</td>
<td>M</td>
<td>9.2.3.16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofRecommendedeNBs</td>
<td>Maximum no. of recommended eNBs, the maximum value is 16.</td>
</tr>
</tbody>
</table>

### 9.2.1.108 Assistance Data for CE capable UEs

This IE provides information for paging for CE capable UEs.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and Reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Identifier and Coverage Enhancement Level</td>
<td>M</td>
<td></td>
<td>9.2.1.109</td>
<td></td>
</tr>
</tbody>
</table>
9.2.1.109 Cell Identifier and Coverage Enhancement Level

This IE provides information for paging CE capable UEs.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Cell ID</td>
<td>M</td>
<td>E-UTRAN CGI</td>
<td>9.2.1.38</td>
<td>Includes either the UEPagingCoverageInformation message as defined in 10.2.2 of TS 36.331 [16], or the UEPagingCoverageInformation-NB message as defined in 10.6.2 of TS 36.331 [16].</td>
</tr>
<tr>
<td>Coverage Enhancement Level</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.110 Paging Attempt Information

This IE includes information related to the paging count over S1.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paging Attempt Count</td>
<td>M</td>
<td>INTEGER (1..16,...)</td>
<td></td>
<td>Shall be set as specified in TS 36.300 [14].</td>
</tr>
<tr>
<td>Intended Number of Paging Attempts</td>
<td>M</td>
<td>INTEGER (1..16,...)</td>
<td></td>
<td>Intended number of paging attempts (see TS 36.300 [14]).</td>
</tr>
<tr>
<td>Next Paging Area Scope</td>
<td>O</td>
<td>ENUMERATED (same, changed, ...)</td>
<td></td>
<td>Indicates whether the paging area scope will change or not at next paging attempt. Usage specified in TS 36.300 [14].</td>
</tr>
</tbody>
</table>

9.2.1.111 Paging eDRX Information

This IE indicates the Paging eDRX parameters as defined in TS 36.304 [20].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paging eDRX Cycle</td>
<td>M</td>
<td>ENUMERATED (hfhalf, hf1, hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, ...)</td>
<td>TeDRX defined in TS 36.304 [20]. Unit: [number of hyperframes].</td>
<td></td>
</tr>
<tr>
<td>Paging Time Window</td>
<td>O</td>
<td>ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, ...)</td>
<td>Unit: [1.28 second].</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.112 UE Retention Information

This information element allows the eNB and the MME to indicate whether prior UE related contexts and signalling connections are intended to be retained.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Retention Information</td>
<td>M</td>
<td>ENUMERATED (ues-retained,...)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.113 UE User Plane CIoT Support Indicator

This IE indicates whether User Plane CIoT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.
9.2.1.114 NB-IoT Default Paging DRX

This IE indicates the NB-IoT Default Paging DRX as defined in TS 36.304 [20].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB-IoT Default Paging DRX</td>
<td>M</td>
<td></td>
<td>ENUMERATED(128, 256, 512, 1024, …)</td>
<td>Unit: [number of radioframes]</td>
</tr>
</tbody>
</table>

9.2.1.115 NB-IoT Paging eDRX Information

This IE indicates the NB-IoT Paging eDRX parameters as defined in TS 36.304 [20].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB-IoT Paging eDRX Cycle</td>
<td>M</td>
<td></td>
<td>ENUMERATED {hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, …}</td>
<td>T_{eDRX} defined in TS 36.304 [20]. Unit: [number of hyperframes].</td>
</tr>
<tr>
<td>NB-IoT Paging Time Window</td>
<td>O</td>
<td></td>
<td>ENUMERATED {s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, …}</td>
<td>Unit: [2.56 seconds]</td>
</tr>
</tbody>
</table>

9.2.1.116 Bearer Type

This IE is used to support Non-IP data as specified in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearer Type</td>
<td>M</td>
<td></td>
<td>ENUMERATED (non IP, …)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.117 RAT Type

This element is provided by the eNB to inform about the RAT Type.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAT Type</td>
<td>M</td>
<td></td>
<td>ENUMERATED (NB-IoT, …)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.118 CE-mode-B Support Indicator

This IE indicates whether CE-mode-B as specified in TS 36.306[41] is supported for the UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE-mode-B Support Indicator</td>
<td>M</td>
<td></td>
<td>ENUMERATED (supported, …)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.119 SRVCC Operation Not Possible

This element indicates that SRVCC operation is not possible any more.
9.2.1.120 V2X Services Authorized

This IE provides information on the authorization status of the UE to use the sidelink for V2X services.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle UE</td>
<td>O</td>
<td></td>
<td>ENUMERATED</td>
<td>Indicates whether the UE is authorized as Vehicle UE</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pedestrian UE</td>
<td>O</td>
<td></td>
<td>ENUMERATED</td>
<td>Indicates whether the UE is authorized as Pedestrian UE</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

9.2.1.121 Served DCNs Items

The Served DCNs Items indicates the relative processing capacity for a DCN-ID in the MME as defined in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Served DCNs Items</td>
<td></td>
<td></td>
<td>INTEGER</td>
<td>Relatvie capacity per DCN in one MME</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;DCN ID</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Relative DCN Capacity</td>
<td>M</td>
<td></td>
<td>Relative MME Capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.2.3.17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.122 UE Sidelink Aggregate Maximum Bit Rate

This IE provides information on the Aggregate Maximum Bitrate of the UE’s sidelink communication for V2X services.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Sidelink Aggregate Maximum Bit Rate</td>
<td>M</td>
<td></td>
<td>Bit Rate</td>
<td>Value 0 shall be considered as a logical error by the receiving eNB.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.2.1.19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.123 Enhanced Coverage Restricted

This IE provides information on the restriction information of using Coverage Enhancement.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhanced Coverage Restricted</td>
<td>O</td>
<td></td>
<td>ENUMERATED</td>
<td>Indicates whether the UE is restricted to use coverage enhancement. Value “restricted” indicates that the UE is not allowed to use coverage enhancement.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
9.2.1.124 Secondary RAT Usage Report List

This IE provides information on the NR resources used with EN-DC.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary RAT usage report Item</td>
<td></td>
<td>1 .. &lt;maxnoofE-RABs&gt;</td>
<td></td>
<td></td>
<td>EACH</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;E-RAB ID</td>
<td>M</td>
<td>9.2.1.2</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;Secondary RAT Type</td>
<td>M</td>
<td>ENUMERATED (nR, ... , unlicensed)</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;E-RAB Usage Report List</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;E-RAB Usage Report Item</td>
<td></td>
<td>1 .. &lt;maxnoof time periods &gt;</td>
<td></td>
<td></td>
<td>EACH</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;&gt;Start timestamp</td>
<td>M</td>
<td>OCTET STRING  (SIZE(4))</td>
<td></td>
<td>UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [42]. It indicates the start time of the collecting period of the included Usage Count UL IE and Usage Count DL IE.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;End timestamp</td>
<td>M</td>
<td>OCTET STRING  (SIZE(4))</td>
<td></td>
<td>UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [42]. It indicates the end time of the collecting period of the included Usage Count UL IE and Usage Count DL IE.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;Usage count UL</td>
<td>M</td>
<td>INTEGER (0..2^{64} - 1)</td>
<td>The unit is: octets</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;Usage count DL</td>
<td>M</td>
<td>INTEGER (0..2^{64} - 1)</td>
<td>The unit is: octets</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofE-RABs</td>
<td>Maximum no. of E-RABs for one UE. Value is 256.</td>
</tr>
<tr>
<td>maxnoof time periods</td>
<td>Maximum no. of time reporting periods. Value is 2.</td>
</tr>
</tbody>
</table>
9.2.1.125 Handover Flag

This IE indicates that the MME should buffer the secondary RAT data usage report since the report is sent due to handover as defined in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handover Flag</td>
<td>M</td>
<td></td>
<td>ENUMERATED (handover_preparation, ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.126 Extended Bit Rate

This IE indicates the number of bits delivered by E-UTRAN in UL or to E-UTRAN 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 bearer, or an aggregated maximum bit rate.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended Bit Rate</td>
<td></td>
<td></td>
<td>INTEGER (10,000,000,001..4,000,000,000, ...)</td>
<td>The unit is: bit/s</td>
</tr>
</tbody>
</table>

9.2.1.127 NR UE Security Capabilities

This IE defines the supported algorithms for encryption and integrity protection in NR as defined in TS 33.401 [15].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR Encryption</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(16, …))</td>
<td>Each position in the bitmap represents an encryption algorithm: “all bits equal to 0” – UE supports no other NR algorithm than NEA0, “first bit” – 128-NEA1, “second bit” – 128-NEA2, “third bit” – 128-NEA3, other bits reserved for future use. Value ‘1’ indicates support and value ‘0’ indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].</td>
</tr>
<tr>
<td>Algorithms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR Integrity</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(16, …))</td>
<td>Each position in the bitmap represents an integrity protection algorithm: “all bits equal to 0” – UE supports no other NR algorithm than NIA0, “first bit” – 128-NIA1, “second bit” – 128-NIA2, “third bit” – 128-NIA3, other bits reserved for future use. Value ‘1’ indicates support and value ‘0’ indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].</td>
</tr>
<tr>
<td>Protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algorithms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.128 UE Application layer measurement configuration

The IE defines configuration information for the QoE Measurement Collection (QMC) function.
| Container for application layer measurement configuration | M | Octet string (1..1000) | Indicates application layer measurement configuration, see Annex L in [43]. | - | - |
| CHOICE Area Scope of QMC | M | - | - | - | - |
| => Cell based | - | - | - | - | - |
| => Cell ID List for QMC | 1 .. <maxno ofCellID forQMC> | - | - | - | - |
| => E-CGI | M | 9.2.1.38 | - | - | - |
| => TA based | - | - | - | - | - |
| => TA List for QMC | 1 .. <maxno ofTAfor QMC> | - | - | - | - |
| => TAI | M | 9.2.3.7 | The TAI is derived using the current serving PLMN. | - | - |
| => TAI based | - | - | - | - | - |
| => TAI List for QMC | 1 .. <maxno ofTAfor QMC> | - | - | - | - |
| => PLMN area based | - | - | - | - | - |
| => PLMN List for QMC | 1 .. <maxno ofPLMN forQMC> | - | - | - | - |
| => PLMN Identity | M | 9.2.3.8 | This IE indicates the service type of UE application layer measurements. | - | - |
| Service Type | M | ENUMERATED (QMC for streaming service, QMC for MTSI service, ...) | - | - | - |

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCellIDforQMC</td>
<td>Maximum no. of Cell ID subject for QMC scope. Value is 32.</td>
</tr>
<tr>
<td>maxnoofTAforQMC</td>
<td>Maximum no. of TA subject for QMC scope. Value is 8.</td>
</tr>
<tr>
<td>maxnoofPLMNforQMC</td>
<td>Maximum no. of PLMNs in the PLMN list for QMC scope. Value is 16.</td>
</tr>
</tbody>
</table>

9.2.1.129  CE-mode-B Restricted

This IE provides information on the restriction information of using Coverage Enhancement Mode B.
9.2.1.130 Packet Loss Rate

This IE indicates the packet loss rate.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packet Loss Rate</td>
<td>M</td>
<td></td>
<td>INTEGER(0..1000)</td>
<td>Ratio of lost packets per number of packets sent, expressed in tenth of percent.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

9.2.1.131 Global RAN Node ID

This IE is used to globally identify an NG-RAN node.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE NG-RAN node</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;gNB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Global gNB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.132</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;ng-eNB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Global ng-eNB ID</td>
<td>M</td>
<td></td>
<td>Global eNB ID</td>
<td>9.2.1.37</td>
</tr>
</tbody>
</table>

9.2.1.132 Global gNB ID

This IE is used to globally identify a gNB (see TS 38.300 [45]).

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>CHOICE gNB ID</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;gNB ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;gNB ID</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(22..32))</td>
<td>Equal to the leftmost bits of the NR Cell Identity IE contained in the NR CGI IE of each cell served by the gNB.</td>
</tr>
</tbody>
</table>

9.2.1.133 Source NG-RAN Node To Target NG-RAN Node Transparent Container

This IE is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from EPS to 5GS.

This IE defined in TS 38.413 [44].
9.2.1.134 Target NG-RAN Node To Source NG-RAN Node Transparent Container

This container is used to transparently pass radio related information between the handover target and the handover source through the EPC. This container is used for inter 3GPP RAT handovers from EPS to 5GS.

This IE defined in TS 38.413 [44].

9.2.1.135 LTE-M Indication

This element is provided by the eNB to inform that the UE indicates category M1 or M2 in its UE Radio Capability.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTE-M Indication</td>
<td>M</td>
<td></td>
<td>ENUMERATED (LTE-M, ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.136 Aerial UE subscription information

This information element is used by the eNB to know if the UE is allowed to use aerial UE function, refer to TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial UE subscription information</td>
<td>M</td>
<td></td>
<td>ENUMERATED (allowed, not allowed, ...)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.1.137 Bluetooth Measurement Configuration

This IE defines the parameters for Bluetooth measurement collection.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluetooth Measurement Configuration</td>
<td>M</td>
<td></td>
<td>ENUMERATED (Setup, ...)</td>
<td></td>
</tr>
<tr>
<td>Bluetooth Measurement Configuration Name List</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Bluetooth Measurement Configuration Name Item IEs</td>
<td>1.. &lt;maxnoofBluetoothName&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Bluetooth Measurement Configuration Name</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE (1..248))</td>
<td>In case of Immediate MDT, it corresponds to M8 measurement as defined in 37.320 [31].</td>
</tr>
<tr>
<td>BT RSSI</td>
<td>O</td>
<td></td>
<td>ENUMERATED (True, ...)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofBluetoothName</td>
<td>Maximum no. of Bluetooth local name used for Bluetooth measurement collection. Value is 4.</td>
</tr>
</tbody>
</table>

9.2.1.138 WLAN Measurement Configuration

This IE defines the parameters for WLAN measurement collection.
### Warning Area Coordinates

This IE contains the affected alert area coordinates of a warning message, and will be broadcast over the radio interface.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning Area Coordinates</td>
<td>M</td>
<td>OCTET STRING (SIZE(1..1024))</td>
<td>The length of this IE varies between 1 to 1024 bytes.</td>
<td></td>
</tr>
</tbody>
</table>

### Subscription Based UE Differentiation Information

This IE is generated by the MME based on the UE subscription information, it provides the Subscription Based UE differentiation Information.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic Communication Indicator</td>
<td>O</td>
<td></td>
<td>ENUMERATED(periodically, on demand, ...)</td>
<td>This IE indicates whether the UE communicates periodically or not, e.g., only on demand.</td>
</tr>
<tr>
<td>Periodic Time</td>
<td>O</td>
<td></td>
<td>INTEGER (1..3600, ...)</td>
<td>This IE indicates the interval time of periodic communication, the unit is: second</td>
</tr>
<tr>
<td>Scheduled Communication Time</td>
<td></td>
<td>0..1</td>
<td></td>
<td>This IE indicates the time zone and day of the week when the UE is available for communication.</td>
</tr>
<tr>
<td>&gt;&gt;Day of Week</td>
<td>O</td>
<td></td>
<td>BIT STRING (SIZE(7))</td>
<td>If Day-Of-Week is not provided this shall be interpreted as every day of the week. Each position in the bitmap represents a day of the week: first bit = Mon, second bit = Tue, third bit = Wed, and so on. Value ‘1’ indicates ‘scheduled’. Value ‘0’ indicates ‘not scheduled’.</td>
</tr>
<tr>
<td>&gt;&gt;Time of Day Start</td>
<td>O</td>
<td></td>
<td>INTEGER (0..86399, ...)</td>
<td>This IE indicates the time to start of the day, each value represent the corresponding second since 00:00 of the day. If Time-Of-Day-Start is not provided, starting time shall be set to start of the day(s) indicated by Day-Of-Week-Mask.</td>
</tr>
<tr>
<td>&gt;&gt;Time of Day End</td>
<td>O</td>
<td></td>
<td>INTEGER (0..86399, ...)</td>
<td>This IE indicates the time to start of the day, each value represent the corresponding second since 00:00 of the day. The value of this IE should be bigger than the value of Time of Day Start IE. If Time-Of-Day-End is not provided, ending time is end of the day(s) indicated by Day-Of-Week-Mask.</td>
</tr>
<tr>
<td>Stationary Indication</td>
<td>O</td>
<td></td>
<td>ENUMERATED(stationary, mobile, ...)</td>
<td></td>
</tr>
<tr>
<td>Traffic Profile</td>
<td>O</td>
<td></td>
<td>ENUMERATED(single packet, dual packets, multiple packets, ...)</td>
<td>“single packet” indicates single packet transmission (UL or DL), “dual packets” indicates dual packet transmission (UL with subsequent DL, or DL with subsequent UL), “multiple packets” indicates multiple packets transmission.</td>
</tr>
<tr>
<td>Battery Indication</td>
<td>O</td>
<td></td>
<td>ENUMERATED(battery powered, battery powered not rechargeable or replaceable, not battery powered, ...)</td>
<td>“battery powered” indicates that the UE is battery powered and the battery is rechargeable/replaceable, “battery powered not rechargeable or replaceable” indicates that the UE is battery powered but the battery is not rechargeable/replaceable., “not battery powered” indicates that the UE is not battery powered.</td>
</tr>
</tbody>
</table>

### 9.2.1.141 PSCell Information

This IE includes the information of the UE’s PSCell.
### 9.2.1.142 NR CGI

This IE is used to globally identify an NR cell (see TS 38.300 [45]).

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>Cell Identity</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(36))</td>
<td></td>
</tr>
</tbody>
</table>
9.2.2 Transport Network Layer Related IEs

9.2.2.1 Transport Layer Address

This information element is an IP address.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Layer Address</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(1..160, ...))</td>
<td>The Radio Network Layer is not supposed to interpret the address information. It should pass it to the transport layer for interpretation. For details on the Transport Layer Address, see TS 36.414 [32].</td>
</tr>
</tbody>
</table>

9.2.2.2 GTP-TEID

This information element is the GTP Tunnel Endpoint Identifier to be used for the user plane transport between eNB and the serving gateway.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTP-TEID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(4))</td>
<td>For details and range, see TS 29.281 [32].</td>
</tr>
</tbody>
</table>

9.2.2.3 Tunnel Information

The Tunnel Information IE indicates the transport layer address and UDP port number.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Layer Address</td>
<td>M</td>
<td></td>
<td>9.2.2.1</td>
<td>HeNB’s Transport Layer Address.</td>
</tr>
<tr>
<td>UDP Port Numbers</td>
<td>O</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td>UDP Port Numbers if NAT/NAPT is deployed in the BBF access network.</td>
</tr>
</tbody>
</table>

9.2.3 NAS Related IEs

9.2.3.1 LAI

This information element is used to uniquely identify a Location Area.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>&gt;LAC</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td>0000 and FFFE not allowed.</td>
</tr>
</tbody>
</table>

9.2.3.2 RAC

This information element is used to identify a Routing Area within a Location Area. It is used for PS services.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAC</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(1))</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.3  MME UE S1AP ID
The MME UE S1AP ID uniquely identifies the UE association over the S1 interface within the MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>INTEGER (0 .. 2^{32} - 1)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.4  eNB UE S1AP ID
The eNB UE S1AP ID uniquely identifies the UE association over the S1 interface within the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (0 .. 2^{24} - 1)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.5  NAS-PDU
This information element contains an EPC – UE or UE – EPC message that is transferred without interpretation in the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS-PDU</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.6  S-TMSI
The Temporary Mobile Subscriber Identity is used for security reasons, to hide the identity of a subscriber.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMEC</td>
<td>M</td>
<td>9.2.3.12</td>
<td>9.2.3.12</td>
<td>9.2.3.12</td>
<td>9.2.3.12</td>
<td>9.2.3.12</td>
</tr>
<tr>
<td>M-TMSI</td>
<td>M</td>
<td>OCTET STRING (SIZE (4))</td>
<td>M-TMSI is unique within MME that allocated it.</td>
<td>9.2.3.12</td>
<td>9.2.3.12</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.7  TAC
This information element is used to uniquely identify a Tracking Area Code.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAC</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE (2))</td>
<td></td>
</tr>
</tbody>
</table>

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

9.2.3.9 GUMMEI

This information element indicates the globally unique MME identity.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUMMEI</td>
<td></td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td>MME Group ID M 9.2.3.8</td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(3))</td>
<td>9.2.3.8</td>
</tr>
<tr>
<td>&gt;MME Group ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td>9.2.3.12</td>
</tr>
</tbody>
</table>

9.2.3.10 UE Identity Index value

The UE Identity Index value IE is used by the eNB to calculate the Paging Frame TS 36.304 [20].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE Identity Index Value</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(10))</td>
<td>Coded as specified in TS 36.304 [20].</td>
</tr>
</tbody>
</table>

9.2.3.11 IMSI

This information element contains an International Mobile Subscriber Identity, which is commonly used to identify the UE in the CN.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSI</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(3..8))</td>
<td>- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bit 4 to 1 of octet n encoding digit 2n-1 - bit 8 to 5 of octet n encoding digit 2n - Number of decimal digits shall be from 6 to 15 starting with the digits from the PLMN identity. When the IMSI is made of an odd number of digits, the filler digit shall be added at the end to make an even number of digits of length 2N. The filler digit shall then be consequently encoded as bit 8 to 5 of octet N.</td>
</tr>
</tbody>
</table>

9.2.3.12 MMEC

This information element represents the MME Code to uniquely identify an MME within an MME pool area.
### 9.2.3.13 UE Paging Identity

This IE represents the Identity with which the UE is paged.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE UE Paging Identity</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>(SIZE (1))</td>
</tr>
<tr>
<td>&gt;&gt;S-TMSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;S-TMSI</td>
<td>M</td>
<td></td>
<td>9.2.3.6</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;IMSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;IMSI</td>
<td>M</td>
<td></td>
<td>9.2.3.11</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.3.14 DL Forwarding

This information element indicates that the E-RAB is proposed for forwarding of downlink packets.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL Forwarding</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(DL forwarding proposed, …)</td>
</tr>
</tbody>
</table>

### 9.2.3.15 Direct Forwarding Path Availability

The availability of a direct forwarding path shall be determined by the source eNB. The EPC behaviour on receipt of this IE is specified in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Forwarding Path Availability</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Direct Path Available, …)</td>
</tr>
</tbody>
</table>

### 9.2.3.16 TAI

This information element is used to uniquely identify a Tracking Area.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;TAC</td>
<td>M</td>
<td></td>
<td>9.2.3.7</td>
<td></td>
</tr>
</tbody>
</table>
9.2.3.17 Relative MME Capacity

This IE indicates the relative processing capacity of an MME with respect to the other MMEs in the pool in order to load-balance MMEs within a pool defined in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative MME Capacity</td>
<td>M</td>
<td></td>
<td>INTEGER (0..255)</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.18 UE S1AP ID pair

This IE contains a pair of UE S1AP identities.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.3</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

9.2.3.19 Overload Response

The Overload Response IE indicates the required behaviour of the eNB in an overload situation.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Overload Response</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Overload Action</td>
<td>M</td>
<td></td>
<td>9.2.3.20</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.20 Overload Action

The Overload Action IE indicates which signalling traffic is subject to rejection by the eNB in an MME overload situation as defined in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload Action</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Reject RRC connection establishments for non-emergency MO DT, Reject RRC connection establishments for Signalling, Permit Emergency Sessions and mobile terminated services only, …, Permit High Priority Sessions and mobile terminated services only, Reject delay tolerant access, Permit high priority sessions and exception reporting and mobile terminated services only, not accept mo-data or delay tolerant access from CP CIoT)</td>
</tr>
</tbody>
</table>

9.2.3.21 CS Fallback Indicator

The IE indicates that a fallback to the CS domain is needed.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS Fallback Indicator</td>
<td>M</td>
<td></td>
<td>ENUMERATED(CS Fallback required, …, CS Fallback High Priority)</td>
<td></td>
</tr>
</tbody>
</table>

ETSI
9.2.3.22  CN Domain
This IE indicates whether Paging is originated from the CS or PS domain.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN Domain</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>ED(PS, CS)</td>
</tr>
</tbody>
</table>

9.2.3.23  RIM Transfer
This IE contains the RIM Information (e.g. NACC information) and additionally in uplink transfers the RIM routing address of the destination of this RIM information.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIM Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;RIM Information</td>
<td>M</td>
<td></td>
<td>9.2.3.24</td>
<td></td>
</tr>
<tr>
<td>&gt;RIM Routing Address</td>
<td>O</td>
<td></td>
<td>9.2.3.25</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.24  RIM Information
This IE contains the RIM Information (e.g., NACC information) i.e., the BSSGP RIM PDU from the RIM application part contained in the eNB, or the BSSGP RIM PDU to be forwarded to the RIM application part in the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIM Information</td>
<td></td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the BSSGP RIM PDU as defined in TS 48.018 [18].</td>
</tr>
</tbody>
</table>

9.2.3.25  RIM Routing Address
This IE identifies the destination node where the RIM Information needs to be routed by the CN.
### 9.2.3.26 SON Configuration Transfer

This IE contains the configuration information, used by e.g., SON functionality, and additionally includes the eNB identifier of the destination of this configuration information and the eNB identifier of the source of this information.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SON Configuration Transfer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Target eNB-ID</td>
<td>M</td>
<td></td>
<td>9.2.1.37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Global eNB ID</td>
<td>M</td>
<td></td>
<td>TAI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Selected TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Source eNB-ID</td>
<td>M</td>
<td></td>
<td>9.2.1.37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Global eNB ID</td>
<td>M</td>
<td></td>
<td>TAI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Selected TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;SON Information</td>
<td>M</td>
<td></td>
<td>9.2.3.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;X2 TNL Configuration Info</td>
<td>M</td>
<td></td>
<td>C-ifSONInfor mationReq uest</td>
<td>9.2.3.29</td>
<td>Source eNB X2 TNL Configuration Info.</td>
<td>YES</td>
</tr>
<tr>
<td>&gt;&gt;Synchronisation Information</td>
<td>M</td>
<td></td>
<td>C-if Activate Muting</td>
<td>9.2.3.42</td>
<td>Information on cell selected as source of synchronisation and aggressor cells.</td>
<td>YES</td>
</tr>
</tbody>
</table>

**Condition**                  | **Explanation**                                                                                                                                 |
--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
ifSONInformationRequest        | This IE shall be present if the SON Information IE contains the SON Information Request IE set to “X2TNL Configuration Info”                |
ifActivateMuting               | This IE shall be present if the SON Information IE contains the SON Information Request IE set to “Activate Muting”                        |
### 9.2.3.26a EN-DC SON Configuration Transfer

This IE contains the configuration information, used by SON functionality for EN-DC for communication between a destination (target) en-gNB and a source eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EN-DC SON Configuration Transfer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;CHOICE Transfer Type</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Request</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Source eNB-ID</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Selected TAI</td>
<td>M</td>
<td>9.2.3.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Target en-gNB-ID</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Global en-gNB ID</td>
<td>M</td>
<td>9.2.1.37a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Selected TAI</td>
<td>O</td>
<td>TAI 9.2.3.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE: The Selected TAI is a 4G TAI and should, if available, correspond to the TAI configured at the en-gNB, however, this TAI is not broadcast by the respective NR cell and may not always be available from UE reporting TAs of overlapping E-UTRA cells.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Target eNB-ID</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Selected TAI</td>
<td>M</td>
<td>TAI 9.2.3.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Associated TAI</td>
<td>O</td>
<td>TAI 9.2.3.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Broadcast 5GS TAI</td>
<td>O</td>
<td>5GS TAI 9.3.2.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE: Used if the SON Information IE indicates a reply.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Source en-gNB-ID</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Global en-gNB ID</td>
<td>M</td>
<td>9.2.1.37a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Selected TAI</td>
<td>M</td>
<td>TAI 9.2.3.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE: The Selected TAI contains a configured TAC of the en-gNB.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;Target eNB-ID</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;Selected TAI</td>
<td>M</td>
<td>TAI 9.2.3.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;SON Information</td>
<td>M</td>
<td>9.2.3.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;X2 TNL Configuration Info</td>
<td>C-iiSONInformation Request</td>
<td>9.2.3.29</td>
<td></td>
<td>Source eNB X2 TNL Configuration Info.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifSONInformationRequest</td>
<td>This IE shall be present if the SON Information IE contains the SON Information Request IE set to “X2 TNL Configuration Info”</td>
</tr>
</tbody>
</table>

### 9.2.3.27 SON Information

This IE identifies the nature of the configuration information transferred, i.e., a request, a reply or a report.
### 9.2.3.28 SON Information Reply

This IE contains the configuration information to be replied to the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose SON Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;SON Information Request</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;SON Information Request</td>
<td>M</td>
<td></td>
<td>ENUMERATE</td>
<td>X2 TNL Configuration Info, Time synchronisation Info, Activate Muting, Deactivate Muting)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>&gt;SON Information Reply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;SON Information Reply</td>
<td>M</td>
<td>9.2.3.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;SON Information Report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;SON Information Report</td>
<td>M</td>
<td>9.2.3.39</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.3.29 X2 TNL Configuration Info

The X2 TNL Configuration Info IE is used for signalling X2 TNL Configuration information for automatic X2 SCTP association establishment. It contains TNL addresses of either an eNB or, in the context of EN-DC, of an en-gNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>X2 TNL Configuration Info</td>
<td>O</td>
<td>9.2.3.29</td>
<td></td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Time Synchronisation Info</td>
<td>O</td>
<td>9.2.3.34</td>
<td>YES</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Muting Pattern Information</td>
<td>O</td>
<td>9.2.3.41</td>
<td>YES</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
</tbody>
</table>
### 9.2.3.30 NAS Security Parameters from E-UTRAN

The purpose of the NAS Security Parameters from E-UTRAN IE is to provide security related parameters for I-RAT handovers from E-UTRAN via the eNB to the UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS Security Parameters from E-UTRAN</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td>Coded as the value part of NAS security parameters from E-UTRA IE defined in TS 24.301 [24].</td>
</tr>
</tbody>
</table>

### 9.2.3.31 NAS Security Parameters to E-UTRAN

The purpose of the NAS Security Parameters to E-UTRAN IE is to provide security related parameters for I-RAT handovers to E-UTRAN via the RNC or BSS to the UE.
9.2.3.32 LPPa-PDU

This information element contains an eNB – E-SMLC or E-SMLC – eNB message that is transferred without interpretation in the MME.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPPa-PDU</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.33 Routing ID

This information element is used to identify an E-SMLC within the EPC.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routing ID</td>
<td>M</td>
<td></td>
<td>INTEGER</td>
<td>(0..255)</td>
</tr>
</tbody>
</table>

9.2.3.34 Time Synchronisation Info

The *Time Synchronisation Info* IE is used for signalling stratum level, synchronisation status and muting availability for over-the-air synchronisation using network listening.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stratum Level</td>
<td>M</td>
<td></td>
<td>INTEGER</td>
<td>(0..3, ...)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchronisation status</td>
<td>M</td>
<td></td>
<td>ENUMERATED(</td>
<td>Synchronous, Asynchronous, ...)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muting Availability</td>
<td>O</td>
<td></td>
<td>ENUMERATED</td>
<td>Available, Unavailable, ...</td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

9.2.3.35 Void

9.2.3.36 Traffic Load Reduction Indication

The *Traffic Load Reduction Indication* IE indicates the percentage of the type of traffic relative to the instantaneous incoming rate at the eNB, as indicated in the *Overload Action* IE, to be rejected.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE Type and Reference</th>
<th>Semantics Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Load Reduction</td>
<td>M</td>
<td></td>
<td>INTEGER</td>
<td>(1..99)</td>
</tr>
</tbody>
</table>
9.2.3.37 Additional CS Fallback Indicator

The IE indicates whether the restrictions contained in the *Handover Restriction List* IE apply or not to the CS Fallback High Priority call.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional CS Fallback</td>
<td>M</td>
<td></td>
<td>ENUMERATED(no restriction, restriction, ...)</td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.38 Masked IMEISV

This information element contains the IMEISV value with a mask, to identify a terminal model without identifying an individual Mobile Equipment.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masked IMEISV</td>
<td>M</td>
<td>BIT STRING (SIZE (64))</td>
<td>Coded as the International Mobile station Equipment Identity and Software Version Number (IMEISV) defined in TS 23.003 [21] with the last 4 digits of the SNR masked by setting the corresponding bits to 1. The first to fourth bits correspond to the first digit of the IMEISV, the fifth to eighth bits correspond to the second digit of the IMEISV, and so on.</td>
<td></td>
</tr>
</tbody>
</table>

9.2.3.39 SON Information Report

This IE contains the configuration information to be transferred to the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE SON Information</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;RLF Report Information</td>
<td>M</td>
<td></td>
<td></td>
<td>9.2.3.40</td>
</tr>
</tbody>
</table>

9.2.3.40 RLF Report Information

This IE contains the RLF report information to be transferred to the eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE RLF Report Container</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>rlf-Report-r9 contained in UEInformationResponse message as defined in TS 36.331 [16].</td>
</tr>
<tr>
<td>UE RLF Report Container for extended bands</td>
<td>O</td>
<td></td>
<td>OCTET STRING</td>
<td>rlf-Report-v9e0 contained in the UEInformationResponse message (TS 36.331 [16])</td>
</tr>
</tbody>
</table>

9.2.3.41 Muting Pattern Information

This information element contains muting pattern information that can be used for over-the-air synchronisation using network listening.
### 9.2.3.42 Synchronisation Information

This information element contains information concerning the cell selected as source of synchronisation signal by the sending eNB.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Stratum Level</td>
<td>O</td>
<td></td>
<td>INTEGER (0..3, …)</td>
<td>Stratum Level of cell selected as synchronisation source. The range of this IE is limited to 0..2.</td>
</tr>
<tr>
<td>Listening Subframe Pattern</td>
<td>O</td>
<td></td>
<td>9.2.3.43</td>
<td>Subframe pattern where the Reference Signals can be detected for synchronisation.</td>
</tr>
<tr>
<td>Aggressor Cell List</td>
<td>0..1</td>
<td></td>
<td></td>
<td>List of cells for which the muting pattern need to be activated.</td>
</tr>
<tr>
<td>&gt;Aggressor E-CGI List</td>
<td>1..&lt;max noofCellsineNB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCellsineNB</td>
<td>Maximum no. cells that can be served by an eNB. Value is 256.</td>
</tr>
</tbody>
</table>

### 9.2.3.43 Listening Subframe Pattern

This information element contains information concerning the pattern of subframes where the reference signals can be detected for the purpose of over the air synchronisation via network listening.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern Period</td>
<td>M</td>
<td></td>
<td>ENUMERATED (1280, 2560, 5120, 10240, …)</td>
<td>Period in milliseconds for repetition of the subframe where reference signals are available.</td>
</tr>
<tr>
<td>Pattern Offset</td>
<td>M</td>
<td></td>
<td>INTEGER (0..10239,…)</td>
<td>Offset in number of subframes of the reference signals starting from subframe 0 in a radio frame where SFN = 0.</td>
</tr>
</tbody>
</table>

### 9.2.3.44 MME Group ID

This information element contains information concerning the MME Group ID that identifies a group of MME’s.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MME Group ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td>The MME Group ID is defined in TS 23.003 [21]</td>
</tr>
</tbody>
</table>
### 9.2.3.45 Additional GUTI

This information element contains DCN related information to for identification of a CN node.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUMMEI</td>
<td>M</td>
<td></td>
<td>9.2.3.9</td>
<td></td>
</tr>
<tr>
<td>M-TMSI</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE (4))</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.3.46 Extended UE Identity Index Value

The *Extended UE Identity Index Value* IE is used by the eNB to calculate the paging resources to be used for the UE, as defined in TS 36.304 [20].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extended UE Identity Index Value</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(14))</td>
<td>Corresponds to the UE_ID used to determine the Paging Narrowband and the NB-IoT paging carrier as specified in TS 36.304 [20].</td>
</tr>
</tbody>
</table>

### 9.2.3.47 NB-IoT UE Identity Index Value

The *NB-IoT UE Identity Index Value* IE is used by the eNB to calculate the paging resources to be used for the UE, as defined in TS 36.304 [20].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB-IoT UE Identity Index Value</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(12))</td>
<td>Coded as specified in TS 36.304 [20].</td>
</tr>
</tbody>
</table>

### 9.2.3.48 DL NAS PDU Delivey Request

This IE indicates the request to acknowledge the successful delivery of a downlink NAS PDU as specified in TS 23.401 [11].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL NAS PDU Delivery Request</td>
<td>M</td>
<td></td>
<td>ENUMERATED (requested, ...)</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.3.49 DL CP Security Information

The *DL CP Security Information* IE contains NAS level security information to be forwarded to the UE as described in TS 33.401 [15].

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL NAS MAC</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(16))</td>
<td>Defined in TS 33.401 [15].</td>
</tr>
</tbody>
</table>

### 9.2.3.50 UL CP Security Information

The *UL CP Security Information* IE contains NAS level security information to enable UE authentication by the MME as described in TS 33.401 [15].
### 9.2.3.51 UE Capability Info Request
This IE indicates the request to provide to the MME the UE capability related information when retrieved from the UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL NAS MAC</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(16))</td>
<td>Defined in TS 33.401 [15].</td>
</tr>
<tr>
<td>UL NAS Count</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(5))</td>
<td>Defined in TS 33.401 [15].</td>
</tr>
</tbody>
</table>

### 9.2.3.52 5GS TAI
This information element is used to uniquely identify a 5GS Tracking Area.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Identity</td>
<td>M</td>
<td></td>
<td>9.2.3.8</td>
<td></td>
</tr>
<tr>
<td>&gt;5GS TAC</td>
<td>M</td>
<td></td>
<td>9.2.3.53</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.3.53 5GS TAC
This information element is used to uniquely identify a 5GS Tracking Area Code.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5GS TAC</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE (3))</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.3.54 End Indication
The *End Indication* IE indicates that there are no further NAS PDUs to be transmitted for this UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Indication</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(no further data, ...</td>
</tr>
</tbody>
</table>

### 9.2.3.55 Pending Data Indication
This IE indicates that some signalling or data is pending in the network for the UE.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pending Data Indication</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(true, ...</td>
</tr>
</tbody>
</table>
9.3 Message and Information Element Abstract Syntax (with ASN.1)

9.3.0 General

S1AP ASN.1 definition conforms to ITU-T Rec. X.691 [4], ITU-T Rec. X.680 [5] and ITU-T Rec. X.681 [6].

The ASN.1 definition specifies the structure and content of S1AP messages. S1AP 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 a S1AP 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 a S1AP 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 subclause 10.3.6.

Subclause 9.3 presents the Abstract Syntax of S1AP protocol with ASN.1. In case there is contradiction between the ASN.1 definition in this subclause and the tabular format in subclause 9.1 and 9.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.

9.3.1 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.
9.3.2 Elementary Procedure Definitions

--- ************************************************************
---
--- Elementary Procedure definitions
---
--- ************************************************************

S1AP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-PDU-Descriptions (0)}

DEFINITIONS AUTOMATIC TAGS ::= BEGIN

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

IMPORTS
Criticality,
ProcedureCode
FROM S1AP-CommonDataTypes

CellTrafficTrace,
DeactivateTrace,
DownlinkUEAssociatedLPPaTransport,
DownlinkNASTransport,
DownlinkNonUEAssociatedLPPaTransport,
DownlinkS1cdma2000tunnelling,
ENBDirectInformationTransfer,
ENBStatusTransfer,
ENBConfigurationUpdate,
ENBConfigurationUpdateAcknowledge,
ENBConfigurationUpdateFailure,
ErrorIndication,
HandoverCancel,
HandoverCancelAcknowledge,
HandoverCommand,
HandoverFailure,
HandoverNotify,
HandoverPreparationFailure,
HandoverRequest,
HandoverRequestAcknowledge,
HandoverRequired,
InitialContextSetupFailure,
InitialContextSetupRequest,
InitialContextSetupResponse,
InitialUEMessage,
KillRequest,
KillResponse,
LocationReportingControl,
LocationReportingFailureIndication,
LocationReport,
MMEConfigurationUpdate,
MMEConfigurationUpdateAcknowledge,
MMEConfigurationUpdateFailure,
MMEDirectInformationTransfer,
MMEStatusTransfer,
NASNonDeliveryIndication,
OverloadStart,
OverloadStop,
Paging,
PathSwitchRequest,
PathSwitchRequestAcknowledge,
PathSwitchRequestFailure,
PrivateMessage,
Reset,
ResetAcknowledge,
SISetupFailure,
SISetupRequest,
SISetupResponse,
E-RABModifyRequest,
E-RABModifyResponse,
E-RABModificationIndication,
E-RABModificationConfirm,
E-RABReleaseCommand,
E-RABReleaseResponse,
E-RABReleaseIndication,
E-RABSetupRequest,
E-RABSetupResponse,
TraceFailureIndication,
TraceStart,
UECapabilityInfoIndication,
UEContextModificationFailure,
UEContextModificationRequest,
UEContextModificationResponse,
UEContextReleaseCommand,
UEContextReleaseComplete,
UEContextReleaseRequest,
URadioCapabilityMatchRequest,
URadioCapabilityMatchResponse,
UplinkUEAssociatedLPPaTransport,
UplinkNASTransport,
UplinkNonUEAssociatedLPPaTransport,
UplinkSlcdma2000tunnelling,
WriteReplaceWarningRequest,
WriteReplaceWarningResponse,
ENBConfigurationTransfer,
MMEConfigurationTransfer,
PWSRestartIndication,
UEContextModificationIndication,
UEContextModificationConfirm,
RerouteNASRequest,
PWSFailureIndication,
UEContextSuspendRequest,
UEContextSuspendResponse,
UEContextResumeRequest,
UEContextResumeResponse,
UEContextResumeFailure,
ConnectionEstablishmentIndication,
NASDeliveryIndication,
RetrieveUEInformation,
UEInformationTransfer,
ENBCCPRelocationIndication,
MMECCPRelocationIndication,
SecondaryRATDataUsageReport

FROM SIAP-PDU-Contents

id-CellTrafficTrace,
id-DeactivateTrace,
id-downlinkUEAssociatedLPPaTransport,
id-downlinkNASTransport,
id-downlinkNonUEAssociatedLPPaTransport,
id-DownlinkSlcdma2000Tunnelling,
id-eNBStatusTransfer,
id-ErrorIndication,
id-HandoverCancel,
id-HandoverNotification,
id-HandoverPreparation,
id-HandoverResourceAllocation,
id-InitialContextSetup,
id-initialUEMessage,
id-ENBConfigurationUpdate,
id-Kill,
id-LocationReportingControl,
id-LocationReportingFailureIndication,
id-LocationReport,
id-eNBDirectInformationTransfer,
id-MMEDirectInformationTransfer,
id-MMEConfigurationUpdate,
id-MMEDirectInformationTransfer,
id-MMEStatusTransfer,
id-NASNonDeliveryIndication,
id-OverloadStart,
id-OverloadStop,
id-Paging,
id-PathSwitchRequest,
id-PrivateMessage,
id-Reset,
id-SISetup,
id-E-RABModify,
id-E-RABModificationIndication,
id-E-RABRelease,
id-E-RABReleaseIndication,
id-E-RABSetup,
id-TraceFailureIndication,
id-TraceStart,
id-UECapabilityInfoIndication,
id-UEContextModification,
id-UEContextRelease,
id-UEContextReleaseRequest,
id-UERadioCapabilityMatch,
id-uplinkUEAssociatedLPPaTransport,
id-uplinkNASTransport,
id-uplinkNonUEAssociatedLPPaTransport,
id-UplinkS1cdma2000tunnelling,
id-WriteReplaceWarning,
id-eNBConfigurationTransfer,
id-MMEConfigurationTransfer,
id-PWSRestartIndication,
id-UEContextModificationIndication,
id-RerouteNASRequest,
id-PWSFailureIndication,
id-UEContextResume,
id-ConnectionEstablishmentIndication,
id-NASDeliveryIndication,
id-RetrieveUEInformation,
id-UEInformationTransfer,
id-eNBRelocationIndication,
id-MMERelocationIndication,
id-SecondaryRATDataUsageReport

FROM S1AP-Constants;

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

S1AP-ELEMENTARY-PROCEDURE ::= CLASS {
  &InitiatingMessage OPTIONAL,
  &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]
}

-- *******************************************************
--
S1AP-PDU ::= CHOICE {
    initiatingMessage   InitiatingMessage,
    successfulOutcome  SuccessfulOutcome,
    unsuccessfulOutcome UnsuccessfulOutcome,
    ...
}

InitiatingMessage ::= SEQUENCE {
    procedureCode  S1AP-ELEMENTARY-PROCEDURE.&procedureCode  {{S1AP-ELEMENTARY-PROCEDURES}},
    criticality    S1AP-ELEMENTARY-PROCEDURE.&criticality   {{S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}},
    value   S1AP-ELEMENTARY-PROCEDURE.&InitiatingMessage   {{S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}}
}

SuccessfulOutcome ::= SEQUENCE {
    procedureCode  S1AP-ELEMENTARY-PROCEDURE.&procedureCode  {{S1AP-ELEMENTARY-PROCEDURES}},
    criticality    S1AP-ELEMENTARY-PROCEDURE.&criticality   {{S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}},
    value   S1AP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome {{S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}}
}

UnsuccessfulOutcome ::= SEQUENCE {
    procedureCode  S1AP-ELEMENTARY-PROCEDURE.&procedureCode  {{S1AP-ELEMENTARY-PROCEDURES}},
    criticality    S1AP-ELEMENTARY-PROCEDURE.&criticality   {{S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}},
    value   S1AP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome {{S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}}
}

-- Interface PDU Definition
--
-- ************************************************************
--
-- Interface Elementary Procedure List
--
-- ************************************************************

S1AP-ELEMENTARY-PROCEDURES S1AP-ELEMENTARY-PROCEDURE ::= {
    S1AP-ELEMENTARY-PROCEDURES-CLASS-1 |
    S1AP-ELEMENTARY-PROCEDURES-CLASS-2, |

    ...
}

S1AP-ELEMENTARY-PROCEDURES-CLASS-1 S1AP-ELEMENTARY-PROCEDURE ::= {
    handoverPreparation
    handoverResourceAllocation
    pathSwitchRequest
    e-RABSetup
    e-RABModify
    e-RABRelease
    initialContextSetup
    handoverCancel
    kill
    reset
    s1Setup
}
S1AP-ELEMENTARY-PROCEDURES-CLASS-2  S1AP-ELEMENTARY-PROCEDURE ::= {
  handoverNotification
  e-RABReleaseIndication
  paging
downlinkNASTransport
initialUEMessage
uplinkNASTransport
errorIndication
NASNonDeliveryIndication
uEContextReleaseRequest
downlinkS1cdma2000tunnelling
uplinkS1cdma2000tunnelling
uECapabilityInfoIndication
eNBStatusTransfer
mMStatusTransfer
deactivateTrace
traceStart
traceFailureIndication
cellTrafficTrace
locationReportingControl
locationReportingFailureIndication
locationReport
overloadStart
overloadStop
eNBDirectInformationTransfer
mMDirectInformationTransfer
eNBConfigurationTransfer
mMConfigurationTransfer
privateMessage
...
downlinkUEAssociatedLPPaTransport
uplinkUEAssociatedLPPaTransport
downlinkNonUEAssociatedLPPaTransport
uplinkNonUEAssociatedLPPaTransport
pWSRestartIndication
rerouteNASRequest
pWSFailureIndication
connectionEstablishmentIndication
nASDeliveryIndication
retrieveUEInformation
uEInformationTransfer
handoverPreparation S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  HandoverRequired
  SUCCESSFUL OUTCOME  HandoverCommand
  UNSUCCESSFUL OUTCOME HandoverPreparationFailure
  PROCEDURE CODE     id-HandoverPreparation
  CRITICALITY        reject
}

handoverResourceAllocation S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  HandoverRequest
  SUCCESSFUL OUTCOME  HandoverRequestAcknowledge
  UNSUCCESSFUL OUTCOME HandoverFailure
  PROCEDURE CODE     id-HandoverResourceAllocation
  CRITICALITY        reject
}

handoverNotification S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  HandoverNotify
  PROCEDURE CODE     id-HandoverNotification
  CRITICALITY        ignore
}

pathSwitchRequest S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  PathSwitchRequest
  SUCCESSFUL OUTCOME  PathSwitchRequestAcknowledge
  UNSUCCESSFUL OUTCOME PathSwitchRequestFailure
  PROCEDURE CODE     id-PathSwitchRequest
  CRITICALITY        reject
}

e-RABSetup S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  E-RABSetupRequest
  SUCCESSFUL OUTCOME  E-RABSetupResponse
  PROCEDURE CODE     id-E-RABSetup
  CRITICALITY        reject
}

e-RABModify S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  E-RABModifyRequest
  SUCCESSFUL OUTCOME  E-RABModifyResponse
  PROCEDURE CODE     id-E-RABModify
  CRITICALITY        reject
}
e-RABRelease S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  E-RABReleaseCommand
  SUCCESSFUL OUTCOME  E-RABReleaseResponse
  PROCEDURE CODE       id-E-RABRelease
  CRITICALITY          reject
}

e-RABReleaseIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  E-RABReleaseIndication
  PROCEDURE CODE       id-E-RABReleaseIndication
  CRITICALITY          ignore
}

initialContextSetup S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  InitialContextSetupRequest
  SUCCESSFUL OUTCOME  InitialContextSetupResponse
  UNSUCCESSFUL OUTCOME InitialContextSetupFailure
  PROCEDURE CODE       id-InitialContextSetup
  CRITICALITY          reject
}

uEContextReleaseRequest S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  UEContextReleaseRequest
  PROCEDURE CODE       id-UEContextReleaseRequest
  CRITICALITY          ignore
}

paging S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  Paging
  PROCEDURE CODE       id-Paging
  CRITICALITY          ignore
}

downlinkNASTransport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  DownlinkNASTransport
  PROCEDURE CODE       id-downlinkNASTransport
  CRITICALITY          ignore
}

initialUEMessage S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  InitialUEMessage
  PROCEDURE CODE       id-initialUEMessage
  CRITICALITY          ignore
}

uplinkNASTransport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  UplinkNASTransport
  PROCEDURE CODE       id-uplinkNASTransport
  CRITICALITY          ignore
}

nASNonDeliveryIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  NASNonDeliveryIndication
  PROCEDURE CODE       id-NASNonDeliveryIndication
}
CRITICALITY    ignore
}

handoverCancel S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  HandoverCancel
  SUCCESSFUL OUTCOME  HandoverCancelAcknowledge
  PROCEDURE CODE   id-HandoverCancel
  CRITICALITY    reject
}

reset S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  Reset
  SUCCESSFUL OUTCOME  ResetAcknowledge
  PROCEDURE CODE   id-Reset
  CRITICALITY    reject
}

errorIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  ErrorIndication
  PROCEDURE CODE   id-ErrorIndication
  CRITICALITY    ignore
}

s1Setup S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  S1SetupRequest
  SUCCESSFUL OUTCOME  S1SetupResponse
  UNSUCCESSFUL OUTCOME  S1SetupFailure
  PROCEDURE CODE   id-S1Setup
  CRITICALITY    reject
}

eNBConfigurationUpdate S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  ENBConfigurationUpdate
  SUCCESSFUL OUTCOME  ENBConfigurationUpdateAcknowledge
  UNSUCCESSFUL OUTCOME  ENBConfigurationUpdateFailure
  PROCEDURE CODE   id-ENBConfigurationUpdate
  CRITICALITY    reject
}

mMEConfigurationUpdate S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  MMEConfigurationUpdate
  SUCCESSFUL OUTCOME  MMEConfigurationUpdateAcknowledge
  UNSUCCESSFUL OUTCOME  MMEConfigurationUpdateFailure
  PROCEDURE CODE   id-MMEConfigurationUpdate
  CRITICALITY    reject
}

downlinkS1cdma2000tunnelling S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  DownlinkS1cdma2000tunnelling
  PROCEDURE CODE   id-DownlinkS1cdma2000tunnelling
  CRITICALITY    ignore
}

uplinkS1cdma2000tunnelling S1AP-ELEMENTARY-PROCEDURE ::= {
uEContextModification S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  UEContextModificationRequest
  SUCCESSFUL OUTCOME  UEContextModificationResponse
  UNSUCCESSFUL OUTCOME UEContextModificationFailure
  PROCEDURE CODE   id-UEContextModification
  CRITICALITY    reject
}

uECapabilityInfoIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  UECapabilityInfoIndication
  PROCEDURE CODE   id-UECapabilityInfoIndication
  CRITICALITY    ignore
}

uEContextRelease S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  UEContextReleaseCommand
  SUCCESSFUL OUTCOME  UEContextReleaseComplete
  PROCEDURE CODE   id-UEContextRelease
  CRITICALITY    reject
}

eNBStatusTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  ENBStatusTransfer
  PROCEDURE CODE   id-eNBStatusTransfer
  CRITICALITY    ignore
}

mMEStatusTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  MMEStatusTransfer
  PROCEDURE CODE   id-MMEStatusTransfer
  CRITICALITY    ignore
}

deactivateTrace S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  DeactivateTrace
  PROCEDURE CODE   id-DeactivateTrace
  CRITICALITY    ignore
}

traceStart S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  TraceStart
  PROCEDURE CODE   id-TraceStart
  CRITICALITY    ignore
}

traceFailureIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  TraceFailureIndication
  PROCEDURE CODE   id-TraceFailureIndication
  CRITICALITY    ignore
}
cellTrafficTrace S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  CellTrafficTrace
  PROCEDURE CODE id-CellTrafficTrace
  CRITICALITY ignore
}

locationReportingControl S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  LocationReportingControl
  PROCEDURE CODE id-LocationReportingControl
  CRITICALITY ignore
}

locationReportingFailureIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  LocationReportingFailureIndication
  PROCEDURE CODE id-LocationReportingFailureIndication
  CRITICALITY ignore
}

locationReport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  LocationReport
  PROCEDURE CODE id-LocationReport
  CRITICALITY ignore
}

overloadStart S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  OverloadStart
  PROCEDURE CODE id-OverloadStart
  CRITICALITY ignore
}

overloadStop S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  OverloadStop
  PROCEDURE CODE id-OverloadStop
  CRITICALITY reject
}

writeReplaceWarning S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  WriteReplaceWarningRequest
  SUCCESSFUL OUTCOME WriteReplaceWarningResponse
  PROCEDURE CODE id-WriteReplaceWarning
  CRITICALITY reject
}

eNBDirectInformationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  ENBDirectInformationTransfer
  PROCEDURE CODE id-eNBDirectInformationTransfer
  CRITICALITY ignore
}

mMEDirectInformationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  MMEDirectInformationTransfer
  PROCEDURE CODE id-MMEDirectInformationTransfer
  CRITICALITY ignore
}
eNBConfigurationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE ENBConfigurationTransfer
  PROCEDURE CODE id-eNBConfigurationTransfer
  CRITICALITY ignore
}

mMEConfigurationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE MMEConfigurationTransfer
  PROCEDURE CODE id-MMEConfigurationTransfer
  CRITICALITY ignore
}

privateMessage S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE PrivateMessage
  PROCEDURE CODE id-PrivateMessage
  CRITICALITY ignore
}

pWSRestartIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE PWSRestartIndication
  PROCEDURE CODE id-PWSRestartIndication
  CRITICALITY ignore
}

kill S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE KillRequest
  SUCCESSFUL OUTCOME KillResponse
  PROCEDURE CODE id-Kill
  CRITICALITY reject
}

downlinkUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE DownlinkUEAssociatedLPPaTransport
  PROCEDURE CODE id-downlinkUEAssociatedLPPaTransport
  CRITICALITY ignore
}

uplinkUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UplinkUEAssociatedLPPaTransport
  PROCEDURE CODE id-uplinkUEAssociatedLPPaTransport
  CRITICALITY ignore
}

downlinkNonUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE DownlinkNonUEAssociatedLPPaTransport
  PROCEDURE CODE id-downlinkNonUEAssociatedLPPaTransport
  CRITICALITY ignore
}

uplinkNonUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UplinkNonUEAssociatedLPPaTransport
  PROCEDURE CODE id-uplinkNonUEAssociatedLPPaTransport
  CRITICALITY ignore
}
CRITICALITY ignore

`uERadioCapabilityMatch S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UERadioCapabilityMatchRequest
  SUCCESSFUL OUTCOME UERadioCapabilityMatchResponse
  PROCEDURE CODE id-UERadioCapabilityMatch
  CRITICALITY reject
}

e-RABModificationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE E-RABModificationIndication
  SUCCESSFUL OUTCOME E-RABModificationConfirm
  PROCEDURE CODE id-E-RABModificationIndication
  CRITICALITY reject
}

`uEContextModificationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UEContextModificationIndication
  SUCCESSFUL OUTCOME UEContextModificationConfirm
  PROCEDURE CODE id-UEContextModificationIndication
  CRITICALITY reject
}

rerouteNASRequest S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE RerouteNASRequest
  PROCEDURE CODE id-RerouteNASRequest
  CRITICALITY reject
}

pWSFailureIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE PWSFailureIndication
  PROCEDURE CODE id-PWSFailureIndication
  CRITICALITY ignore
}

`uEContextSuspend S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UEContextSuspendRequest
  SUCCESSFUL OUTCOME UEContextSuspendResponse
  PROCEDURE CODE id-UEContextSuspend
  CRITICALITY reject
}

uEContextResume S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UEContextResumeRequest
  SUCCESSFUL OUTCOME UEContextResumeResponse
  UNSUCCESSFUL OUTCOME UEContextResumeFailure
  PROCEDURE CODE id-UEContextResume
  CRITICALITY reject
}

connectionEstablishmentIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE ConnectionEstablishmentIndication
  PROCEDURE CODE id-ConnectionEstablishmentIndication
}

ETSI
CRITICALITY reject

nASDeliveryIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE NASDeliveryIndication
  PROCEDURE CODE id-NASDeliveryIndication
  CRITICALITY ignore
}

retrieveUEInformation S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE RetrieveUEInformation
  PROCEDURE CODE id-RetrieveUEInformation
  CRITICALITY reject
}

UEInformationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UEInformationTransfer
  PROCEDURE CODE id-UEInformationTransfer
  CRITICALITY reject
}

eNBCPRelocationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE ENBCPRelocationIndication
  PROCEDURE CODE id-eNBCPRelocationIndication
  CRITICALITY reject
}

mMECPRelocationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE MMECPRelocationIndication
  PROCEDURE CODE id-mMECPRelocationIndication
  CRITICALITY reject
}

secondaryRATDataUsageReport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE SecondaryRATDataUsageReport
  PROCEDURE CODE id-SecondaryRATDataUsageReport
  CRITICALITY ignore
}

END
9.3.3 PDU Definitions

-- **********************************************
-- -- PDU definitions for SIAP.
--
-- **********************************************

SIAP-PDU-Contents {
  itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
  eps-Access (21) modules (3) s1ap (1) version1 (1) s1ap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **********************************************

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

IMPORTS

UEAggregateMaximumBitrate,
BearerType,
Cause,
CellAccessMode,
Cdma2000DHOREquiredIndication,
Cdma2000HOStatus,
Cdma2000OneXSRVCCInfo,
Cdma2000OneXRAND,
Cdma2000PDU,
Cdma2000RATType,
Cdma2000SectorID,
EUTRANRoundTripDelayEstimationInfo,
CNDomain,
ConcurrentWarningMessageIndicator,
CriticalityDiagnostics,
CSFallbackIndicator,
CSG-IId,
CSG-IIdList,
CSGMembershipStatus,
Data-Forwarding-Not-Possible,
Direct-Forwarding-Path-Availability,
Global-ENB-ID,
EUTRAN-CGI,
ENBname,
ENB-StatusTransfer-TransparentContainer,
ENB-UE-S1AP-ID,
ExtendedRepetitionPeriod,
GTP-TEID,
GUMMEI,
GUMMEIType,
HandoverRestrictionList,
HandoverType,
Masked-IMEISV,
LAI,
LPa-PDU,
ManagementBasedMDTAAllowed,
MDTPLMNList,
MMEname,
MMERelaySupportIndicator,
MME-UE-S1AP-ID,
MSClassmark2,
MSClassmark3,
NAS-PDU,
NASSecurityParametersfromE-UTRAN,
NASSecurityParameterstoE-UTRAN,
OverloadResponse,
PagingDRX,
PagingPriority,
PlMNidentity,
ProSeAuthorized,
RIMTransfer,
RelativeMMECapacity,
RequestType,
E-RAB-ID,
E-RABLevelQoSParameters,
E-RABList,
RelayNode-Indicator,
Routing-ID,
SecurityKey,
SecurityContext,
ServedGUMMEIs,
SONConfigurationTransfer,
Source-ToTarget-TransparentContainer,
SourceBSS-ToTargetBSS-TransparentContainer,
SourceeNB-ToTargeteNB-TransparentContainer,
SourceRNC-ToTargetRNC-TransparentContainer,
SubscriberProfileIDforRFP,
SRVCCOperationNotPossible,
SRVCCOperationPossible,
SRVCCHOIndication,
SupportedTAs,
TAI,
Target-ToSource-TransparentContainer,
TargetBSS-ToSourceBSS-TransparentContainer,
TargeteNB-ToSourceeNB-TransparentContainer,
TargetID,
TargetRNC-ToSourceRNC-TransparentContainer,
TimeToWait,
TraceActivation,
TrafficLoadReductionIndication,
E-UTRAN-Trace-ID,
TransportLayerAddress,
UEIdentityIndexValue,
UEPagingID,
UERadioCapability,
UERadioCapabilityForPaging,
UE-RetentionInformation,
UE-S1AP-IDs,
UE-associatedLogicalS1-ConnectionItem,
UESecurityCapabilities,
S-TMSI,
MessageIdentifier,
SerialNumber,
WarningAreaList,
RepetitionPeriod,
NumberOfBroadcastRequest,
WarningType,
WarningSecurityInfo,
DataCodingScheme,
WarningMessageContents,
BroadcastCompletedAreaList,
RRC-Establishment-Cause,
BroadcastCancelledAreaList,
PS-ServiceNotAvailable,
GUMMEIList,
Correlation-ID,
GWContextReleaseIndication,
PrivacyIndicator,
VoiceSupportMatchIndicator,
TunnelInformation,
KillAllWarningMessages,
TransportInformation,
LHN-ID,
UserLocationInformation,
AdditionalCSFallbackIndicator,
ECGIListForRestart,
TAIListForRestart,
EmergencyAreaIDListForRestart,
ExpectedUEBehaviour,
Paging-eDRXInformation,
Extended-UEIdentityIndexValue,
MME-Group-ID,
Additional-GUTI,
PWSfailedECGIList,
CellIdentityAndCELevelForCECapableUEs,
AssistanceDataForPaging,
InformationOnRecommendedCellsAndENBsForPaging,
UE-Usage-Type,
UEUserPlaneC1oTSupportIndicator,
NB-IoT-DefaultPagingDRX,
NB-IoT-Paging-eDRXInformation,
CE-mode-B-SupportIndicator,
NB-IoT-UEIdentityIndexValue,
V2XServicesAuthorized,
DCN-ID,
ServedDCNs,
UESidelinkAggregateMaximumBitrate,

FROM SIAP-IEs


id-AssistanceDataForPaging, id-AerialUEsubscriptionInformation, id-uEaggregateMaximumBitrate, id-BearerType, id-Cause, id-CellAccessMode, id-CellIdentifierAndCELevelForCECapableUEs, id-cdma2000HORequiredIndication,
id-cdma2000HOStatus, id-cdma2000OneXSRVCCInfo, id-cdma2000OneXXRAI, id-cdma2000PDU, id-cdma2000RATType, id-cdma2000SectorID, id-EUTRANRoundTripDelayEstimationInfo, id-CNDomain, id-ConcurrentWarningMessageIndicator, id-CriticalityDiagnostics, id-CSFallbackIndicator, id-CSG-Id, id-CSG-IdList, id-CSGMembershipStatus, id-Data-Forwarding-Not-Possible, id-DefaultPagingDRX, id-Direct-Forwarding-Path-Availability, id-Global-ENB-ID, id-EUTRAN-CGI, id-eNBname, id-eNB-StatusTransfer-TransparentContainer, id-eNB-UE-S1AP-ID, id-GERANtoLTEHOInformationRes, id-GUMMEI-ID, id-GUMMEIType, id-HandoverRestrictionList, id-HandoverType, id-Masked-IMEISV, id-InformationOnRecommendedCellsAndENBsForPaging, id-InitialContextSetup, id-Inter-SystemInformationTransferTypeEDT, id-Inter-SystemInformationTransferTypeMDT, id-LPPa-PDU, id-NAS-DownlinkCount, id-Management-BasedMDTAllowed, id-Management-BasedMDTPLMNList, id-MMEname, id-MME-UE-S1AP-ID, id-MSClassmark2, id-MSClassmark3, id-NAS-PDU, id-NASSecurityParametersfromE-UTRAN, id-NASSecurityParameterstoE-UTRAN, id-OverloadResponse, id-pagingDRX, id-PagingPriority, id-RelativeMMECapacity, id-RequestType, id-Routing-ID, id-E-RABAdmittedItem, id-E-RABAdmittedList, id-E-RABDataForwardingItem, id-E-RABFailedToModifyList, id-E-RABFailedToReleaseList,
id-E-RABFailedToSetupItemHOReqAck,
id-E-RABFailedToSetupListBearerSUReq,
id-E-RABFailedToSetupListCtxtSUReq,
id-E-RABFailedToSetupListHOReqAck,
id-E-RABFailedToBeReleasedList,
id-E-RABFailedToResumeListResumeReq,
id-E-RABFailedToResumeItemResumeReq,
id-E-RABFailedToResumeListResumeRes,
id-E-RABFailedToResumeItemResumeRes,
id-E-RABModify,
id-E-RABModifyItemBearerSUReq,
id-E-RABModifyListBearerSURes,
id-E-RABRelease,
id-E-RABReleaseItemBearerRelComp,
id-E-RABReleaseItemHOCmd,
id-E-RABReleaseListBearerRelComp,
id-E-RABReleaseIndication,
id-E-RABSetup,
id-E-RABSetupItemBearerSUReq,
id-E-RABSetupListBearerSURes,
id-E-RABSetupListCtxtSURes,
id-E-RABSubjecttoDataForwardingList,
id-E-RABToBeModifiedItemBearerModReq,
id-E-RABToBeModifiedListBearerModReq,
id-E-RABToBeModifiedListBearerModInd,
id-E-RABToBeModifiedItemBearerModInd,
id-E-RABNotToBeModifiedListBearerModInd,
id-E-RABNotToBeModifiedItemBearerModInd,
id-E-RABModifyListBearerModConf,
id-E-RABModifyItemBearerModConf,
id-E-RABFailedToModifyListBearerModConf,
id-E-RABToBeReleasedListBearerModConf,
id-E-RABToBeReleasedItemBearerSUReq,
id-E-RABToBeSetupItemCtxtSUReq,
id-E-RABToBeSetupItemHOReq,
id-E-RABToBeSetupListBearerSUReq,
id-E-RABToBeSetupListCtxtSUReq,
id-E-RABToBeSwitchedDLItem,
id-E-RABToBeSwitchedDownload,
id-E-RABToBeSwitchedULList,
id-E-RABToBeSwitchedULItem,
id-E-RABToReleaseListHOCmd,
id-PreSeAuthorized,
id-SecurityKey,
id-SecurityContext,
id-ServedGUMMEIs,
id-SONConfigurationTransferECT,
id-SONConfigurationTransferMCT,
id-Source-ToTarget-TransparentContainer,
id-Source-ToTarget-TransparentContainer-Secondary,
id-GUMMEIList, id-SourceMME-GUMMEI, id-MME-UE-5GAP-ID-2, id-GW-TransportLayerAddress, id-RelayNode-Indicator, id-Correlation-ID, id-MMERelaySupportIndicator, id-GWContextReleaseIndication, id-PrivacyIndicator, id-VoiceSupportMatchIndicator, id-Tunnel-Information-for-BBF, id-SIPTO-Correlation-ID, id-SIPTO-L-GW-TransportLayerAddress, id-KillAllWarningMessages, id-TransportInformation, id-LMN-ID, id-UserLocationInformation, id-AdditionalCSFallbackIndicator, id-ECGIListForRestart, id-TAIListForRestart, id-EmergencyAreaIDListForRestart, id-ExpectedUEBehaviour, id-Paging-eDRXInformation, id-extended-UEIDIdentityIndexValue, id-CSGMembershipInfo, id-MME-Group-ID, id-Additional-GUTI, id-SI-Message, id-PWSfailedECGIList, id-PWSFailureIndication, id-UE-Usage-Type, id-UEUserPlaneCotSupportIndicator, id-NB-IoT-DefaultPagingDRX, id-NB-IoT-Paging-eDRXInformation, id-C-E-mode-B-SupportIndicator, id-NB-IoT-UEIdentityIndexValue, id-RRC-Resume-Cause, id-DCN-ID, id-ServedDCNs, id-UESidelinkAggregateMaximumBitrate, id-DLNASPDUDeliveryAckRequest, id-Coverage-Level, id-EnhancedCoverageRestricted, id-UE-Level-QoS-Parameters, id-DL-CP-SecurityInformation, id-UL-CP-SecurityInformation, id-SecondaryRATDataUsageRequest, id-SecondaryRATDataUsageReportList, id-HandoverFlag, id-NRUESecurityCapabilities, id-UE-Application-Layer-Measurement-Capability, id-CE-ModeBRestricted, id-DownlinkPacketLossRate, id-UplinkPacketLossRate,
FROM SIAP-Constants;

-- ************************************************************
-- Common Container Lists
-- ************************************************************
E-RAB-IE-ContainerList { SIAP-PROTOCOL-IES : IEsSetParam } ::= ProtocolIE-ContainerList { 1, maxnoofE-RABs, {IEsSetParam} }
E-RAB-IE-ContainerPairList { SIAP-PROTOCOL-IES-PAIR : IEsSetParam } ::= ProtocolIE-ContainerPairList { 1, maxnoofE-RABs, {IEsSetParam} }
ProtocolError-IE-ContainerList { SIAP-PROTOCOL-IES : IEsSetParam } ::= ProtocolIE-ContainerList { 1, maxnoofE-RABs, {IEsSetParam} }

-- ************************************************************
-- HANDOVER PREPARATION ELEMENTARY PROCEDURE
-- ************************************************************
-- ************************************************************
-- Handover Required
-- ************************************************************
-- Handover Required ::= SEQUENCE {
protocolIEs ProtocolIE-Container { { HandoverRequiredIEs } },
...}
HandoverRequiredIEs SIAP-PROTOCOL-IES ::= { 
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory},
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
  { ID id-HandoverType CRITICALITY reject TYPE HandoverType PRESENCE mandatory},
  { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory},
  { ID id-TargetID CRITICALITY reject TYPE TargetID PRESENCE mandatory},
  { ID id-Direct-Forwarding-Path-Availability CRITICALITY ignore TYPE Direct-Forwarding-Path-Availability PRESENCE optional},
  { ID id-SRVCCHOIndication CRITICALITY reject TYPE SRVCCHOIndication PRESENCE optional},
  { ID id-Source-ToTarget-TransparentContainer CRITICALITY reject TYPE Source-ToTarget-TransparentContainer PRESENCE mandatory} 
}
{ ID id-Source-ToTarget-TransparentContainer-Secondary CRITICALITY reject TYPE Source-ToTarget-TransparentContainer PRESENCE optional },
{ ID id-MSClassmark2 CRITICALITY reject TYPE MSClassmark2 PRESENCE conditional },
{ ID id-MSClassmark3 CRITICALITY ignore TYPE MSClassmark3 -- },
{ ID id-CSG-Id CRITICALITY reject TYPE CSG-Id PRESENCE optional },
{ ID id-CellAccessMode CRITICALITY reject TYPE CellAccessMode PRESENCE optional },
{ ID id-PS-ServiceNotAvailable CRITICALITY ignore TYPE PS-ServiceNotAvailable PRESENCE optional },
...
-- Handover Preparation Failure

HandoverPreparationFailure ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container  { { HandoverPreparationFailureIEs} },
  ...
}

HandoverPreparationFailureIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY ignore TYPE MME-UE-S1AP-ID     PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID     CRITICALITY ignore TYPE ENB-UE-S1AP-ID     PRESENCE mandatory }|
  { ID id-Cause       CRITICALITY ignore TYPE Cause       PRESENCE mandatory }|
  { ID id-CriticalityDiagnostics   CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional },
  ...

-- Handover Request

HandoverRequest ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container  { {HandoverRequestIEs} },
  ...
}

HandoverRequestIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID       CRITICALITY reject TYPE MME-UE-S1AP-ID      PRESENCE mandatory}|
  { ID id-HandoverType       CRITICALITY reject TYPE HandoverType      PRESENCE mandatory}|
  { ID id-Cause         CRITICALITY ignore TYPE Cause        PRESENCE mandatory}|
  { ID id-uEaggregateMaximumBitrate    CRITICALITY reject TYPE UEAggregateMaximumBitrate   PRESENCE mandatory}|
  { ID id-E-RABToBeSetupListHOReq     CRITICALITY reject TYPE E-RABToBeSetupListHOReq   PRESENCE mandatory}|
  { ID id-Source-ToTarget-TransparentContainer CRITICALITY reject TYPE Source-ToTarget-TransparentContainer  PRESENCE mandatory}|
  { ID id-UESecurityCapabilities     CRITICALITY reject TYPE UESecurityCapabilities   PRESENCE mandatory}|
  { ID id-HandoverRestrictionList     CRITICALITY ignore TYPE HandoverRestrictionList PRESENCE optional}|
  { ID id-TraceActivation     CRITICALITY ignore TYPE TraceActivation   PRESENCE optional}|
  { ID id-RequestType      CRITICALITY ignore TYPE RequestType     PRESENCE optional}|
  { ID id-SRVCCOperationPossible     CRITICALITY ignore TYPE SRVCCOperationPossible   PRESENCE optional}|
  { ID id-SecurityContext     CRITICALITY reject TYPE SecurityContext     PRESENCE mandatory}|
  { ID id-NASSecurityParameterstoE-UTRAN CRITICALITY reject TYPE NASSecurityParameterstoE-UTRAN  PRESENCE conditional}
This IE shall be present if the Handover Type IE is set to the value "UTRANtoLTE" or "GERANtoLTE" -- }

{ ID id-CSG-Id CRITICALITY reject TYPE CSG-Id PRESENCE optional }|
{ ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional }|
{ ID id-GUMMEI-ID CRITICALITY ignore TYPE GUMMEI PRESENCE optional }|
{ ID id-MME-UE-S1AP-ID-2 CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE optional }|
{ ID id-ManagementBasedMDTAllowed CRITICALITY ignore TYPE ManagementBasedMDTAllowed PRESENCE optional }|
{ ID id-ManagementBasedMDTPLMNList CRITICALITY ignore TYPE MDTPLMNList PRESENCE optional }|
{ ID id-Masked-IMEISV CRITICALITY ignore TYPE Masked-IMEISV PRESENCE optional }|
{ ID id-ExpectedUEBehaviour CRITICALITY ignore TYPE ExpectedUEBehaviour PRESENCE optional }|
{ ID id-ProSeAuthorized CRITICALITY ignore TYPE ProSeAuthorized PRESENCE optional }|
{ ID id-UESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE UESidelinkAggregateMaximumBitrate PRESENCE optional }|
{ ID id-EnhancedCoverageRestricted CRITICALITY ignore TYPE EnhancedCoverageRestricted PRESENCE optional }|
{ ID id-NRUESecurityCapabilities CRITICALITY ignore TYPE NRUESecurityCapabilities PRESENCE optional }|
{ ID id-CE-ModeBRestricted CRITICALITY ignore TYPE CE-ModeBRestricted PRESENCE optional }|
{ ID id-AerialUEsubscriptionInformation CRITICALITY ignore TYPE AerialUEsubscriptionInformation PRESENCE optional }|
{ ID id-Subscription-Based-UE-DifferentiationInfo CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo PRESENCE optional }, ...

E-RABToBeSetupListHOReq ::= E-RAB-IE-ContainerList { {E-RABToBeSetupItemHOReqIEs} }

E-RABToBeSetupItemHOReqIEs SIAP-PROTOCOL-IES ::= {
{ ID id-E-RABToBeSetupItemHOReq CRITICALITY reject TYPE E-RABToBeSetupItemHOReq PRESENCE mandatory }, ...
}

E-RABToBeSetupItemHOReq ::= SEQUENCE {
  e-RAB-ID E-RAB-ID,
  transportLayerAddress TransportLayerAddress,
  gTP-TEID GTP-TEID,
  e-RABLevelQoSParameters E-RABLevelQoSParameters,
  iE-Extensions ProtocolExtensionContainer { {E-RABToBeSetupItemHOReq-ExtIEs} } OPTIONAL,
  ...
}

E-RABToBeSetupItemHOReq-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
{ ID id-Data-Forwarding-Not-Possible CRITICALITY ignore EXTENSION Data-Forwarding-Not-Possible PRESENCE optional }|
{ ID id-BearerType CRITICALITY reject EXTENSION BearerType PRESENCE optional }, ...
}

-- *******************************************************
-- Handover Request Acknowledge
-- *******************************************************

HandoverRequestAcknowledge ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {HandoverRequestAcknowledgeIEs} },
  ...
}
HandoverRequestAcknowledgeIEs S1AP-PROTOCOL-IES ::= {  
  { ID id-mme-ue-s1ap-id      CRITICALITY ignore TYPE mme-ue-s1ap-id       PRESENCE mandatory },  
  { ID id-enb-ue-s1ap-id      CRITICALITY ignore TYPE enb-ue-s1ap-id       PRESENCE mandatory },  
  { ID id-e-rabadmittedlist      CRITICALITY ignore TYPE e-rabadmittedlist       PRESENCE mandatory },  
  { ID id-e-rabfailedtsetuplisthoreqack      CRITICALITY ignore TYPE e-rabfailedtsetuplisthoreqack       PRESENCE optional },  
  { ID id-target-tosource-transparentcontainer      CRITICALITY reject TYPE target-tosource-transparentcontainer       PRESENCE mandatory },  
  { ID id-csg-id      CRITICALITY ignore TYPE csg-id       PRESENCE optional },  
  { ID id-criticalitydiagnostics      CRITICALITY ignore TYPE criticalitydiagnostics       PRESENCE optional },  
  { ID id-cellaccessmode      CRITICALITY ignore TYPE cellaccessmode       PRESENCE optional },  
  { ID id-ce-mode-b-supportindicator      CRITICALITY ignore TYPE ce-mode-b-supportindicator       PRESENCE optional },  
  ... }  

E-RABAdmittedList ::= E-RAB-IE-ContainerList { {E-RABAdmittedItemIEs} }  

E-RABAdmittedItemIEs S1AP-PROTOCOL-IES ::= {  
  { ID id-e-rabadmitteditem      CRITICALITY ignore TYPE e-rabadmitteditem       PRESENCE mandatory },  
  ... }  

E-RABAdmittedItem ::= SEQUENCE {  
  e-rab-id      E-RAB-ID,  
  transportlayeraddress      TransportLayerAddress,  
  gtp-teid      GTP-TEID,  
  dl-transportlayeraddress      TransportLayerAddress OPTIONAL,  
  dl-gtp-teid      GTP-TEID OPTIONAL,  
  ul-transportlayeraddress      TransportLayerAddress OPTIONAL,  
  ul-gtp-teid      GTP-TEID OPTIONAL,  
  ie-extensions      ProtocolExtensionContainer { {E-RABAdmittedItem-ExtIEs} } OPTIONAL,  
  ... }  

E-RABAdmittedItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {  
  ... }  

E-RABFailedtoSetupListHOREqAck ::= E-RAB-IE-ContainerList { {E-RABFailedtoSetupItemHOREqAckIEs} }  

E-RABFailedtoSetupItemHOREqAckIEs S1AP-PROTOCOL-IES ::= {  
  { ID id-e-rabfailedtsetupitemhoreqack      CRITICALITY ignore TYPE e-rabfailedtsetupitemhoreqack       PRESENCE mandatory },  
  ... }  

E-RABFailedtoSetupItemHOREqAck ::= SEQUENCE {  
  e-rab-id      E-RAB-ID,  
  cause      Cause,  
  ie-extensions      ProtocolExtensionContainer { {E-RABFailedtoSetupItemHOREqAckExtIEs} } OPTIONAL,  
  ... }  

E-RABFailedtoSetupItemHOREqAckExtIEs S1AP-PROTOCOL-EXTENSION ::= {  
  ... }
HandoverFailure ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container  {{ HandoverFailureIEs}},
  ...
}

HandoverFailureIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID   CRITICALITY ignore TYPE MME-UE-S1AP-ID   PRESENCE mandatory },
  { ID id-Cause      CRITICALITY ignore TYPE Cause       PRESENCE mandatory },
  { ID id-CriticalityDiagnostics  CRITICALITY ignore TYPE CriticalityDiagnostics  PRESENCE optional },
  ...
}

HandoverNotify ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container  {{ HandoverNotifyIEs}},
  ...
}

HandoverNotifyIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY reject TYPE MME-UE-S1AP-ID   PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID     CRITICALITY reject TYPE ENB-UE-S1AP-ID   PRESENCE mandatory },
  { ID id-EUTRAN-CGI      CRITICALITY ignore TYPE EUTRAN-CGI    PRESENCE mandatory },
  { ID id-TAI        CRITICALITY ignore TYPE TAI     PRESENCE mandatory },
  -- Extension for Release 11 to support BBAI --
  { ID id-Tunnel-Information-for-BBF  CRITICALITY ignore TYPE TunnelInformation  PRESENCE optional },
  { ID id-LHN-ID       CRITICALITY ignore TYPE LHN-ID     PRESENCE optional },
  { ID id-PSCellInformation    CRITICALITY ignore TYPE PSCellInformation  PRESENCE optional },
  ...
}
PathSwitchRequest ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { { PathSwitchRequestIEs} },
    ...
}

PathSwitchRequestIEs S1AP-PROTOCOL-IES ::= {
    ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory|
    ID id-E-RABToBeSwitchedDLList CRITICALITY reject TYPE E-RABToBeSwitchedDLList PRESENCE mandatory|
    ID id-SourceMME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory|
    ID id-EUTRAN-CGI CRITICALITY ignore TYPE EUTRAN-CGI PRESENCE mandatory|
    ID id-RAI CRITICALITY ignore TYPE RAI PRESENCE mandatory|
    ID id-UESecurityCapabilities CRITICALITY ignore TYPE UESecurityCapabilities PRESENCE mandatory|
    ID id-csg-id CRITICALITY ignore TYPE CSG-Id PRESENCE optional|
    ID id-CellAccessMode CRITICALITY ignore TYPE CellAccessMode PRESENCE optional|
    ID id-SourceMME-GUMMEI CRITICALITY ignore TYPE GUMMEI PRESENCE optional|
    ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional,
    ...
}

E-RABToBeSwitchedDLList ::= E-RAB-IE-ContainerList { E-RABToBeSwitchedDLItemIEs }

E-RABToBeSwitchedDLItemIEs S1AP-PROTOCOL-IES ::= {
    ID id-E-RABToBeSwitchedDLItem CRITICALITY reject TYPE E-RABToBeSwitchedDLItem PRESENCE mandatory |
    ...
}

E-RABToBeSwitchedDLItem ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
    transportLayerAddress TransportLayerAddress,
    gTP-TEID GTP-TEID,
    iE-Extensions ProtocolExtensionContainer { E-RABToBeSwitchedDLItem-ExtIEs } OPTIONAL,
    ...
}

E-RABToBeSwitchedDLItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}
-- Path Switch Request Acknowledge
--
-- **************************************************************

PathSwitchRequestAcknowledge ::= SEQUENCE {
  protocolIEs ProtocolIE-Container [ { PathSwitchRequestAcknowledgeIEs } ],
  ...}

PathSwitchRequestAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE mandatory},
  { ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
  { ID id-uAggregateMaximumBitrate CRITICALITY ignore TYPE UEAggregateMaximumBitrate PRESENCE optional},
  { ID id-E-RABToBeSwitchedULList CRITICALITY ignore TYPE E-RABToBeSwitchedULList PRESENCE optional},
  { ID id-E-RABToBeReleasedList CRITICALITY ignore TYPE E-RABList PRESENCE optional},
  { ID id-SecurityContext CRITICALITY reject TYPE SecurityContext PRESENCE optional},
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional},
  { ID id-MME-UE-S1AP-ID-2 CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE optional},
  { ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional},
  { ID id-ProSeAuthorized CRITICALITY ignore TYPE ProSeAuthorized PRESENCE optional},
  { ID id-UEUserPlaneClotSupportIndicator CRITICALITY ignore TYPE UEUserPlaneClotSupportIndicator PRESENCE optional},
  { ID id-V2XservicesAuthorized CRITICALITY ignore TYPE V2XservicesAuthorized PRESENCE optional},
  { ID id-UESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE UESidelinkAggregateMaximumBitrate PRESENCE optional},
  { ID id-EnhancedCoverageRestricted CRITICALITY ignore TYPE EnhancedCoverageRestricted PRESENCE optional},
  { ID id-NRUESecurityCapabilities CRITICALITY ignore TYPE NRUESecurityCapabilities PRESENCE optional},
  { ID id-CE-ModeBRestricted CRITICALITY ignore TYPE CE-ModeBRestricted PRESENCE optional},
  { ID id-AerialUEsubscriptionInformation CRITICALITY ignore TYPE AerialUEsubscriptionInformation PRESENCE optional},
  { ID id-PendingDataIndication CRITICALITY ignore TYPE PendingDataIndication PRESENCE optional},
  { ID id-Subscription-Based-UE-DifferentiationInfo CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo PRESENCE optional},
  ...}

E-RABToBeSwitchedULList ::= E-RAB-IE-ContainerList [ {E-RABToBeSwitchedULItemIEs} ]

E-RABToBeSwitchedULItemIEs S1AP-PROTOCOL-IES ::= {
  { ID id-E-RABToBeSwitchedULItem CRITICALITY ignore TYPE E-RABToBeSwitchedULItem PRESENCE mandatory },
  ...}

E-RABToBeSwitchedULItem ::= SEQUENCE {
  e-RAB-ID E-RAB-ID,
  transportLayerAddress TransportLayerAddress,
  gTP-TEID GTP-TEID,
  iE-Extensions ProtocolIE-Container [ { E-RABToBeSwitchedULItem-ExtIEs } ] OPTIONAL,
  ...}

E-RABToBeSwitchedULItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...}

-- **************************************************************
-- -- Path Switch Request Failure
--  ******************************************************
PathSwitchRequestFailure ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   { { PathSwitchRequestFailureIEs} },
  ...
}

PathSwitchRequestFailureIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY ignore TYPE MME-UE-S1AP-ID   PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID     CRITICALITY ignore TYPE ENB-UE-S1AP-ID   PRESENCE mandatory }|
  { ID id-Cause       CRITICALITY ignore TYPE Cause       PRESENCE mandatory }|
  { ID id-CriticalityDiagnostics   CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional },
  ...
}

--  ******************************************************
-- -- HANDOVER CANCEL ELEMENTARY PROCEDURE
--  ******************************************************
--  ******************************************************
HandoverCancel ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   { { HandoverCancelIEs} },
  ...
}

HandoverCancelIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY reject TYPE MME-UE-S1AP-ID   PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID     CRITICALITY reject TYPE ENB-UE-S1AP-ID   PRESENCE mandatory }|
  { ID id-Cause       CRITICALITY ignore TYPE Cause       PRESENCE mandatory },
  ...
}

--  ******************************************************
-- -- Handover Cancel Request Acknowledge
--  ******************************************************
HandoverCancelAcknowledge ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   { { HandoverCancelAcknowledgeIEs} },
  ...
}

HandoverCancelAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY reject TYPE MME-UE-S1AP-ID   PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID     CRITICALITY reject TYPE ENB-UE-S1AP-ID   PRESENCE mandatory }|
  { ID id-Cause       CRITICALITY ignore TYPE Cause       PRESENCE mandatory },
  ...
}
{ ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE mandatory } |
{ ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory } |
{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
...

-- ****************************
--
-- E-RAB SETUP ELEMENTARY PROCEDURE
-- ****************************

-- ****************************
-- E-RAB Setup Request
-- ****************************

E-RABSetupRequest ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {E-RABSetupRequestIEs} },
...}

E-RABSetupRequestIEs S1AP-PROTOCOL-IES ::= {  
{ ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory } |
{ ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory } |
{ ID id-uEaggregateMaximumBitrate CRITICALITY reject TYPE UEAggregateMaximumBitrate PRESENCE optional } |
{ ID id-E-RABToBeSetupListBearerSUReq CRITICALITY reject TYPE E-RABToBeSetupListBearerSUReq PRESENCE mandatory },
...
}

E-RABToBeSetupListBearerSUReq ::= SEQUENCE {SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABToBeSetupItemBearerSUReqIEs} } }

E-RABToBeSetupItemBearerSUReqIEs S1AP-PROTOCOL-IES ::= {  
{ ID id-E-RABToBeSetupItemBearerSUReq CRITICALITY reject TYPE E-RABToBeSetupItemBearerSUReq PRESENCE mandatory },
...
}

E-RABToBeSetupItemBearerSUReq ::= SEQUENCE {  
e-RAB-ID E-RAB-ID,  
e-RABlevelQoSParameters E-RABLevelQoSParameters,  
transportLayerAddress TransportLayerAddress,  
gTP-TEID GTP-TEID,  
nAS-PDU NAS-PDU,  
iE-Extensions ProtocolExtensionContainer { {E-RABToBeSetupItemBearerSUReqExtIEs} } OPTIONAL,
...}

E-RABToBeSetupItemBearerSUReqExtIEs S1AP-PROTOCOL-EXTENSION ::= {  
{ ID id-Correlation-ID CRITICALITY reject EXTENSION Correlation-ID PRESENCE optional } |
{ ID id-SIPTO-Correlation-ID CRITICALITY ignore EXTENSION Correlation-ID PRESENCE optional } |
{ ID id-BearerType CRITICALITY reject EXTENSION BearerType PRESENCE optional },
...}
E-RABSetupResponse ::= SEQUENCE {
    protocolIEs ProtocolIE-Container [ {E-RABSetupResponseIEs} ],
    ...
}

E-RABSetupResponseIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID       CRITICALITY ignore TYPE MME-UE-S1AP-ID    PRESENCE mandatory }|
    { ID id-eNB-UE-S1AP-ID       CRITICALITY ignore TYPE ENB-UE-S1AP-ID    PRESENCE mandatory }|
    { ID id-E-RABSetupListBearerSURes    CRITICALITY ignore TYPE E-RABSetupListBearerSURes PRESENCE optional }|
    { ID id-E-RABFailedToSetupListBearerSURes  CRITICALITY ignore TYPE E-RABList PRESENCE optional }|
    { ID id-CriticalityDiagnostics     CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

E-RABSetupListBearerSURes ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABSetupItemBearerSUResIEs} }

E-RABSetupItemBearerSUResIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABSetupItemBearerSURes CRITICALITY ignore TYPE E-RABSetupItemBearerSURes PRESENCE mandatory },
    ...
}

E-RABSetupItemBearerSURes ::= SEQUENCE {
    e-RAB-ID     E-RAB-ID,
    transportLayerAddress  TransportLayerAddress,
    gTP-TEID     GTP-TEID,
    iE-Extensions    ProtocolExtensionContainer { {E-RABSetupItemBearerSUResExtIEs} } OPTIONAL,
    ...
}

E-RABSetupItemBearerSUResExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}
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-- E-RAB Modify Request
-- *******************************************************************************

E-RABModifyRequest ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container [ {E-RABModifyRequestIEs} ],
  ...}

E-RABModifyRequestIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY reject TYPE MME-UE-S1AP-ID       PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID     CRITICALITY reject TYPE E-NB-UE-S1AP-ID       PRESENCE mandatory },
  { ID id-uEaggregateMaximumBitrate  CRITICALITY reject TYPE UEAggregateMaximumBitrate       PRESENCE optional },
  { ID id-E-RABToBeModifiedListBearerModReq CRITICALITY reject TYPE E-RABToBeModifiedListBearerModReq       PRESENCE mandatory },
  { ID id-SecondaryRATDataUsageRequest  CRITICALITY ignore TYPE SecondaryRATDataUsageRequest       PRESENCE optional },
  ...}

E-RABToBeModifiedListBearerModReq ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer [ {E-RABToBeModifiedItemBearerModReqIEs} ]

E-RABToBeModifiedItemBearerModReqIEs S1AP-PROTOCOL-IES ::= {
  { ID id-E-RABToBeModifiedItemBearerModReq CRITICALITY reject TYPE E-RABToBeModifiedItemBearerModReq       PRESENCE mandatory },
  ...}

E-RABToBeModifiedItemBearerModReq ::= SEQUENCE {
  e-RAB-ID      E-RAB-ID,
  e-RABLevelQoSParameters  E-RABLevelQoSParameters,
  nAS-PDU       NAS-PDU,
  iE-Extensions  ProtocolExtensionContainer [ {E-RABToBeModifyItemBearerModReqExtIEs} ] OPTIONAL,
  ...}

E-RABToBeModifyItemBearerModReqExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  { ID id-TransportInformation CRITICALITY reject EXTENSION TransportInformation       PRESENCE optional },
  ...}

-- *******************************************************************************

-- E-RAB Modify Response
-- *******************************************************************************

E-RABModifyResponse ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container [ {E-RABModifyResponseIEs} ],
  ...}

E-RABModifyResponseIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY ignore TYPE MME-UE-S1AP-ID       PRESENCE mandatory },
{ ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
{ ID id-E-RABModifyListBearerModRes CRITICALITY ignore TYPE E-RABModifyListBearerModRes PRESENCE optional },
{ ID id-E-RABFailedToModifyList CRITICALITY ignore TYPE E-RABList PRESENCE optional },
{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
{ ID id-SecondaryRATDataUsageReportList CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional },
...

E-RABModifyListBearerModRes ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABModifyItemBearerModResIEs} }

E-RABModifyItemBearerModResIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABModifyItemBearerModRes CRITICALITY ignore TYPE E-RABModifyItemBearerModRes PRESENCE mandatory },
    ...
}

E-RABModifyItemBearerModRes ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
    iE-Extensions ProtocolExtensionContainer { {E-RABModifyItemBearerModResExtIEs} } OPTIONAL,
    ...
}

E-RABModifyItemBearerModResExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ********************************************************************************
-- -- E-RAB RELEASE ELEMENTARY PROCEDURE
-- ********************************************************************************

E-RABReleaseCommand ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {E-RABReleaseCommandIEs} },
    ...
}

E-RABReleaseCommandIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
    { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
    { ID id-uEaggregateMaximumBitrate CRITICALITY reject TYPE UEAggregateMaximumBitrate PRESENCE optional },
    { ID id-E-RABToBeReleasedList CRITICALITY ignore TYPE E-RABList PRESENCE mandatory },
    { ID id-NAS-PDU CRITICALITY ignore TYPE NAS-PDU PRESENCE optional },
    ...
}
E-RAB Release Response ::= SEQUENCE {
    protocolIEs  ProtocolIE-Container  { { E-RABReleaseResponseIEs } },
    ...}

E-RABReleaseResponseIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID    CRITICALITY ignore TYPE MME-UE-S1AP-ID      PRESENCE mandatory },
    { ID id-eNB-UE-S1AP-ID    CRITICALITY ignore TYPE ENB-UE-S1AP-ID      PRESENCE mandatory },
    { ID id-E-RABReleaseListBearerRelComp CRITICALITY ignore TYPE E-RABReleaseListBearerRelComp PRESENCE optional },
    { ID id-E-RABFailedToReleaseList CRITICALITY ignore TYPE E-RABList PRESENCE optional },
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    -- Extension for Release 12 to support User Location Information --
    { ID id-UserLocationInformation CRITICALITY ignore TYPE UserLocationInformation PRESENCE optional },
    ...}

E-RABReleaseListBearerRelComp ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABReleaseItemBearerRelCompIEs} }

E-RABReleaseItemBearerRelCompIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABReleaseItemBearerRelComp CRITICALITY ignore TYPE E-RABReleaseItemBearerRelComp PRESENCE mandatory },
    ...}

E-RABReleaseItemBearerRelComp ::= SEQUENCE {
    e-RAB-ID    E-RAB-ID,
    iE-Extensions ProtocolExtensionContainer { {E-RABReleaseItemBearerRelCompExtIEs} } OPTIONAL,
    ...}

E-RABReleaseItemBearerRelCompExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...}
E-RAB Release Indication

-- ************************************************************

E-RABReleaseIndication ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {E-RABReleaseIndicationIEs} },
  ...
}

E-RABReleaseIndicationIEs SIAP-PROTOCOL-IES ::= {
  { ID id-mME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory } |
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory } |
  { ID id-E-RABReleasedList CRITICALITY ignore TYPE E-RABList PRESENCE mandatory } |
-- Extension for Release 12 to support User Location Information --
  { ID id-UserLocationInformation CRITICALITY ignore TYPE UserLocationInformation PRESENCE optional } | |
  { ID id-SecondaryRATDataUsageReportList CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional },
  ...
} -- ************************************************************

-- INITIAL CONTEXT SETUP ELEMENTARY PROTOCOL

-- INITIAL CONTEXT SETUP REQUEST

-- INITIAL CONTEXT SETUP REQUEST

InitialContextSetupRequest ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {InitialContextSetupRequestIEs} },
  ...
}

InitialContextSetupRequestIEs SIAP-PROTOCOL-IES ::= {
  { ID id-mME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory }) |
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory } |
  { ID id-uEaggregateMaximumBitrate CRITICALITY reject TYPE UEAggregateMaximumBitrate PRESENCE mandatory } |
  { ID id-E-RABToBeSetupListCtxtSUReq CRITICALITY reject TYPE E-RABToBeSetupListCtxtSUReq PRESENCE mandatory } |
  { ID id-UESecurityCapabilities CRITICALITY reject TYPE UESecurityCapabilities PRESENCE mandatory } |
  { ID id-SecurityKey CRITICALITY reject TYPE SecurityKey PRESENCE mandatory } |
  { ID id-TraceActivation CRITICALITY ignore TYPE TraceActivation PRESENCE optional } |
  { ID id-HandoverRestrictionList CRITICALITY ignore TYPE HandoverRestrictionList PRESENCE optional } |
  { ID id-UERadioCapability CRITICALITY ignore TYPE UERadioCapability PRESENCE optional } |
  { ID id-SubscriberProfileIDforRFP CRITICALITY ignore TYPE SubscriberProfileIDforRFP PRESENCE optional } |
  { ID id-CSFallbackIndicator CRITICALITY ignore TYPE CSFallbackIndicator PRESENCE optional } |
  { ID id-SRVCCOperationPossible CRITICALITY ignore TYPE SRVCCOperationPossible PRESENCE optional } |
  { ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional } |
  { ID id-DeregisteredLAI CRITICALITY ignore TYPE LAI PRESENCE optional } |
  { ID id-GUMMEI-ID CRITICALITY ignore TYPE GUMMEI PRESENCE optional } |
  { ID id-mME-UE-S1AP-ID-2 CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE optional } |
  { ID id-ManagementBasedMDTAllowed CRITICALITY ignore TYPE ManagementBasedMDTAllowed PRESENCE optional }) |
E-RABToBeSetupListCtxtSUReq ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABToBeSetupItemCtxtSUReqIEs} }

E-RABToBeSetupItemCtxtSUReqIEs S1AP-PROTOCOL-IES ::= { { ID id-E-RABToBeSetupItemCtxtSUReq CRITICALITY reject TYPE E-RABToBeSetupItemCtxtSUReq PRESENCE mandatory } },

...}

E-RABToBeSetupItemCtxtSUReq ::= SEQUENCE {
e-RAB-ID E-RAB-ID,
e-RABlevelQoSParameters E-RABLevelQoSParameters,
transportLayerAddress TransportLayerAddress,
gTP-TEID GTP-TEID,
nAS-PDU NAS-PDU OPTIONAL,
iE-Extensions ProtocolExtensionContainer { {E-RABToBeSetupItemCtxtSUReqExtIEs} } OPTIONAL,
...}

E-RABToBeSetupItemCtxtSUReqExtIEs S1AP-PROTOCOL-EXTENSION ::= { { ID id-Correlation-ID CRITICALITY ignore EXTENSION Correlation-ID PRESENCE optional },
{ ID id-SIPTO-Correlation-ID CRITICALITY ignore EXTENSION Correlation-ID PRESENCE optional },
{ ID id-BearerType CRITICALITY reject EXTENSION BearerType PRESENCE optional },
...}
InitialContextSetupResponseIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID      CRITICALITY ignore TYPE MME-UE-S1AP-ID     PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID      CRITICALITY ignore TYPE ENB-UE-S1AP-ID     PRESENCE mandatory }|
  { ID id-E-RABSetupListCtxtSURes CRITICALITY ignore TYPE E-RABSetupListCtxtSURes PRESENCE mandatory }|
  { ID id-E-RABFailedToSetupListCtxtSURes CRITICALITY ignore TYPE E-RABList PRESENCE optional }|
  { ID id-CriticalityDiagnostics    CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional },
...
}

E-RABSetupListCtxtSURes ::= SEQUENCE {SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABSetupItemCtxtSUResIEs} }

E-RABSetupItemCtxtSUResIEs S1AP-PROTOCOL-IES ::= {
  { ID id-E-RABSetupItemCtxtSURes      CRITICALITY ignore TYPE E-RABSetupItemCtxtSURes PRESENCE mandatory },
...
}

E-RABSetupItemCtxtSURes ::= SEQUENCE {
  e-RAB-ID      E-RAB-ID,  
  transportLayerAddress    TransportLayerAddress,  
  gTP-TEID      GTP-TEID,  
  iE-Extensions     ProtocolExtensionContainer { {E-RABSetupItemCtxtSUResExtIEs} } OPTIONAL,
...
}

E-RABSetupItemCtxtSUResExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

-- ******************************************************************************
-- -- Initial Context Setup Failure
-- ******************************************************************************

InitialContextSetupFailure ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container     [ {InitialContextSetupFailureIEs} ],
...
}

InitialContextSetupFailureIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID      CRITICALITY ignore TYPE MME-UE-S1AP-ID     PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID      CRITICALITY ignore TYPE ENB-UE-S1AP-ID     PRESENCE mandatory }|
  { ID id-Cause      CRITICALITY ignore TYPE Cause PRESENCE mandatory }|
  { ID id-CriticalityDiagnostics    CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional },
...
}
-- ****************************
-- PAGING ELEMENTARY PROCEDURE
-- ****************************

Paging ::= SEQUENCE {
  protocolIEs     ProtocolIE-Container  {{PagingIEs}},
  ...
}

PagingIEs S1AP-PROTOCOL-IES ::= {
  { ID id-UEIdentityIndexValue   CRITICALITY ignore TYPE UEIdentityIndexValue    PRESENCE mandatory}|
  { ID id-UEPagingID      CRITICALITY ignore TYPE UEPagingID       PRESENCE mandatory}|
  { ID id-pagingDRX      CRITICALITY ignore TYPE PagingDRX       PRESENCE optional}|  { ID id-CNDomain      CRITICALITY ignore TYPE CNDomain       PRESENCE mandatory}|
  { ID id-TAIList       CRITICALITY ignore TYPE TAIList       PRESENCE mandatory}|
  { ID id-CSG-IdList     CRITICALITY ignore TYPE CSG-IdList      PRESENCE optional}|
  { ID id-PagingPriority     CRITICALITY ignore TYPE PagingPriority   PRESENCE optional}|
  { ID id-UERadioCapabilityForPaging  CRITICALITY ignore TYPE UERadioCapabilityForPaging   PRESENCE optional}|

-- Extension for Release 13 to support Paging Optimisation and Coverage Enhancement paging --
  { ID id-AssistanceDataForPaging   CRITICALITY ignore TYPE AssistanceDataForPaging   PRESENCE optional}|
  { ID id-Paging-eDRXInformation   CRITICALITY ignore TYPE Paging-eDRXInformation   PRESENCE optional}|
  { ID id-NB-IoT-Paging-eDRXInformation   CRITICALITY ignore TYPE NB-IoT-Paging-eDRXInformation   PRESENCE optional}|

-- Extension for Release 13 to support Paging Optimisation and Coverage Enhancement paging --
  { ID id-extended-UEIdentityIndexValue CRITICALITY ignore TYPE Extended-UEIdentityIndexValue PRESENCE optional}|
  { ID id-NB-IoT-UEIdentityIndexValue CRITICALITY ignore TYPE NB-IoT-UEIdentityIndexValue PRESENCE optional}|
  { ID id-EnhancedCoverageRestricted  CRITICALITY ignore TYPE EnhancedCoverageRestricted   PRESENCE optional}|
  { ID id-CE-ModeBRestricted    CRITICALITY ignore TYPE CE-ModeBRestricted   PRESENCE optional},
  ...
}

TAIList ::= SEQUENCE (SIZE(1.. maxnoofTAs)) OF ProtocolIE-SingleContainer  {{TAIItemIEs}}

TAIItemIEs S1AP-PROTOCOL-IES ::= {
  { ID id-TAIItem  CRITICALITY ignore TYPE TAIItem PRESENCE mandatory },
  ...
}

TAIItem ::= SEQUENCE {
  tAI         TAI,
  iE-Extensions ProtocolExtensionContainer  {{TAIItemExtIEs}}  OPTIONAL,
  ...
}

TAIItemExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}
UEContextReleaseRequest ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{UEContextReleaseRequest-IEs}},
  ...
}

UEContextReleaseRequest-IEs S1AP-PROTOCOL-IEs ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory }|
  { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory }|
  { ID id-GWContextReleaseIndication CRITICALITY reject TYPE GWContextReleaseIndication PRESENCE optional }|
  { ID id-SecondaryRATDataUsageReportList CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional },
  ...
}

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

UEContextReleaseCommand-IEs S1AP-PROTOCOL-IEs ::= {
  { ID id-UE-S1AP-IDs CRITICALITY reject TYPE UE-S1AP-IDs PRESENCE mandatory }|
  { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory },
  ...
}

UEContextReleaseComplete ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{UEContextReleaseComplete-IEs}},
  ...
}
UEContextReleaseComplete-IEs S1AP-PROTOCOL-IEs ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
  -- Extension for Release 12 to support User Location Information --
  { ID id-UserLocationInformation CRITICALITY ignore TYPE UserLocationInformation PRESENCE optional },
  -- Extension for Release 13 to support Paging Optimisation --
  { ID id-InformationOnRecommendedCellsAndENBsForPaging CRITICALITY ignore TYPE InformationOnRecommendedCellsAndENBsForPaging PRESENCE optional },
  -- Extension for Release 13 to support coverage enhancement paging --
  { ID id-CellIdentifierAndCELevelForCECapableUEs CRITICALITY ignore TYPE CellIdentifierAndCELevelForCECapableUEs PRESENCE optional }|
  { ID id-SecondaryRATDataUsageReportList CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional },
...}

-- ******************************************************************************************************
-- UE CONTEXT MODIFICATION ELEMENTARY PROCEDURE
-- ******************************************************************************************************

-- UE Context Modification Request
-- ******************************************************************************************************

UEContextModificationRequest ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { { UEContextModificationRequestIEs } },
...}

UEContextModificationRequestIEs S1AP-PROTOCOL-IEs ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
  { ID id-SecurityKey CRITICALITY reject TYPE SecurityKey PRESENCE optional },
  { ID id-SubscriberProfileIDforRFP CRITICALITY ignore TYPE SubscriberProfileIDforRFP PRESENCE optional },
  { ID id-UEaggregateMaximumBitrate CRITICALITY ignore TYPE UEAggregateMaximumBitrate PRESENCE optional },
  { ID id-CSFallbackIndicator CRITICALITY reject TYPE CSFallbackIndicator PRESENCE optional },
  { ID id-UESecurityCapabilities CRITICALITY reject TYPE UESecurityCapabilities PRESENCE optional },
  { ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional },
  { ID id-RegisteredLAI CRITICALITY ignore TYPE LAI PRESENCE optional },
  { ID id-AdditionalCSFallbackIndicator CRITICALITY ignore TYPE AdditionalCSFallbackIndicator PRESENCE conditional },
  { ID id-ProSeAuthorized CRITICALITY ignore TYPE ProSeAuthorized PRESENCE optional },
  { ID id-SRVCCOperationPossible CRITICALITY ignore TYPE SRVCCOperationPossible PRESENCE optional },
  { ID id-SRVCCOperationNotPossible CRITICALITY ignore TYPE SRVCCOperationNotPossible PRESENCE optional },
  { ID id-V2XServicesAuthorized CRITICALITY ignore TYPE V2XServicesAuthorized PRESENCE optional },
  { ID id-UESidelinkAggregateMaximumBitrate CRITICALITY ignore TYPE UESidelinkAggregateMaximumBitrate PRESENCE optional },
  { ID id-NRUESecurityCapabilities CRITICALITY ignore TYPE NRUESecurityCapabilities PRESENCE optional },
  { ID id-AerialUEsubscriptionInformation CRITICALITY ignore TYPE AerialUEsubscriptionInformation PRESENCE optional },
...
UEContextModificationResponse ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   [ { UEContextModificationResponseIEs} ],
  ...
}

UEContextModificationResponseIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID    CRITICALITY ignore TYPE MME-UE-S1AP-ID     PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID    CRITICALITY ignore TYPE ENB-UE-S1AP-ID     PRESENCE mandatory },
  { ID id-CriticalityDiagnostics  CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional },
  ...
}

UEContextModificationFailure ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   [ { UEContextModificationFailureIEs} ],
  ...
}

UEContextModificationFailureIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID    CRITICALITY ignore TYPE MME-UE-S1AP-ID     PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID    CRITICALITY ignore TYPE ENB-UE-S1AP-ID     PRESENCE mandatory },
  { ID id-Cause      CRITICALITY ignore TYPE Cause       PRESENCE mandatory },
  { ID id-CriticalityDiagnostics  CRITICALITY ignore TYPE CriticalityDiagnostics   PRESENCE optional },
  ...
}
UERadioCapabilityMatchRequestIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
  { ID id-UERadioCapability CRITICALITY ignore TYPE UERadioCapability PRESENCE optional },
  ...
}

UERadioCapabilityMatchResponse ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ { UERadioCapabilityMatchResponseIEs } }},
  ...
}

UERadioCapabilityMatchResponseIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
  { ID id-VoiceSupportMatchIndicator CRITICALITY reject TYPE VoiceSupportMatchIndicator PRESENCE mandatory },
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
  ...
}

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

DownlinkNASTransport-IEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
  { ID id-NAS-PDU CRITICALITY reject TYPE NAS-PDU PRESENCE mandatory },
  { ID id-HandoverRestrictionList CRITICALITY ignore TYPE HandoverRestrictionList PRESENCE optional },
  { ID id-SubscriberProfileIDforRFP CRITICALITY ignore TYPE SubscriberProfileIDforRFP PRESENCE optional },
  { ID id-SRVCCOperationPossible CRITICALITY ignore TYPE SRVCCOperationPossible PRESENCE optional },
  { ID id-UERadioCapability CRITICALITY ignore TYPE UERadioCapability PRESENCE optional },
  { ID id-DLNASNasPDUDeliveryAckRequest CRITICALITY ignore TYPE DLNASPDUDeliveryAckRequest PRESENCE optional },
  { ID id-EnhancedCoverageRestricted CRITICALITY ignore TYPE EnhancedCoverageRestricted PRESENCE optional },
  { ID id-NRUEncapsulationCapabilities CRITICALITY ignore TYPE NRUEncapsulationCapabilities PRESENCE optional },
{ ID id-CE-ModeBRestricted CRITICALITY ignore TYPE CE-ModeBRestricted PRESENCE optional},
{ ID id-UECapabilityInfoRequest CRITICALITY ignore TYPE UECapabilityInfoRequest PRESENCE optional},
{ ID id-EndIndication CRITICALITY ignore TYPE EndIndication PRESENCE optional},
{ ID id-PendingDataIndication CRITICALITY ignore TYPE PendingDataIndication PRESENCE optional},
{ ID id-Subscription-Based-UE-DifferentiationInfo CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo PRESENCE optional}, ...
}

-- ***************************************************************
-- INITIAL UE MESSAGE
-- ***************************************************************

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

InitialUEMessage-IEs S1AP-PROTOCOL-IES ::= {
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
  { ID id-NAS-PDU CRITICALITY reject TYPE NAS-PDU PRESENCE mandatory},
  { ID id-TAI CRITICALITY reject TYPE TAI PRESENCE mandatory},
  { ID id-EUTRAN-CGI CRITICALITY ignore TYPE EUTRAN-CGI PRESENCE mandatory},
  { ID id-RRC-Establishment-Cause CRITICALITY ignore TYPE RRC-Establishment-Cause PRESENCE mandatory},
  { ID id-S-TMSI CRITICALITY reject TYPE S-TMSI PRESENCE optional},
  { ID id-CSG-Id CRITICALITY reject TYPE CSG-Id PRESENCE optional},
  { ID id-GUMMEI-ID CRITICALITY reject TYPE GUMMEI PRESENCE optional},
  { ID id-CellAccessMode CRITICALITY reject TYPE CellAccessMode PRESENCE optional},
  { ID id-GW-TransportLayerAddress CRITICALITY ignore TYPE TransportLayerAddress PRESENCE optional},
  { ID id-RelayNode-Indicator CRITICALITY reject TYPE RelayNode-Indicator PRESENCE optional},
  { ID id-GUMMEIType CRITICALITY ignore TYPE GUMMEIType PRESENCE optional},
-- Extension for Release 11 to support BBAI --
  { ID id-Tunnel-Information-for-BBF CRITICALITY ignore TYPE TunnelInformation PRESENCE optional},
  { ID id-SIPTO-L-GW-TransportLayerAddress CRITICALITY ignore TYPE TransportLayerAddress PRESENCE optional},
  { ID id-LHN-ID CRITICALITY ignore TYPE LHN-ID PRESENCE optional},
  { ID id-MMENode-Group-ID CRITICALITY ignore TYPE MMENode-Group-ID PRESENCE optional},
  { ID id-UE-Usage-Type CRITICALITY ignore TYPE UE-Usage-Type PRESENCE optional},
  { ID id-CellAccess-Mode CRITICALITY ignore TYPE CellAccess-Mode PRESENCE optional},
  { ID id-DCN-ID CRITICALITY ignore TYPE DCN-ID PRESENCE optional},
  { ID id-Coverage-Level CRITICALITY ignore TYPE Coverage-Level PRESENCE optional},
  { ID id-EDT-Session CRITICALITY ignore TYPE EDT-Session PRESENCE optional},
  ...
}

-- ***************************************************************
-- UPLINK NAS TRANSPORT

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

UplinkNASTransport-IEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
    { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
    { ID id-NAS-PDU CRITICALITY reject TYPE NAS-PDU PRESENCE mandatory },
    { ID id-EUTRAN-CGI CRITICALITY ignore TYPE EUTRAN-CGI PRESENCE mandatory },
    { ID id-TAI CRITICALITY ignore TYPE TAI PRESENCE mandatory },
    { ID id-GW-TransportLayerAddress CRITICALITY ignore TYPE TransportLayerAddress PRESENCE optional },
    { ID id-SIPTO-L-GW-TransportLayerAddress CRITICALITY ignore TYPE TransportLayerAddress PRESENCE optional },
    { ID id-LHN-ID CRITICALITY ignore TYPE LHN-ID PRESENCE optional },
    { ID id-PSCellInformation CRITICALITY ignore TYPE PSCellInformation PRESENCE optional },
    ...
}

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

NASNonDeliveryIndication-IEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
    { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
    { ID id-NAS-PDU CRITICALITY ignore TYPE NAS-PDU PRESENCE mandatory },
    { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory },
    ...
}

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

RerouteNASRequest-IEs S1AP-PROTOCOL-IES ::= {
    { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
    { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE optional },
    { ID id-S1-Message CRITICALITY reject TYPE OCTET STRING PRESENCE mandatory },
    ...
}
NAS DELIVERY INDICATION

NASDeliveryIndication ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { { NASDeliveryIndicationIEs} },
  ...
}

NASDeliveryIndicationIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID       CRITICALITY reject TYPE MME-UE-S1AP-ID      PRESENCE mandatory}|
  { ID id-eNB-UE-S1AP-ID       CRITICALITY reject TYPE ENB-UE-S1AP-ID      PRESENCE mandatory},
  ...
}

RESET ELEMENTARY PROCEDURE

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

ResetIEs S1AP-PROTOCOL-IES ::= {
  { ID id-Cause      CRITICALITY ignore TYPE Cause      PRESENCE mandatory }|
  { ID id-ResetType     CRITICALITY reject TYPE ResetType     PRESENCE mandatory },
  ...
}

ResetType ::= CHOICE {
  sl-Interface     ResetAll,
  partOfS1-Interface UE-associatedLogicalS1-ConnectionListRes,
  ...
}
ResetAll ::= ENUMERATED {
    reset-all,
    ...}

UE-associatedLogicalS1-ConnectionListRes ::= SEQUENCE (SIZE(1.. maxnoofIndividualS1ConnectionsToReset)) OF ProtocolIE-SingleContainer { { UE-associatedLogicalS1-ConnectionItemRes } }

UE-associatedLogicalS1-ConnectionItemRes S1AP-PROTOCOL-IES ::= {
    { ID id-UE-associatedLogicalS1-ConnectionItem CRITICALITY reject TYPE UE-associatedLogicalS1-ConnectionItem PRESENCE mandatory},
    ...}

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

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

ResetAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
    { ID id-UE-associatedLogicalS1-ConnectionListResAck CRITICALITY ignore TYPE UE-associatedLogicalS1-ConnectionListResAck PRESENCE optional  },
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...}

UE-associatedLogicalS1-ConnectionListResAck ::= SEQUENCE (SIZE(1.. maxnoofIndividualS1ConnectionsToReset)) OF ProtocolIE-SingleContainer { { UE-associatedLogicalS1-ConnectionItemResAck } }

UE-associatedLogicalS1-ConnectionItemResAck S1AP-PROTOCOL-IES ::= {
    { ID id-UE-associatedLogicalS1-ConnectionItem CRITICALITY ignore TYPE UE-associatedLogicalS1-ConnectionItem PRESENCE mandatory },
    ...}

-- ************************************************************
-- ERROR INDICATION ELEMENTARY PROCEDURE
-- ************************************************************

ErrorIndication ::= SEQUENCE {
    ...}
ErrorIndicationIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE optional }|
  { ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE optional }|
  { ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE optional }|
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
  ...
}

-- ************************************************************
-- S1 SETUP ELEMENTARY PROCEDURE
-- ************************************************************

-- S1 Setup Request
-- ************************************************************

S1SetupRequest ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container  {{S1SetupRequestIEs} },
  ...
}

S1SetupRequestIEs S1AP-PROTOCOL-IES ::= {
  { ID id-Global-ENB-ID CRITICALITY reject TYPE Global-ENB-ID PRESENCE mandatory }|
  { ID id-eNBname CRITICALITY ignore TYPE ENBname PRESENCE optional }|
  { ID id-SupportedTAs CRITICALITY reject TYPE SupportedTAs PRESENCE mandatory }|
  { ID id-DefaultPagingDRX CRITICALITY ignore TYPE PagingDRX PRESENCE mandatory }|
  { ID id-CSG-IdList CRITICALITY reject TYPE CSG-IdList PRESENCE optional }|
  { ID id-UE-RetentionInformation CRITICALITY ignore TYPE UE-RetentionInformation PRESENCE optional }|
  { ID id-NB-IoT-DefaultPagingDRX CRITICALITY ignore TYPE NB-IoT-DefaultPagingDRX PRESENCE optional }|
  { ID id-ConnectedengNBList CRITICALITY ignore TYPE ConnectedengNBList PRESENCE optional },
  ...
}

-- ************************************************************
-- S1 Setup Response
-- ************************************************************

S1SetupResponse ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container  {{S1SetupResponseIEs} },
  ...
}

S1SetupResponseIEs S1AP-PROTOCOL-IES ::= {
  ...
}
S1SetupFailure ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { {S1SetupFailureIEs} },
  ...}

S1SetupFailureIEs S1AP-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 },
  ...}

ENBConfigurationUpdate ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { {ENBConfigurationUpdateIEs} },
  ...}

ENBConfigurationUpdateIEs S1AP-PROTOCOL-IES ::= {
  { ID id-eNBname      CRITICALITY ignore TYPE ENBname     PRESENCE optional}|
  { ID id-SupportedTAs    CRITICALITY reject TYPE SupportedTAs    PRESENCE optional}|
  { ID id-CSG-IdList     CRITICALITY reject TYPE CSG-IdList     PRESENCE optional}|
  { ID id-NB-IoT-DefaultPagingDRX  CRITICALITY ignore TYPE NB-IoT-DefaultPagingDRX  PRESENCE optional}|
  { ID id-ConnectedengNBToAddList  CRITICALITY ignore TYPE ConnectedengNBList   PRESENCE optional}|
  { ID id-ConnectedengNBToRemoveList CRITICALITY ignore TYPE ConnectedengNBList   PRESENCE optional},
  ...}
ENBConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {ENBConfigurationUpdateAcknowledgeIEs} },
    ...
}

ENBConfigurationUpdateAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

ENBConfigurationUpdateFailure ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {ENBConfigurationUpdateFailureIEs} },
    ...
}

ENBConfigurationUpdateFailureIEs S1AP-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 },
    ...
}

MMEConfigurationUpdate ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {MMEConfigurationUpdateIEs} },
    ...
}
MMEConfigurationUpdateIEs S1AP-PROTOCOL-IES ::= {
    ... ID id-MMEname CRITICALITY ignore TYPE MMEname PRESENCE optional },
    { ID id-ServedGUMMEIs CRITICALITY reject TYPE ServedGUMMEIs PRESENCE optional },
    { ID id-RelativeMMECapacity CRITICALITY reject TYPE RelativeMMECapacity PRESENCE optional },
    { ID id-ServedDCNs CRITICALITY ignore TYPE ServedDCNs PRESENCE optional },
    ...
}

-- ****************************
-- MME Configuration Update Acknowledge
-- ****************************

MMEConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {MMEConfigurationUpdateAcknowledgeIEs} },
    ...
}

MMEConfigurationUpdateAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
    ... ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- ****************************
-- MME Configuration Update Failure
-- ****************************

MMEConfigurationUpdateFailure ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {MMEConfigurationUpdateFailureIEs} },
    ...
}

MMEConfigurationUpdateFailureIEs S1AP-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 },
    ...
}

-- ****************************
-- DOWNLINK S1 CDMA2000 TUNNELLING ELEMENTARY PROCEDURE
-- ****************************

-- -- Downlink S1 CDMA2000 Tunnelling
-- --
-- **************************************************************
-- UPLINK S1 CDMA2000 TUNNELLING ELEMENTARY PROCEDURE
-- **************************************************************

UplinkS1cdma2000tunnelling ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { {UplinkS1cdma2000tunnellingIEs} },
...

UplinkS1cdma2000tunnellingIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID       CRITICALITY reject TYPE MME-UE-S1AP-ID      PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID       CRITICALITY reject TYPE ENB-UE-S1AP-ID      PRESENCE mandatory },
  { ID id-cdma2000RATType       CRITICALITY reject TYPE Cdma2000RATType     PRESENCE mandatory },
  { ID id-cdma2000SectorID      CRITICALITY reject TYPE Cdma2000SectorID     PRESENCE mandatory },
  { ID id-cdma2000HORequiredIndication   CRITICALITY ignore TYPE Cdma2000HORequiredIndication  PRESENCE optional },
  { ID id-cdma2000OneXRAND      CRITICALITY reject TYPE Cdma2000OneXRAND     PRESENCE optional },
  { ID id-cdma2000OneXSRVCCInfo     CRITICALITY reject TYPE Cdma2000OneXSRVCCInfo   PRESENCE optional },
  { ID id-cdma2000PDU        CRITICALITY reject TYPE Cdma2000PDU      PRESENCE mandatory },
  { ID id-EUTRANRoundTripDelayEstimationInfo  CRITICALITY ignore TYPE EUTRANRoundTripDelayEstimationInfo  PRESENCE optional },
-- Extension for Release 9 to assist target HRPD access with the acquisition of the UE --
...

-- **************************************************************
-- UE CAPABILITY INFO INDICATION ELEMENTARY PROCEDURE
-- **************************************************************
UECapabilityInfoIndication ::= SEQUENCE {
    protocolIEs ProtocolIE-Container [ { UECapabilityInfoIndicationIEs} ],
    ...
}

UECapabilityInfoIndicationIEs S1AP-PROTOCOL-IES ::= {
    {ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory},
    {ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
    {ID id-UERadioCapability CRITICALITY ignore TYPE UERadioCapability PRESENCE mandatory},
    {ID id-UERadioCapabilityForPaging CRITICALITY ignore TYPE UERadioCapabilityForPaging PRESENCE optional},
    {ID id-LTE-M-Indication CRITICALITY ignore TYPE LTE-M-Indication PRESENCE optional},
    ...
}

-- ************************************************************** --

-- eNB STATUS TRANSFER ELEMENTARY PROCEDURE
-- ************************************************************** --

ENBStatusTransfer ::= SEQUENCE {
    protocolIEs ProtocolIE-Container [ {ENBStatusTransferIEs} ],
    ...
}

ENBStatusTransferIEs S1AP-PROTOCOL-IES ::= {
    {ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory},
    {ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
    {ID id-eNB-StatusTransfer-TransparentContainer CRITICALITY reject TYPE ENB-StatusTransfer-TransparentContainer PRESENCE mandatory},
    ...
}

-- ************************************************************** --

-- MME STATUS TRANSFER ELEMENTARY PROCEDURE
-- ************************************************************** --
MMEStatusTransfer ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {MMEStatusTransferIEs} },
  ...
}

MMEStatusTransferIEs SIAP-PROTOCOL-IEs ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory},
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
  { ID id-eNB-StatusTransfer-TransparentContainer CRITICALITY reject TYPE ENB-StatusTransfer-TransparentContainer PRESENCE mandatory},
  ...
}

TraceStart ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {TraceStartIEs} },
  ...
}

TraceStartIEs SIAP-PROTOCOL-IEs ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
  { ID id-TraceActivation CRITICALITY ignore TYPE TraceActivation PRESENCE mandatory },
  ...
}

TraceFailureIndication ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {TraceFailureIndicationIEs} },
  ...
}

TraceFailureIndicationIEs SIAP-PROTOCOL-IEs ::= {
  ...
}
DeactivateTrace ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { { DeactivateTraceIEs} },
  ...
}

DeactivateTraceIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID  CRITICALITY reject TYPE MME-UE-S1AP-ID  PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID  CRITICALITY reject TYPE ENB-UE-S1AP-ID  PRESENCE mandatory },
  { ID id-E-UTRAN-Trace-ID CRITICALITY ignore TYPE E-UTRAN-Trace-ID  PRESENCE mandatory },
  ...
}

CellTrafficTrace ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { { CellTrafficTraceIEs} },
  ...
}

CellTrafficTraceIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID     CRITICALITY reject TYPE MME-UE-S1AP-ID    PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID     CRITICALITY reject TYPE ENB-UE-S1AP-ID    PRESENCE mandatory },
  { ID id-E-UTRAN-Trace-ID    CRITICALITY ignore TYPE E-UTRAN-Trace-ID   PRESENCE mandatory },
  { ID id-EUTRAN-CGI      CRITICALITY ignore TYPE EUTRAN-CGI    PRESENCE mandatory },
  { ID id-TraceCollectionEntityIPAddress CRITICALITY ignore TYPE TransportLayerAddress   PRESENCE mandatory },
  ...
}
{ID id-PrivacyIndicator     CRITICALITY ignore TYPE PrivacyIndicator    PRESENCE optional },
...

-- ******************************************************************************
-- -- LOCATION ELEMENTARY PROCEDURES
-- ******************************************************************************
-- ******************************************************************************
-- Location Reporting Control
-- ******************************************************************************

LocationReportingControl ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container       { { LocationReportingControlIEs} },
    ...
}

LocationReportingControlIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID   CRITICALITY reject TYPE MME-UE-S1AP-ID    PRESENCE mandatory }|
    { ID id-eNB-UE-S1AP-ID   CRITICALITY reject TYPE ENB-UE-S1AP-ID    PRESENCE mandatory }|
    { ID id-RequestType    CRITICALITY ignore TYPE RequestType    PRESENCE mandatory },
    ...
}

-- ******************************************************************************
-- Location Report Failure Indication
-- ******************************************************************************

LocationReportingFailureIndication ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container       { { LocationReportingFailureIndicationIEs} },
    ...
}

LocationReportingFailureIndicationIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID   CRITICALITY reject TYPE MME-UE-S1AP-ID    PRESENCE mandatory }|
    { ID id-eNB-UE-S1AP-ID   CRITICALITY reject TYPE ENB-UE-S1AP-ID    PRESENCE mandatory }|
    { ID id-Cause     CRITICALITY ignore TYPE Cause      PRESENCE mandatory },
    ...
}

-- ******************************************************************************
-- Location Report
-- ******************************************************************************

LocationReport ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container       { { LocationReportIEs} },
  
}
LocationReportIEs S1AP-PROTOCOL-IEs ::= {
{ ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
{ ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
{ ID id-EUTRAN-CGI CRITICALITY ignore TYPE EUTRAN-CGI PRESENCE mandatory },
{ ID id-TAI CRITICALITY ignore TYPE TAI PRESENCE mandatory },
{ ID id-RequestType CRITICALITY ignore TYPE RequestType PRESENCE mandatory },
{ ID id-PCellInformation CRITICALITY ignore TYPE PCellInformation PRESENCE optional },
...
}

-- **************************************************************
-- OVERLOAD ELEMENTARY PROCEDURES
-- **************************************************************
-- **************************************************************
-- Overload Start
-- **************************************************************
OverloadStart ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {OverloadStartIEs} },
...
}
OverloadStartIEs S1AP-PROTOCOL-IEs ::= {
{ ID id-OverloadResponse CRITICALITY reject TYPE OverloadResponse PRESENCE mandatory },
{ ID id-GUMMEIList CRITICALITY ignore TYPE GUMMEIList PRESENCE optional },
{ ID id-TrafficLoadReductionIndication CRITICALITY ignore TYPE TrafficLoadReductionIndication PRESENCE optional },
...
}
-- **************************************************************
-- Overload Stop
-- **************************************************************
OverloadStop ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {OverloadStopIEs} },
...
}
OverloadStopIEs S1AP-PROTOCOL-IEs ::= {
{ ID id-GUMMEIList CRITICALITY ignore TYPE GUMMEIList PRESENCE optional },
...
}
-- **************************************************************
-- WRITE-REPLACE WARNING ELEMENTARY PROCEDURE

-- **********
WriteReplaceWarningRequest ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container  [ {WriteReplaceWarningRequestIEs} ],
  ...
}

WriteReplaceWarningRequestIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MessageIdentifier      CRITICALITY reject TYPE MessageIdentifier     PRESENCE mandatory }|
  { ID id-SerialNumber          CRITICALITY reject TYPE SerialNumber      PRESENCE mandatory }|
  { ID id-WarningAreaList       CRITICALITY ignore TYPE WarningAreaList     PRESENCE optional }|
  { ID id-RepetitionPeriod      CRITICALITY reject TYPE RepetitionPeriod     PRESENCE optional }|
  { ID id-ExtendedRepetitionPeriod CRITICALITY reject TYPE ExtendedRepetitionPeriod PRESENCE optional }|
  { ID id-NumbersOfBroadcastRequest CRITICALITY reject TYPE NumbersOfBroadcastRequest PRESENCE mandatory }|
  { ID id-WarningType           CRITICALITY ignore TYPE WarningType      PRESENCE optional }|
  { ID id-WarningSecurityInfo   CRITICALITY ignore TYPE WarningSecurityInfo    PRESENCE optional }|
  { ID id-DataCodingScheme      CRITICALITY ignore TYPE DataCodingScheme     PRESENCE optional }|
  { ID id-WarningMessageContents CRITICALITY ignore TYPE WarningMessageContents    PRESENCE optional }|
  { ID id-ConcurrentWarningMessageIndicator CRITICALITY reject TYPE ConcurrentWarningMessageIndicator PRESENCE optional }|
  { ID id-WarningAreaCoordinates CRITICALITY ignore TYPE WarningAreaCoordinates     PRESENCE optional },
  ...
}

WriteReplaceWarningResponse ::= SEQUENCE {
  protocolIEs  ProtocolIE-Container  [ {WriteReplaceWarningResponseIEs} ],
  ...
}

WriteReplaceWarningResponseIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MessageIdentifier    CRITICALITY reject TYPE MessageIdentifier     PRESENCE mandatory }|
  { ID id-SerialNumber         CRITICALITY reject TYPE SerialNumber      PRESENCE mandatory }|
  { ID id-BroadcastCompletedAreaList CRITICALITY ignore TYPE BroadcastCompletedAreaList PRESENCE optional }|
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics    PRESENCE optional },
  ...
}

---
--- ****************************
--- ****************************
--- Write-Replace Warning Request
--- ****************************
--- ****************************

-- eNB DIRECT INFORMATION TRANSFER ELEMENTARY PROCEDURE
--- ****************************
ENBDirectInformationTransfer ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ ENBDirectInformationTransferIEs}},
  ...
}

ENBDirectInformationTransferIEs S1AP-PROTOCOL-IES ::= {
  { ID id-Inter-SystemInformationTransferTypeEDT CRITICALITY reject TYPE Inter-SystemInformationTransferType PRESENCE mandatory },
  ...
}

Inter-SystemInformationTransferType ::= CHOICE {
  rIMTransfer RIMTransfer,
  ...
}

MMEDirectInformationTransfer ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ MMEDirectInformationTransferIEs}},
  ...
}

MMEDirectInformationTransferIEs S1AP-PROTOCOL-IES ::= {
  { ID id-Inter-SystemInformationTransferTypeMDT CRITICALITY reject TYPE Inter-SystemInformationTransferType PRESENCE mandatory },
  ...
}

ENBConfigurationTransfer ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   {{ ENBConfigurationTransferIEs}},
  ...
}

ENBConfigurationTransferIEs SIAP-PROTOCOL-IES ::= {
  { ID id-SONConfigurationTransferECT   CRITICALITY ignore TYPE SONConfigurationTransfer   PRESENCE optional } |
  { ID id-EN-DCSONConfigurationTransfer-ECT CRITICALITY ignore TYPE EN-DCSONConfigurationTransfer PRESENCE optional },
  ...
}

-- ************************************************************
-- MME CONFIGURATION TRANSFER ELEMENTARY PROCEDURE
-- ************************************************************
-- ************************************************************
-- MME Configuration Transfer
-- ************************************************************

MMEConfigurationTransfer ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   {{ MMEConfigurationTransferIEs}},
  ...
}

MMEConfigurationTransferIEs SIAP-PROTOCOL-IES ::= {
  { ID id-SONConfigurationTransferMCT   CRITICALITY ignore TYPE SONConfigurationTransfer   PRESENCE optional } |
  { ID id-EN-DCSONConfigurationTransfer-MCT CRITICALITY ignore TYPE EN-DCSONConfigurationTransfer PRESENCE optional },
  ...
}

-- ************************************************************
-- PRIVATE MESSAGE ELEMENTARY PROCEDURE
-- ************************************************************
-- ************************************************************
-- Private Message
-- ************************************************************

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

PrivateMessageIEs SIAP-PRIVATE-IES ::= {
  ...
}
--- ************************************************************
--- KILL PROCEDURE
--- ************************************************************
--- Kill Request
--- ************************************************************

KillRequest ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container       { {KillRequestIEs} },
    ...
}

KillRequestIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MessageIdentifier   CRITICALITY reject TYPE MessageIdentifier  PRESENCE mandatory}|
    { ID id-SerialNumber    CRITICALITY reject TYPE SerialNumber   PRESENCE mandatory}|
    { ID id-WarningAreaList    CRITICALITY ignore TYPE WarningAreaList  PRESENCE optional}|
    { ID id-KillAllWarningMessages  CRITICALITY reject TYPE KillAllWarningMessages PRESENCE optional},
    ...
}

--- ************************************************************
--- Kill Response
--- ************************************************************

KillResponse ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container  { {KillResponseIEs} },
    ...
}

KillResponseIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MessageIdentifier   CRITICALITY reject TYPE MessageIdentifier     PRESENCE mandatory }|
    { ID id-SerialNumber    CRITICALITY reject TYPE SerialNumber      PRESENCE mandatory }|
    { ID id-BroadcastCancelledAreaList CRITICALITY ignore TYPE BroadcastCancelledAreaList   PRESENCE optional }|
    { ID id-CriticalityDiagnostics  CRITICALITY ignore TYPE CriticalityDiagnostics    PRESENCE optional },
    ...
}

--- ************************************************************
--- PWS RESTART INDICATION PROCEDURE
--- ************************************************************
PWSRestartIndication ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ PWSRestartIndicationIEs}},
  ...
}

PWSRestartIndicationIEs S1AP-PROTOCOL-IEs ::= {
  { ID id-ECGIListForRestart CRITICALITY reject TYPE ECGIListForRestart PRESENCE mandatory}|
  { ID id-Global-ENB-ID CRITICALITY reject TYPE Global-ENB-ID PRESENCE mandatory}|
  { ID id-TAIListForRestart CRITICALITY reject TYPE TAIListForRestart PRESENCE mandatory}|
  { ID id-EmergencyAreaIDListForRestart CRITICALITY reject TYPE EmergencyAreaIDListForRestart PRESENCE optional},
  ...
}

PWSFailureIndication ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ PWSFailureIndicationIEs}},
  ...
}

PWSFailureIndicationIEs S1AP-PROTOCOL-IEs ::= {
  { ID id-PWSfailedECGIList CRITICALITY reject TYPE PWSfailedECGIList PRESENCE mandatory}|
  { ID id-Global-ENB-ID CRITICALITY reject TYPE Global-ENB-ID PRESENCE mandatory},
  ...
}

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

DownlinkUEAssociatedLPPaTransport-IEs S1AP-PROTOCOL-IEs ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory}|
  ...
}
UplinkUEAssociatedLPPaTransport ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       {{UplinkUEAssociatedLPPaTransport-IEs}},
  ...
}

UplinkUEAssociatedLPPaTransport-IEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID   CRITICALITY reject TYPE MME-UE-S1AP-ID    PRESENCE mandatory }|
  { ID id-eNB-UE-S1AP-ID   CRITICALITY reject TYPE ENB-UE-S1AP-ID    PRESENCE mandatory }|
  { ID id-Routing-ID       CRITICALITY reject TYPE Routing-ID         PRESENCE mandatory }|
  { ID id-LPPa-PDU         CRITICALITY reject TYPE LPPa-PDU           PRESENCE mandatory },
  ...
}

-----------------------------------------------------------------------------------
-- DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT
-- ********************************************************************************

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

DownlinkNonUEAssociatedLPPaTransport-IEs S1AP-PROTOCOL-IES ::= {
  { ID id-Routing-ID       CRITICALITY reject TYPE Routing-ID         PRESENCE mandatory }|
  { ID id-LPPa-PDU         CRITICALITY reject TYPE LPPa-PDU           PRESENCE mandatory },
  ...
}

-----------------------------------------------------------------------------------
-- UPLINK NON UE ASSOCIATED LPPA TRANSPORT
-- ********************************************************************************

UplinkNonUEAssociatedLPPaTransport ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       {{UplinkNonUEAssociatedLPPaTransport-IEs}},
  ...
}
UplinkNonUEAssociatedLPPaTransport-IEs S1AP-PROTOCOL-IEs ::= {
  { ID id-Routing-ID CRITICALITY reject TYPE Routing-ID PRESENCE mandatory },
  { ID id-LPPa-PDU CRITICALITY reject TYPE LPPa-PDU PRESENCE mandatory },
  ...
}

-- **************************************************************************
-- E-RAB MODIFICATION INDICATION ELEMENTARY PROCEDURE
-- **************************************************************************

E-RABModificationIndication ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { { E-RABModificationIndicationIEs } },
  ...
}

E-RABModificationIndicationIEs S1AP-PROTOCOL-IEs ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
  { ID id-E-RABToBeModifiedListBearerModInd CRITICALITY reject TYPE E-RABToBeModifiedListBearerModInd PRESENCE mandatory },
  { ID id-E-RABNotToBeModifiedListBearerModInd CRITICALITY reject TYPE E-RABNotToBeModifiedListBearerModInd PRESENCE optional },
  { ID id-CSGMembershipInfo CRITICALITY reject TYPE CSGMembershipInfo PRESENCE optional },
  -- Extension for Release 11 to support BBAI --
  { ID id-Tunnel-Information-for-BBF CRITICALITY ignore TYPE TunnelInformation PRESENCE optional },
  { ID id-SecondaryRATDataUsageReportList CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional },
  ...
}

E-RABToBeModifiedListBearerModInd ::= E-RAB-IE-ContainerList { {E-RABToBeModifiedItemBearerModIndIEs} }

E-RABToBeModifiedItemBearerModIndIEs S1AP-PROTOCOL-IEs ::= {
  { ID id-E-RABToBeModifiedItemBearerModInd CRITICALITY reject TYPE E-RABToBeModifiedItemBearerModInd PRESENCE mandatory },
  ...
}

E-RABToBeModifiedItemBearerModInd ::= SEQUENCE {
  e-RAB-ID E-RAB-ID,
  transportLayerAddress TransportLayerAddress,
  dl-GTP-TEID GTP-TEID,
  iE-Extensions ProtocolExtensionContainer { { E-RABToBeModifiedItemBearerModInd-ExtIEs } } OPTIONAL,
  ...
}

E-RABToBeModifiedItemBearerModInd-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}
E-RABNotToBeModifiedListBearerModInd ::= E-RAB-IE-ContainerList {{E-RABNotToBeModifiedItemBearerModIndIEs}}

E-RABNotToBeModifiedItemBearerModIndIEs S1AP-PROTOCOL-IES ::= {
  { ID id-E-RABNotToBeModifiedItemBearerModInd CRITICALITY reject TYPE E-RABNotToBeModifiedItemBearerModInd PRESENCE mandatory},
  ...}

E-RABNotToBeModifiedItemBearerModInd ::= SEQUENCE {
  e-RAB-ID             E-RAB-ID,
  transportLayerAddress TransportLayerAddress,
  dL-GTP-TEID          GTP-TEID,
  iE-Extensions        ProtocolExtensionContainer {{ E-RABNotToBeModifiedItemBearerModInd-ExtIEs} } OPTIONAL,
  ...}

E-RABNotToBeModifiedItemBearerModInd-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...}

CSGMembershipInfo ::= SEQUENCE {
  cSGMembershipStatus        CSGMembershipStatus,
  cSG-Id                     CSG-Id,
  cellAccessMode             CellAccessMode OPTIONAL,
  pLMNidentity               PLMNidentity OPTIONAL,
  iE-Extensions              ProtocolExtensionContainer {{ CSGMembershipInfo-ExtIEs} } OPTIONAL,
  ...}

CSGMembershipInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...}

-- ****************************
-- E-RAB Modification Confirm
-- ****************************

E-RABModificationConfirm ::= SEQUENCE {
  protocolIEs        ProtocolIE-Container {{E-RABModificationConfirmIEs}},
  ...}

E-RABModificationConfirmIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE mandatory},
  { ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
  { ID id-E-RABModifyListBearerModConf CRITICALITY ignore TYPE E-RABModifyListBearerModConf PRESENCE optional},
  { ID id-E-RABFailedToModifyListBearerModConf CRITICALITY ignore TYPE E-RABLList PRESENCE optional},
  { ID id-E-RABToBeReleasedListBearerModConf CRITICALITY ignore TYPE E-RABLList PRESENCE optional},
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional},
  { ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional},
  ...}
E-RABModifyListBearerModConf ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABModifyItemBearerModConfIEs} }

E-RABModifyItemBearerModConfIEs S1AP-PROTOCOL-IES ::= {
  { ID id-E-RABModifyItemBearerModConf CRITICALITY ignore TYPE E-RABModifyItemBearerModConf PRESENCE mandatory},
  ...
}

E-RABModifyItemBearerModConf ::= SEQUENCE {
  e-RAB-ID E-RAB-ID,
  iE-Extensions ProtocolExtensionContainer { {E-RABModifyItemBearerModConfExtIEs} } OPTIONAL,
  ...
}

E-RABModifyItemBearerModConfExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- ****************************
-- UE CONTEXT MODIFICATION INDICATION ELEMENTARY PROCEDURE
-- ****************************

UEContextModificationIndication ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { { UEContextModificationIndicationIEs} },
  ...
}

UEContextModificationIndicationIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory},
  { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory},
  { ID id-CSGMembershipInfo CRITICALITY reject TYPE CSGMembershipInfo PRESENCE optional},
  ...
}

-- ****************************
-- UE Context Modification Confirm
-- ****************************

UEContextModificationConfirm ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {UEContextModificationConfirmIEs} },
  ...
}
UEContextModificationConfirmIEs  S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE mandatory },
    { ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
    { ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional },
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- ****************************************
-- UE CONTEXT SUSPEND ELEMENTARY PROCEDURE
-- 
-- ****************************************

UEContextSuspendRequest ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { { UEContextSuspendRequestIEs } },
    ...
}

UEContextSuspendRequestIEs  S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory },
    { ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
    { ID id-InformationOnRecommendedCellsAndENBsForPaging CRITICALITY ignore TYPE InformationOnRecommendedCellsAndENBsForPaging PRESENCE optional },
    { ID id-CellIdentifierAndCELevelForCECapableUEs CRITICALITY ignore TYPE CellIdentifierAndCELevelForCECapableUEs PRESENCE optional },
    { ID id-SecondaryRATDataUsageReportList CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional },
    ...
}

-- ****************************************
-- UE Context Suspend Response
-- 
-- ****************************************

UEContextSuspendResponse ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { { UEContextSuspendResponseIEs } },
    ...
}

UEContextSuspendResponseIEs  S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID PRESENCE mandatory },
    { ID id-eNB-UE-S1AP-ID CRITICALITY ignore TYPE ENB-UE-S1AP-ID PRESENCE mandatory },
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    { ID id-SecurityContext CRITICALITY reject TYPE SecurityContext PRESENCE optional },
    ...
}
UEContextResumeRequest ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { { UEContextResumeRequestIEs} },
  ...
}

UEContextResumeRequestIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID          CRITICALITY reject TYPE MME-UE-S1AP-ID    PRESENCE mandatory}|
  { ID id-eNB-UE-S1AP-ID         CRITICALITY reject TYPE ENB-UE-S1AP-ID    PRESENCE mandatory}|
  { ID id-E-RABFailedToResumeListResumeReq     CRITICALITY reject TYPE E-RABFailedToResumeListResumeReq  PRESENCE optional}|
  { ID id-RRC-Resume-Cause        CRITICALITY ignore TYPE RRC-Establishment-Cause PRESENCE optional},
  ...
}

E-RABFailedToResumeListResumeReq ::= E-RAB-IE-ContainerList { {E-RABFailedToResumeItemResumeReqIEs} }

E-RABFailedToResumeItemResumeReqIEs S1AP-PROTOCOL-IES ::= {
  { ID id-E-RABFailedToResumeItemResumeReq CRITICALITY reject TYPE E-RABFailedToResumeItemResumeReq PRESENCE mandatory},
  ...
}

E-RABFailedToResumeItemResumeReq ::= SEQUENCE {
  e-RAB-ID       E-RAB-ID,  
  cause        Cause,  
  iE-Extensions      ProtocolExtensionContainer { { E-RABFailedToResumeItemResumeReq-ExtIEs} } OPTIONAL,  
  ...
}

E-RABFailedToResumeItemResumeReq-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

UEContextResumeResponse ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { { UEContextResumeResponseIEs} },
  ...
}
UEContextResumeResponseIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MM-UE-S1AP-ID     CRITICALITY ignore TYPE MM-UE-S1AP-ID     PRESENCE mandatory},
    { ID id-eNB-UE-S1AP-ID    CRITICALITY ignore TYPE ENB-UE-S1AP-ID    PRESENCE mandatory}|,
    { ID id-E-RABFailedToResumeListResumeRes     CRITICALITY reject TYPE E-RABFailedToResumeListResumeRes     PRESENCE optional},
    { ID id-CriticalityDiagnostics     CRITICALITY ignore TYPE CriticalityDiagnostics     PRESENCE optional},
    { ID id-SecurityContext     CRITICALITY reject TYPE SecurityContext     PRESENCE optional},
    { ID id-PendingDataIndication    CRITICALITY ignore TYPE PendingDataIndication    PRESENCE optional},
    ... }

E-RABFailedToResumeListResumeRes ::= E-RAB-IE-ContainerList { {E-RABFailedToResumeItemResumeResIEs} }

E-RABFailedToResumeItemResumeResIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABFailedToResumeItemResumeRes     CRITICALITY reject TYPE E-RABFailedToResumeItemResumeRes     PRESENCE mandatory},
    ... }

E-RABFailedToResumeItemResumeRes ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,  
    cause Cause,  
    iE-Extensions ProtocolExtensionContainer { { E-RABFailedToResumeItemResumeRes-ExtIEs} } OPTIONAL,  
    ... }

E-RABFailedToResumeItemResumeRes-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... }

-- ******************************************************************
-- UE Context Resume Failure
-- ******************************************************************

UEContextResumeFailure ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { { UEContextResumeFailureIEs} },
    ... }

UEContextResumeFailureIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MM-UE-S1AP-ID     CRITICALITY ignore TYPE MM-UE-S1AP-ID     PRESENCE mandatory},
    { ID id-eNB-UE-S1AP-ID    CRITICALITY ignore TYPE ENB-UE-S1AP-ID    PRESENCE mandatory},
    { ID id-Cause     CRITICALITY ignore TYPE Cause     PRESENCE mandatory},
    { ID id-CriticalityDiagnostics     CRITICALITY ignore TYPE CriticalityDiagnostics     PRESENCE optional},
    ... }

-- ******************************************************************
-- Connection Establishment Indication
-- ******************************************************************
ConnectionEstablishmentIndication ::= SEQUENCE {
  protocolIEs       ProtocolIE-Container       { {ConnectionEstablishmentIndicationIEs} },
  ...
}

ConnectionEstablishmentIndicationIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MME-UE-S1AP-ID  CRITICALITY ignore TYPE MME-UE-S1AP-ID  PRESENCE mandatory},
  { ID id-eNB-UE-S1AP-ID   CRITICALITY ignore TYPE ENB-UE-S1AP-ID   PRESENCE mandatory},
  { ID id-UERadioCapability CRITICALITY ignore TYPE UERadioCapability  PRESENCE optional },
  { ID id-EnhancedCoverageRestricted CRITICALITY ignore TYPE EnhancedCoverageRestricted PRESENCE optional },
  { ID id-DL-CP-SecurityInformation CRITICALITY ignore TYPE DL-CP-SecurityInformation PRESENCE optional },
  { ID id-CR-MessageRestricted CRITICALITY ignore TYPE CR-MessageRestricted PRESENCE optional },
  { ID id-EndIndication      CRITICALITY ignore TYPE EndIndication      PRESENCE optional},
  { ID id-Subscription-Based-UE-DifferentiationInfo CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo PRESENCE optional},
  ...
}

RetrieveUEInformation ::= SEQUENCE {
  protocolIEs       ProtocolIE-Container       { {RetrieveUEInformationIEs} },
  ...
}

RetrieveUEInformationIEs S1AP-PROTOCOL-IES ::= {
  { ID id-S-TMSI          CRITICALITY reject TYPE S-TMSI          PRESENCE mandatory},
  ...
}

UEInformationTransfer ::= SEQUENCE {
  protocolIEs       ProtocolIE-Container       { { UEInformationTransferIEs} },
  ...
}

UEInformationTransferIEs S1AP-PROTOCOL-IES ::= {
  { ID id-S-TMSI          CRITICALITY reject TYPE S-TMSI          PRESENCE mandatory}|,
  { ID id-UE-Level-QoS-Parameters CRITICALITY ignore TYPE E-RABLevelQoSParameters PRESENCE optional},
  { ID id-UERadioCapability     CRITICALITY ignore TYPE UERadioCapability      PRESENCE optional},
  { ID id-Subscription-Based-UE-DifferentiationInfo CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo PRESENCE optional}|,
  { ID id-PendingDataIndication CRITICALITY ignore TYPE PendingDataIndication PRESENCE optional},
}
...}

-- ************************************************************
-- eNB CP Relocation Indication
-- ************************************************************
ENBCPRelocationIndication ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container { { ENBCPRelocationIndicationIEs} },
...}

ENBCPRelocationIndicationIEs SIAP-PROTOCOL-IES ::= {
    { ID id-eNB-UE-S1AP-ID   CRITICALITY reject TYPE ENB-UE-S1AP-ID   PRESENCE mandatory}|} -- ************************************************************
-- MME CP Relocation Indication
-- ************************************************************
MMECPRelocationIndication ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container { { MMECPRelocationIndicationIEs} },
...}

MMECPRelocationIndicationIEs SIAP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID   CRITICALITY reject TYPE MME-UE-S1AP-ID   PRESENCE mandatory}|} -- Secondary RAT Data Usage Report
-- ************************************************************
SecondaryRATDataUsageReport ::= SEQUENCE {
    protocolIEs   ProtocolIE-Container { { SecondaryRATDataUsageReportIEs} },
...}
Secondary RAT Data Usage Report IEs S1AP-PROTOCOL-IEs ::= {
    { ID id-MME-UE-S1AP-ID   CRITICALITY ignore TYPE MME-UE-S1AP-ID   PRESENCE mandatory},
    { ID id-eNB-UE-S1AP-ID    CRITICALITY ignore TYPE ENB-UE-S1AP-ID    PRESENCE mandatory},
    { ID id-SecondaryRATDataUsageReportList   CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE mandatory},
    { ID id-HandoverFlag       CRITICALITY ignore TYPE HandoverFlag       PRESENCE optional},
    ...
}
END
9.3.4 Information Element Definitions

S1AP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::= BEGIN IMPORTS id-E-RABInformationListItem, id-E-RABItem, id-Bearers-SubjectToStatusTransfer-Item, id-Time-Synchronisation-Info, id-x2TNLConfigurationInfo, id-eNBX2ExtendedTransportLayerAddresses, id-MDTConfiguration, id-Time-UE-StayedInCell-EnhancedGranularity, id-HO-Cause, id-M3Configuration, id-M4Configuration, id-M5Configuration, id-MDT-Location-Info, id-SignallingBasedMDTPLMNList, id-MobilityInformation, id-ULCOUNTValueExtended, id-DLCOUNTValueExtended, id-ReceiveStatusOfULPDCPSDUssExtended, id-eNBIndirectX2TransportLayerAddresses, id-Muting-Availability-Indication, id-Muting-Pattern-Information, id-NRrestrictioninEPSasSecondaryRAT, id-NRrestrictionin5G, id-Synchronisation-Information, id-uE-HistoryInformationFromTheUE, id-LoggedMBSFNMDT, id-SON-Information-Report, id-RecommendedCellItem, id-RecommendedENBItem, id-ProSeUEtoNetworkRelaying, id-ULCOUNTValuePDCP-SNlength18, id-DLCOUNTValuePDCP-SNlength18, id-ReceiveStatusOfULPDCPSDUspPDCP-SNlength18, id-M6Configuration, id-M7Configuration, id-RAT-Type, ...
id-extended-e-RAB-MaximumBitrateDL,
id-extended-e-RAB-MaximumBitrateUL,
id-extended-e-RAB-GuaranteedBitrateDL,
id-extended-e-RAB-GuaranteedBitrateUL,
id-extended-uEaggregateMaximumBitRateDL,
id-extended-uEaggregateMaximumBitRateUL,
id-SecondaryRATDataUsageReportItem,
id-E-RABUsageReportItem,
id-UEAppLayerMeasConfig,
id-serviceType,
id-UnlicensedSpectrumRestriction,
id-CNTypeRestrictions,
id-DownLinkPacketLossRate,
id-UplinkPacketLossRate,
id-BluetoothMeasurementConfiguration,
id-WLANMeasurementConfiguration,
id-LastNG-RANPLMNIdentity,
id-FSCellInformation,
maxnooSCSGs,
maxnoofE-RABs,
maxnooErrors,
maxnoofEPLMNs,
maxnoofEPLMNsWithMME,
maxnoofTACs,
maxnoofEPLMNs,
maxnoofEPLMNsWithPlusOne,
maxnoofForbLACs,
maxnoofForbTACs,
maxnoofCellsinUEHistoryInfo,
maxnooCellID,
maxnooDCNs,
maxnoofEmergencyAreaID,
maxnoofTAforWarning,
maxnoofCellinTAI,
maxnoofCellinEAI,
maxnoofNBX2TLAs,
maxnoofNBX2ExtTLAs,
maxnoofNBX2GTPTLAs,
maxnoofRATs,
maxnoofGroupIDs,
maxnooENMMEs,
maxnooTAforMDT,
maxnoofCellIDforMDT,
maxnooMDPLMNs,
maxnoofCellsforRestart,
maxnoofRestartTALs,
maxnoofRestartEmergencyAreaIDs,
maxnooMBSFNAreaMDT,
maxEARFCN,
maxnoofCellsinENB,
maxnoofRecommendedCells,
maxnoofRecommendedENBs,
maxnooftimeperiods,
maxnoofCellIDforQMC,
maxnoofTAforQMC,
maxnoofPLMNforQMC,
maxnoofBluetoothName,
maxnoofWLANName,
maxnoofConnectedengNBs

FROM SIAP-Constants

Criticality,
ProcedureCode,
ProtocolIE-ID,
TriggeringMessage
FROM SIAP-CommonDataTypes

ProtocolExtensionContainer(),
SIAP-PROTOCOL-EXTENSION,
ProtocolIE-SingleContainer(),
SIAP-PROTOCOL-IES

FROM SIAP-Containers;

-- A

Additional-GUTI::= SEQUENCE {
gUMMEI            GUMMEI,
m-TMSI            M-TMSI,
iE-Extensions     ProtocolExtensionContainer { {Additional-GUTI-ExtIEs} } OPTIONAL,
...                 }

Additional-GUTI-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
...                 }

AerialUEsubscriptionInformation ::= ENUMERATED {
allowed,
not-allowed,
...                 }

AreaScopeOfMDT ::= CHOICE {
cellBased        CellBasedMDT,
tABased          TANBasedMDT,
plMNWide         NULL,
...                 }

tAIBased         TAIBasedMDT

AreaScopeOfQMC ::= CHOICE {
cellBased        CellBasedQMC,
AllocationAndRetentionPriority ::= SEQUENCE {
  priorityLevel    PriorityLevel,
  pre-emptionCapability  Pre-emptionCapability,
  pre-emptionVulnerability Pre-emptionVulnerability,
  iE-Extensions    ProtocolExtensionContainer { {AllocationAndRetentionPriority-ExtIEs} } OPTIONAL,
  ...
}

AllocationAndRetentionPriority-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

AssistanceDataForCECapableUEs ::= SEQUENCE {
  cellIdentifierAndCELevelForCECapableUEs CellIdentifierAndCELevelForCECapableUEs,
  iE-Extensions    ProtocolExtensionContainer { { InformationForCECapableUEs-ExtIEs} } OPTIONAL,
  ...
}

InformationForCECapableUEs-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

AssistanceDataForPaging ::= SEQUENCE {
  assistanceDataForRecommendedCells AssistanceDataForRecommendedCells OPTIONAL,
  assistanceDataForCECapableUEs AssistanceDataForCECapableUEs OPTIONAL,
  pagingAttemptInformation PagingAttemptInformation OPTIONAL,
  iE-Extensions    ProtocolExtensionContainer { { AssistanceDataForPaging-ExtIEs} } OPTIONAL,
  ...
}

AssistanceDataForPaging-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

AssistanceDataForRecommendedCells ::= SEQUENCE {
  recommendedCellsForPaging RecommendedCellsForPaging,
  iE-Extensions    ProtocolExtensionContainer { { AssistanceDataForRecommendedCells-ExtIEs} } OPTIONAL,
  ...
}

AssistanceDataForRecommendedCells-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- B

Bearers-SubjectToStatusTransferList ::= SEQUENCE {SIZE(1..maxnoofE-RABs)) OF ProtocolIE-SingleContainer { { Bearers-SubjectToStatusTransfer-ItemIEs } }
Bearers-SubjectToStatusTransfer-ItemIEs S1AP-PROTOCOL-IES ::= {
    | ID id-Bearers-SubjectToStatusTransfer-Item CRITICALITY ignore TYPE Bearers-SubjectToStatusTransfer-Item PRESENCE mandatory },

Bearers-SubjectToStatusTransfer-Item ::= SEQUENCE {
    e-RAB-ID        E-RAB-ID,
    uL-COUNTvalue       COUNTvalue,
    dL-COUNTvalue       COUNTvalue,
    receiveStatusofULPDCP-SDUs ReceiveStatusofULPDCP-SDUs OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {Bearers-SubjectToStatusTransfer-ItemExtIEs} } OPTIONAL,
}

Bearers-SubjectToStatusTransfer-ItemExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    | ID id-ULCOUNTValueExtended CRITICALITY ignore EXTENSION COUNTValueExtended PRESENCE optional|}

BearerType ::= ENUMERATED {
    non-IP,
    ...
}

BitRate ::= INTEGER (0..10000000000)

BluetoothMeasurementConfiguration ::= SEQUENCE {
    bluetoothMeasConfig             BluetoothMeasConfig,
    bluetoothMeasConfigNameList  BluetoothMeasConfigNameList OPTIONAL,
    bt-rssi                          ENUMERATED {true, ...} OPTIONAL,
    iE-Extensions  ProtocolExtensionContainer { { BluetoothMeasurementConfiguration-ExtIEs } } OPTIONAL,
}

BluetoothMeasurementConfiguration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

BluetoothMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofBluetoothName)) OF BluetoothName

BluetoothMeasConfig ::= ENUMERATED {setup,...}

BluetoothName ::= OCTET STRING (SIZE (1..248))

BPLMNs ::= SEQUENCE (SIZE(1.. maxnoofBPLMNs)) OF PLMNidentity

BroadcastCancelledAreaList ::= CHOICE {
    cellID-Cancelled CellID-Cancelled,
BroadcastCompletedAreaList ::= CHOICE {
  cellID-Broadcast    CellID-Broadcast,
  tAI-Broadcast     TAI-Broadcast,
  emergencyAreaID-Broadcast  EmergencyAreaID-Broadcast,
 ...
}

-- C

CancelledCellinEAI ::= SEQUENCE (SIZE(1..maxnoofCellinEAI)) OF CancelledCellinEAI-Item

CancelledCellinEAI-Item ::= SEQUENCE {
  eCGI     EUTRAN-CGI,
  numberOfBroadcasts  NumberOfBroadcasts,
  iE-Extensions   ProtocolExtensionContainer { {CancelledCellinEAI-Item-ExtIEs} } OPTIONAL,
 ...
}

CancelledCellinEAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
 ...
}

CancelledCellinTAI ::= SEQUENCE (SIZE(1..maxnoofCellinTAI)) OF CancelledCellinTAI-Item

CancelledCellinTAI-Item ::= SEQUENCE{
  eCGI    EUTRAN-CGI,
  numberOfBroadcasts NumberOfBroadcasts,
  iE-Extensions ProtocolExtensionContainer { {CancelledCellinTAI-Item-ExtIEs} } OPTIONAL,
 ...
}

CancelledCellinTAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
 ...
}

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

CauseMisc ::= ENUMERATED {
  control-processing-overload,
  not-enough-user-plane-processing-resources,
  hardware-failure,
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,
  tx2relocoverall-expiry,
  successful-handover,
  release-due-to-eutra-generated-reason,
  handover-cancelled,
  partial-handover,
  ho-failure-in-target-EPC-eNB-or-target-system,
  ho-target-not-allowed,
  ts1relocoverall-expiry,
  ts1relocprep-expiry,
  cell-not-available,
  unknown-targetID,
  no-radio-resources-available-in-target-cell,
  unknown-mme-ue-slap-id,
  unknown-enb-ue-slap-id,
  unknown-pair-ue-slap-id,
  handover-desirable-for-radio-reason,
  time-critical-handover,
  resource-optimisation-handover,
  reduce-load-in-serving-cell,
  user-inactivity,
  radio-connection-with-ue-lost,
  load-balancing-tau-required,
  cs-fallback-triggered,
  ue-not-available-for-ps-service,
  radio-resources-not-available,
  failure-in-radio-interface-procedure,
  invalid-qos-combination,
  interrat-redirection,
  interaction-with-other-procedure,
  unknown-E-RAB-ID,
  multiple-E-RAB-ID-instances,
  encryption-and-or-integrity-protection-algorithms-not-supported,
  s1-intra-system-handover-triggered,
  s1-inter-system-handover-triggered,
  x2-handover-triggered,
...,
redirection-towards-1xRTT,
not-supported-QCI-value,
invalid-CSG-Id,
release-due-to-pre-emption

}

CauseTransport ::= ENUMERATED {
  transport-resource-unavailable,
  unspecified,
  ...
}

CauseNas ::= ENUMERATED {
  normal-release,
  authentication-failure,
  detach,
  unspecified,
  ...,
  csg-subscription-expiry
}

CellAccessMode ::= ENUMERATED {
  hybrid,
  ...
}

CellIdentifierAndCELevelForCECapableUEs ::= SEQUENCE {
  global-Cell-ID  EUTRAN-CGI,
  cELevel    CELevel,
  iE-Extensions  ProtocolExtensionContainer { { CellIdentifierAndCELevelForCECapableUEs-ExtIEs} } OPTIONAL,
  ...
}

CellIdentifierAndCELevelForCECapableUEs-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- Coverage Enhancement level encoded according to TS 36.331 [16] --
CELevel ::= OCTET STRING

CE-mode-B-SupportIndicator ::= ENUMERATED {
  supported,
  ...
}

CellIdentity ::= BIT STRING (SIZE (28))

CellID-Broadcast ::= SEQUENCE (SIZE(1..maxnoofCellID)) OF CellID-Broadcast-Item

CellID-Broadcast-Item ::= SEQUENCE {
eCGI EUTRAN-CGI,
iE-Extensions  ProtocolExtensionContainer [ {CellID-Broadcast-Item-ExtIEs} ] OPTIONAL,
...}

CellID-Broadcast-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...}

CellID-Cancelled::= SEQUENCE (SIZE(1..maxnoofCellID)) OF CellID-Cancelled-Item

CellID-Cancelled-Item ::= SEQUENCE {
  eCGI EUTRAN-CGI,
  numberOfBroadcasts NumberOfBroadcasts,
  iE-Extensions ProtocolExtensionContainer { {CellID-Cancelled-Item-ExtIEs} } OPTIONAL,
  ...
}

CellID-Cancelled-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...}

CellBasedMDT::= SEQUENCE {
  cellIdListforMDT CellIdListforMDT,
  iE-Extensions ProtocolExtensionContainer { {CellBasedMDT-ExtIEs} } OPTIONAL,
  ...
}

CellBasedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...}

CellIdListforMDT ::= SEQUENCE (SIZE(1..maxnoofCellIDforMDT)) OF EUTRAN-CGI

CellBasedQMC::= SEQUENCE {
  cellIdListforQMC CellIdListforQMC,
  iE-Extensions ProtocolExtensionContainer { {CellBasedQMC-ExtIEs} } OPTIONAL,
  ...
}

CellBasedQMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...}

CellIdListforQMC ::= SEQUENCE (SIZE(1..maxnoofCellIDforQMC)) OF EUTRAN-CGI

Cdma2000PDU ::= OCTET STRING

Cdma2000RATType ::= ENUMERATED {
  hRPD,
  onexRTT,
  ...
}

Cdma2000SectorID ::= OCTET STRING
ETSI

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Cdma2000HOStatus ::= ENUMERATED {
  hOSuccess,
  hOFailure,
  ...
}

Cdma2000HORequiredIndication ::= ENUMERATED {
  true,
  ...
}

Cdma2000OneXSRVCCInfo ::= SEQUENCE {
  cdma2000OneXMEID   Cdma2000OneXMEID,
  cdma2000OneXMSI    Cdma2000OneXMSI,
  cdma2000OneXPilot   Cdma2000OneXPilot,
  iE-Extensions    ProtocolExtensionContainer { {Cdma2000OneXSRVCCInfo-ExtIEs} } OPTIONAL,
  ...
}

Cdma2000OneXSRVCCInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

Cdma2000OneXMEID ::= OCTET STRING

Cdma2000OneXMSI ::= OCTET STRING

Cdma2000OneXPilot ::= OCTET STRING

Cdma2000OneXRAND ::= OCTET STRING

Cell-Size ::= ENUMERATED {verysmall, small, medium, large, ...}

CellType ::= SEQUENCE {
  cell-Size    Cell-Size,
  iE-Extensions   ProtocolExtensionContainer { {CellType-ExtIEs}} OPTIONAL,
  ...
}

CellType-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

CGI ::= SEQUENCE {
  pLMNidentity PLMNidentity,
  iAC    LAC,
  cI    CI,
  rAC    RAC            OPTIONAL,  iE-Extensions ProtocolExtensionContainer { {CGI-ExtIEs} }  OPTIONAL,
  ...
}

CGI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}
CI ::= OCTET STRING (SIZE (2))

CNDomain ::= ENUMERATED {
  ps,
  cs
}

CNTypeRestrictions ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF CNTypeRestrictions-Item

CNTypeRestrictions-Item ::= SEQUENCE {
  pLMN-Identity PLMNIdentity,
  cNType CNType,
  iE-Extensions ProtocolExtensionContainer [ { CNTypeRestrictions-Item-ExtIEs} ] OPTIONAL,
  ...
}

CNTypeRestrictions-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

CNType ::= ENUMERATED {
  fiveGCForbidden,
  ...
}

ConcurrentWarningMessageIndicator ::= ENUMERATED {
  true
}

ConnectedengNBList ::= SEQUENCE (SIZE(1..maxnoofConnectedengNBs)) OF ConnectedengNBItem

ConnectedengNBItem ::= SEQUENCE {
  en-gNB-ID En-gNB-ID,
  supportedTAs SupportedTAs,
  iE-Extensions ProtocolExtensionContainer [ {ConnectedengNBItem-ExtIEs} ] OPTIONAL,
  ...
}

ConnectedengNBItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

Correlation-ID ::= OCTET STRING (SIZE (4))

CSFallbackIndicator ::= ENUMERATED {
  cs-fallback-required,
  ...
}

CSFallbackIndicator ::= ENUMERATED {
  cs-fallback-high-priority
}
AdditionalCSFallbackIndicator ::= ENUMERATED {
    no-restriction,
    restriction,
    ...
}

CSG-Id ::= BIT STRING (SIZE (27))

CSG-IdList ::= SEQUENCE (SIZE (1..maxnoofCSGs)) OF CSG-IdList-Item

CSG-IdList-Item ::= SEQUENCE {
    cSG-Id      CSG-Id,
    iE-Extensions ProtocolExtensionContainer { {CSG-IdList-Item-ExtIEs} } OPTIONAL,
    ...
}

CSG-IdList-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

CSGMembershipStatus ::= ENUMERATED {
    member,
    not-member
}

COUNTvalue ::= SEQUENCE {
    pDCP-SN   PDCP-SN,
    hFN    HFN,
    iE-Extensions ProtocolExtensionContainer { {COUNTvalue-ExtIEs} } OPTIONAL,
    ...
}

COUNTvalue-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

COUNTValueExtended ::= SEQUENCE {
    pDCP-SNExtended   PDCP-SNExtended,
    hFNModified  HFNModified,
    iE-Extensions ProtocolExtensionContainer { {COUNTValueExtended-ExtIEs} } OPTIONAL,
    ...
}

COUNTValueExtended-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

COUNTvaluePDCP-SNlength18 ::= SEQUENCE {
    pDCP-SNlength18   PDCP-SNlength18,
    hFNforPDCP-SNlength18  HFNforPDCP-SNlength18,
    iE-Extensions ProtocolExtensionContainer { {COUNTvaluePDCP-SNlength18-ExtIEs} } OPTIONAL,
    ...
}
COUNTvaluePDCCP-SNlength18-ExtIEs S1AP-PROTOCOL-EXTENSION ::= { ... }

Coverage-Level ::= ENUMERATED {
   extendedcoverage,
   ... }

CriticalityDiagnostics ::= SEQUENCE {
   procedureCode     ProcedureCode              OPTIONAL,
   triggeringMessage    TriggeringMessage             OPTIONAL,
   procedureCriticality  Criticality               OPTIONAL,
   iEsCriticalityDiagnostics  CriticalityDiagnostics-IE-List          OPTIONAL,
   iE-Extensions     ProtocolExtensionContainer {{CriticalityDiagnostics-ExtIEs}}  OPTIONAL,
   ... }

CriticalityDiagnostics-ExtIEs S1AP-PROTOCOL-EXTENSION ::= { ... }

CriticalityDiagnostics-IE-List ::= SEQUENCE {SIZE (1.. maxnoofErrors)} OF CriticalityDiagnostics-IE-Item

CriticalityDiagnostics-IE-Item ::= SEQUENCE {
   iECriticality   Criticality,
   iE-ID     ProtocolIE-ID,
   typeOfError    TypeOfError,
   iE-Extensions   ProtocolExtensionContainer {{CriticalityDiagnostics-IE-Item-ExtIEs}} OPTIONAL,
   ... }

CriticalityDiagnostics-IE-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
   ... }

-- D

DataCodingScheme ::= BIT STRING {SIZE (8)}

DCN-ID ::= INTEGER {0..65535}

ServedDCNs ::= SEQUENCE {SIZE(0..maxnoofDCNs)} OF ServedDCNsItem

ServedDCNsItem ::= SEQUENCE {
   dCN-ID      DCN-ID,
   relativeDCNCapacity   RelativeMMECapacity,
   iE-Extensions   ProtocolExtensionContainer {{ServedDCNsItem-ExtIEs}} OPTIONAL,
   ... }

ServedDCNsItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= { ... }
DL-CP-SecurityInformation ::= SEQUENCE {
    dl-NAS-MAC          DL-NAS-MAC,
    iE-Extensions       ProtocolExtensionContainer { { DL-CP-SecurityInformation-ExtIEs} } OPTIONAL,
    ... }

DL-CP-SecurityInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= ( }

DL-Forwarding ::= ENUMERATED {
    dL-Forwarding-proposed,
    ... }

DL-NAS-MAC ::= BIT STRING (SIZE (16))

Direct-Forwarding-Path-Availability ::= ENUMERATED {
    directPathAvailable,
    ... }

Data-Forwarding-Not-Possible ::= ENUMERATED {
    data-Forwarding-not-Possible,
    ... }

DLNASPDUDeliveryAckRequest ::= ENUMERATED {
    requested,
    ... }

-- E

EARFCN ::= INTEGER(0..maxEARFCN, ...)

ECGIList ::= SEQUENCE (SIZE(1..maxnoofCellID)) OF EUTRAN-CGI

PWSfailedECGIList ::= SEQUENCE (SIZE(1..maxnoofCellsineNB)) OF EUTRAN-CGI

EDT-Session ::= ENUMERATED {
    true,
    ... }

EmergencyAreaIDList ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID

EmergencyAreaID ::= OCTET STRING (SIZE (3))

EmergencyAreaID-Broadcast ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID-Broadcast-Item

ETSI
EmergencyAreaID-Broadcast-Item ::= SEQUENCE {
  emergencyAreaID   EmergencyAreaID,
  completedCellinEAI CompletedCellinEAI,
  iE-Extensions   ProtocolExtensionContainer { {EmergencyAreaID-Broadcast-Item-ExtIEs} } OPTIONAL,
  ... 
}

EmergencyAreaID-Broadcast-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... 
}

EmergencyAreaID-Cancelled ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID-Cancelled-Item

EmergencyAreaID-Cancelled-Item ::= SEQUENCE {
  emergencyAreaID   EmergencyAreaID,
  cancelledCellinEAI CancelledCellinEAI,
  iE-Extensions   ProtocolExtensionContainer { {EmergencyAreaID-Cancelled-Item-ExtIEs} } OPTIONAL,
  ... 
}

EmergencyAreaID-Cancelled-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... 
}

CompletedCellinEAI ::= SEQUENCE (SIZE(1..maxnoofCellinEAI)) OF CompletedCellinEAI-Item

CompletedCellinEAI-Item ::= SEQUENCE {
  eCGI     EUTRAN-CGI,
  iE-Extensions   ProtocolExtensionContainer { {CompletedCellinEAI-Item-ExtIEs} } OPTIONAL,
  ... 
}

CompletedCellinEAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... 
}

ECGI-List ::= SEQUENCE (SIZE(1..maxnoofCellsineNB)) OF EUTRAN-CGI

EmergencyAreaIDListForRestart ::= SEQUENCE (SIZE(1..maxnoofRestartEmergencyAreaIDs)) OF EmergencyAreaID

ENB-ID ::= CHOICE {
  macroENB-ID   BIT STRING (SIZE(20)),
  homeENB-ID   BIT STRING (SIZE(28)),
  ...,
  short-macroENB-ID  BIT STRING (SIZE(18)),
  long-macroENB-ID  BIT STRING (SIZE(21))
}

En-gNB-ID ::= BIT STRING (SIZE(22..32, ...))

GERAN-Cell-ID ::= SEQUENCE {
  lAI    LAI,
  rAC    RAC,
  cI    CI,
}
iE-Extensions    ProtocolExtensionContainer { { GERAN-Cell-ID-ExtIEs} } OPTIONAL,
...
}

GERAN-Cell-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

Global-ENB-ID ::= SEQUENCE {
   plMNidentity   PLMNidentity,
enB-ID     ENB-ID,
   iE-Extensions   ProtocolExtensionContainer { {GlobalENB-ID-ExtIEs} } OPTIONAL,
...
}

GlobalENB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

Global-en-gNB-ID ::= SEQUENCE {
   plMNidentity   PLMNidentity,
en-gNB-ID    En-gNB-ID,
   iE-Extensions   ProtocolExtensionContainer { {Global-en-gNB-ID-ExtIEs} } OPTIONAL,
...
}

Global-en-gNB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

GUMMEIList ::= sequence (size (1.. maxnoofMMECs)) of GUMMEI

ENB-StatusTransfer-TransparentContainer ::= SEQUENCE {
   bearers-SubjectToStatusTransferList    Bearers-SubjectToStatusTransferList,
iE-Extensions   ProtocolExtensionContainer { {ENB-StatusTransfer-TransparentContainer-ExtIEs} } OPTIONAL,
...
}

ENB-StatusTransfer-TransparentContainer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

ENB-UE-S1AP-ID ::= INTEGER (0..16777215)

ENBname ::= PrintableString (size (1..150,...))

ENBX2TLAs ::= sequence (size(1.. maxnoofENBX2TLAs)) of TransportLayerAddress

EncryptionAlgorithms ::= BIT STRING (size (16,...))

EN-DCSONConfigurationTransfer ::= SEQUENCE {
   transfertype    EN-DCSONTransferType,
sONInformation     SONInformation,
x2TNLConfigInfo     X2TNLConfigurationInfo OPTIONAL,
-- This IE shall be present if the SON Information IE contains the SON Information Request IE and the SON Information Request IE is set to "X2TNL Configuration Info" --

ie-Extensions ProtocolExtensionContainer { {EN-DCSONConfigurationTransfer-ExtIEs} } OPTIONAL,
...

EN-DCSONConfigurationTransfer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

EN-DCSONTransferType ::= CHOICE {
  request EN-DCTransferTypeRequest,
  reply  EN-DCTransferTypeReply,
  ...
}

EN-DCTransferTypeRequest ::= SEQUENCE {
  sourceeNB EN-DCSONeNBIdentification,
  targetengNB EN-DCSONeNBIdentification,
  targeteNB  EN-DCSONeNBIdentification OPTIONAL,
  associatedTAI TAI OPTIONAL,
  broadcast5GSTAI FiveGSTAI OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {EN-DCTransferTypeRequest-ExtIEs} } OPTIONAL,
...
}

EN-DCTransferTypeRequest-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

EN-DCTransferTypeReply ::= SEQUENCE {
  sourceengNB EN-DCSONeNBIdentification,
  targeteNB  EN-DCSONeNBIdentification,
  iE-Extensions ProtocolExtensionContainer { {EN-DCTransferTypeReply-ExtIEs} } OPTIONAL,
...
}

EN-DCTransferTypeReply-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

EN-DCSONeNBIdentification ::= SEQUENCE {
  globaleNBID Global-ENB-ID,
  selectedTAI TAI,
  iE-Extensions ProtocolExtensionContainer { {EN-DCSONeNBIdentification-ExtIEs} } OPTIONAL,
...
}

EN-DCSONeNBIdentification-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}

EN-DCSONeNBIdentification ::= SEQUENCE {
  globaleNBID Global-ENB-ID,
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selectedTAI TAI,
ie-Extensions ProtocolExtensionContainer { {EN-DCSONengNBIdentification-ExtIEs} } OPTIONAL,
...
}
EN-DCSONengNBIdentification-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
...
}
EndIndication ::= ENUMERATED {
    no-further-data,
    further-data-exists,
    ...
}
EnhancedCoverageRestricted ::= ENUMERATED {
    restricted,
    ...
}
CE-ModeBRestricted ::= ENUMERATED {
    restricted,
    not-restricted,
    ...
}
EPLMNs ::= SEQUENCE (SIZE(1..maxnoofEPLMNs)) OF PLMNidentity
EventType ::= ENUMERATED {
    direct,
    change-of-serve-cell,
    stop-change-of-serve-cell,
    ...
}
E-RAB-ID ::= INTEGER (0..15, ...)
E-RABInformationList ::= SEQUENCE (SIZE (1..maxnoofE-RABs)) OF ProtocolIE-SingleContainer { { E-RABInformationListIEs } }
E-RABInformationListIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABInformationListItem CRITICALITY ignore TYPE E-RABInformationListItem PRESENCE mandatory },
    ...
}
E-RABInformationListItem ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
dL-Forwarding DL-Forwarding OPTIONAL,
iE-Extensions ProtocolExtensionContainer { {E-RABInformationListItem-ExtIEs} } OPTIONAL,
    ...
}
E-RABInformationListItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}
E-RABList ::= SEQUENCE (SIZE(1..maxnoofE-RABs)) OF ProtocolIE-SingleContainer { (E-RABItemIEs) }

E-RABItemIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABItem CRITICALITY ignore TYPE E-RABItem PRESENCE mandatory },
    ... }

E-RABItem ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
    cause Cause,
    iE-Extensions ProtocolExtensionContainer { (E-RABItem-ExtIEs) } OPTIONAL,
    ... }

E-RABItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... }

E-RABLevelQoSParameters ::= SEQUENCE {
    qCI QCI,
    allocationRetentionPriority AllocationAndRetentionPriority,
    gbrQosInformation GBR-QosInformation OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { (E-RABQoSParameters-ExtIEs) } OPTIONAL,
    ... }

E-RABUsageReportList ::= SEQUENCE (SIZE(1..maxnooftimeperiods)) OF ProtocolIE-SingleContainer { (E-RABUsageReportItemIEs) }

E-RABUsageReportItemIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABUsageReportItem CRITICALITY ignore TYPE E-RABUsageReportItem PRESENCE mandatory },
    ... }

E-RABUsageReportItem ::= SEQUENCE {
    startTimestamp OCTET STRING (SIZE(4)),
    endTimestamp OCTET STRING (SIZE(4)),
    usageCountUL INTEGER (0..18446744073709551615),
    usageCountDL INTEGER (0..18446744073709551615),
    iE-Extensions ProtocolExtensionContainer { (E-RABUsageReportItem-ExtIEs) } OPTIONAL,
    ... }

E-RABUsageReportItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... }

E-RABQoSParameters-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    -- Extended for introduction of downlink and uplink packet loss rate for enhanced Voice performance --
    { ID id-DownlinkPacketLossRate CRITICALITY ignore EXTENSION Packet-LossRate PRESENCE optional },
    { ID id-UplinkPacketLossRate CRITICALITY ignore EXTENSION Packet-LossRate PRESENCE optional },
    ... }
EUTRAN-CGI ::= SEQUENCE {
  plMNidentity  PLMNIdentity,
  cell-ID     CellIdentity,
  iE-Extensions ProtocolExtensionContainer { {EUTRAN-CGI-ExtIEs} } OPTIONAL,
  ...  
}

EUTRAN-CGI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...  
}

EUTRANRoundTripDelayEstimationInfo ::= INTEGER (0..2047)

ExpectedUEBehaviour ::= SEQUENCE {
  expectedActivity  ExpectedUEActivityBehaviour OPTIONAL,
  expectedHOInterval  ExpectedHOInterval OPTIONAL,
  iE-Extensions  ProtocolExtensionContainer { { ExpectedUEBehaviour-ExtIEs} } OPTIONAL,
  ...  
}

ExpectedUEBehaviour-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...  
}

ExpectedUEActivityBehaviour ::= SEQUENCE {
  expectedActivityPeriod  ExpectedActivityPeriod OPTIONAL,
  expectedIdlePeriod      ExpectedIdlePeriod      OPTIONAL,
  sourceofUEActivityBehaviourInformation SourceOfUEActivityBehaviourInformation OPTIONAL,
  iE-Extensions  ProtocolExtensionContainer { { ExpectedUEActivityBehaviour-ExtIEs} } OPTIONAL,
  ...  
}

ExpectedUEActivityBehaviour-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...  
}

ExpectedActivityPeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181,...)

ExpectedIdlePeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181,...)

SourceOfUEActivityBehaviourInformation ::= ENUMERATED {
  subscription-information,  
  statistics,  
  ...  
}

ExpectedHOInterval ::= ENUMERATED {
  sec15, sec30, sec60, sec90, sec120, sec180, long-time,  
  ...  
}

ExtendedBitRate ::= INTEGER (10000000001..4000000000000, ...)}
ExtendedRNC-ID ::= INTEGER (4096..65535)

ExtendedRepetitionPeriod ::= INTEGER (4096..131071)

Extended-UEIdentityIndexValue ::= BIT STRING (SIZE (14))

-- F

FiveGSTAC ::= OCTET STRING (SIZE (3))

FiveGSTAI ::= SEQUENCE {
  pLMNidentity PLMNidentity,
  fiveGSTAC FiveGSTAC,
  iE-Extensions ProtocolExtensionContainer { {FiveGSTAI-ExtIEs} } OPTIONAL,
  ...
}

FiveGSTAI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

ForbiddenInterRATs ::= ENUMERATED {
  all,
  geran,
  utran,
  cdma2000,
  ...
  geranandutran,
  cdma2000andutran
}

ForbiddenTAs ::= SEQUENCE (SIZE(1..maxnoofEPLMNsPlusOne)) OF ForbiddenTAs-Item

ForbiddenTAs-Item ::= SEQUENCE {
  pLMN-Identity PLMNIdentity,
  forbiddenTACs ForbiddenTACs,
  iE-Extensions ProtocolExtensionContainer { {ForbiddenTAs-Item-ExtIEs} } OPTIONAL,
  ...
}

ForbiddenTAs-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

ForbiddenTACs ::= SEQUENCE (SIZE(1..maxnoofForbTACs)) OF TAC

ForbiddenLAs ::= SEQUENCE (SIZE(1..maxnoofEPLMNsPlusOne)) OF ForbiddenLAs-Item

ForbiddenLAs-Item ::= SEQUENCE {
  pLMN-Identity PLMNIdentity,
  forbiddenLACs ForbiddenLACs,
  iE-Extensions ProtocolExtensionContainer { {ForbiddenLAs-Item-ExtIEs} } OPTIONAL,
  ...
}
ForbiddenLAs-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... 
}

ForbiddenLACs ::= SEQUENCE (SIZE(1..maxnoofForbLACs)) OF LAC

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 S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for maximum bitrate > 1 Gbps --
  { ID id-extended-e-RAB-MaximumBitrateDL CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional},
  { ID id-extended-e-RAB-MaximumBitrateUL CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional},
  { ID id-extended-e-RAB-GuaranteedBitrateDL CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional},
  { ID id-extended-e-RAB-GuaranteedBitrateUL CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional},
  ... 
}

GTP-TEID ::= OCTET STRING (SIZE (4))

GUMMEI ::= SEQUENCE {
  pLMN-Identity     PLMNidentity,
  mME-Group-ID      MME-Group-ID,
  mME-Code          MME-Code,
  iE-Extensions     ProtocolExtensionContainer { {GUMMEI-ExtIEs} } OPTIONAL,
  ... 
}

GUMMEI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... 
}

GUMMETYPE ::= ENUMERATED {
  native,
  mapped,
  mappedFrom5G
}

GWContextReleaseIndication ::= ENUMERATED {
  true,
  ... 
}
HandoverFlag ::= ENUMERATED {
  handoverPreparation,
  ...
}

HandoverRestrictionList ::= SEQUENCE {
  servingPLMN    PLMNidentity,
  equivalentPLMNs EPLMNs     OPTIONAL,
  forbiddenTAs    ForbiddenTAs    OPTIONAL,
  forbiddenLAs    ForbiddenLAs    OPTIONAL,
  forbiddenInterRATs ForbiddenInterRATs OPTIONAL,
  iE-Extensions  ProtocolExtensionContainer { (HandoverRestrictionList-ExtIEs) } OPTIONAL,
  ...
}

HandoverRestrictionList-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  { ID id-NRrestrictioninEPSasSecondaryRAT  CRITICALITY ignore EXTENSION NRrestrictioninEPSasSecondaryRAT  PRESENCE optional}}
{ ID id-UnlicensedSpectrumRestriction  CRITICALITY ignore EXTENSION UnlicensedSpectrumRestriction  PRESENCE optional}}
{ ID id-CNTypeRestrictions  CRITICALITY ignore EXTENSION CNTypeRestrictions  PRESENCE optional}}
{ ID id-NRrestrictionin5GS  CRITICALITY ignore EXTENSION NRrestrictionin5GS  PRESENCE optional}}
{ ID id-LastNG-RANPLMNIdentity   CRITICALITY ignore EXTENSION PLMNidentity  PRESENCE optional},
...

HandoverType ::= ENUMERATED {
  intralte,
  ltetoutran,
  ltetogeran,
  utrantolte,
  gerantolte,
  ...
}
  eps-to-5gs,
  fivegs-to-eps
}

HFN ::= INTEGER (0..1048575)

HFNModified ::= INTEGER (0..131071)

HFNforPDCP-SNlength18 ::= INTEGER (0..16383)

-- I

Masked-IMEISV ::= BIT STRING (SIZE (64))

ImmediateMDT ::= SEQUENCE {
  measurementsToActivate MeasurementsToActivate,
  m1reportingTrigger M1ReportingTrigger,
  m1thresholdEventA2 M1ThresholdEventA2 OPTIONAL,
  ...
  m1periodicReporting M1PeriodicReporting OPTIONAL,
  -- Included in case of event-triggered, or event-triggered periodic reporting for measurement M1
-- Included in case of periodic or event-triggered periodic reporting
  iE-Extensions ProtocolExtensionContainer { ( ImmediateMDT-ExtIEs) } OPTIONAL,
    ...
}

ImmediateMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  { ID id-M3Configuration CRITICALITY ignore EXTENSION M3Configuration PRESENCE conditional}|
  { ID id-M5Configuration CRITICALITY ignore EXTENSION M5Configuration PRESENCE conditional}|
  { ID id-MDT-Location-Info CRITICALITY ignore EXTENSION MDT-Location-Info PRESENCE optional}|
  { ID id-M6Configuration CRITICALITY ignore EXTENSION M6Configuration PRESENCE conditional}|
  { ID id-W7Configuration CRITICALITY ignore EXTENSION W7Configuration PRESENCE optional}|
  { ID id-WLANMeasurementConfiguration CRITICALITY ignore EXTENSION WLANMeasurementConfiguration PRESENCE optional},
  ...
}

IMSI ::= OCTET STRING (SIZE (3..8))

InformationOnRecommendedCellsAndENBsForPaging ::= SEQUENCE {
  recommendedCellsForPaging RecommendedCellsForPaging,
  recommendedENBsForPaging RecommendedENBsForPaging,
  iE-Extensions ProtocolExtensionContainer { ( InformationOnRecommendedCellsAndENBsForPaging-ExtIEs) } OPTIONAL,
    ...
}

InformationOnRecommendedCellsAndENBsForPaging-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

IntegrityProtectionAlgorithms ::= BIT STRING (SIZE (16,...))

IntendedNumberOfPagingAttempts ::= INTEGER (1..16,...)

InterfacesToTrace ::= BIT STRING (SIZE (8))

-- J
-- K

KillAllWarningMessages ::= ENUMERATED {true}

-- L

LAC ::= OCTET STRING (SIZE (2))

LAI ::= SEQUENCE {
  pLMNidentity PLMNidentity,
  LAC LAC,
  iE-Extensions ProtocolExtensionContainer { (LAI-ExtIEs) } OPTIONAL,
    ...
}
LAI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= { ...

LastVisitedCell-Item ::= CHOICE {
  e-UTRAN-Cell LastVisitedEUTRANCellInformation,
  uTRAN-Cell LastVisitedUTRANCellInformation,
  gERAN-Cell LastVisitedGERANCellInformation,
  ...
  nG-RAN-Cell LastVisitedNGRANCellInformation
}

LastVisitedEUTRANCellInformation ::= SEQUENCE {
  global-Cell-ID EUTRAN-CGI,
  cellType CellType,
  time-UE-StayedInCell Time-UE-StayedInCell,
  iE-Extensions ProtocolExtensionContainer { { LastVisitedEUTRANCellInformation-ExtIEs} } OPTIONAL,
  ...
}

LastVisitedEUTRANCellInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for Rel-11 to support enhanced granularity for time UE stayed in cell --
  { ID id-Time-UE-StayedInCell-EnhancedGranularity CRITICALITY ignore EXTENSION Time-UE-StayedInCell-EnhancedGranularity PRESENCE optional},
  ... }
LoggedMDT ::= SEQUENCE {
    loggingInterval    LoggingInterval,
    loggingDuration    LoggingDuration,
    iE-Extensions    ProtocolExtensionContainer { {LoggedMDT-ExtIEs} } OPTIONAL,
    ...
}

LoggedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    { ID id-BluetoothMeasurementConfiguration CRITICALITY ignore EXTENSION BluetoothMeasurementConfiguration PRESENCE optional},
    { ID id-WLANMeasurementConfiguration CRITICALITY ignore EXTENSION WLANMeasurementConfiguration PRESENCE optional},
    ...
}

LoggingInterval ::= ENUMERATED (ms128, ms256, ms512, ms1024, ms2048, ms3072, ms4096, ms6144)

LoggingDuration ::= ENUMERATED (m10, m20, m40, m60, m90, m120)

LoggedMBSFNMDT ::= SEQUENCE {
    loggingInterval    LoggingInterval,
    loggingDuration    LoggingDuration,
    mBSFN-ResultToLog   MBSFN-ResultToLog  OPTIONAL,
    iE-Extensions    ProtocolExtensionContainer { { LoggedMBSFNMDT-ExtIEs } } OPTIONAL,
    ...
}

LoggedMBSFNMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

LTE-M-Indication ::= ENUMERATED {lte-m, ... }

-- M

M3Configuration ::= SEQUENCE {
    m3period   M3period,
    iE-Extensions  ProtocolExtensionContainer { { M3Configuration-ExtIEs} } OPTIONAL,
    ...
}

M3Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

M3period ::= ENUMERATED (ms100, ms1000, ms10000, ...,ms1024, ms1280, ms2048, ms2560, ms5120, ms10240, min1 )

M4Configuration ::= SEQUENCE {
    m4period   M4period,
    m4-links-to-log  Links-to-log,
    iE-Extensions  ProtocolExtensionContainer { { M4Configuration-ExtIEs} } OPTIONAL,
    ...
}

M4Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
M4period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }

M5Configuration ::= SEQUENCE {
    m5period   M5period,
    m5-links-to-log  Links-to-log,
    iE-Extensions  ProtocolExtensionContainer [ { M5Configuration-ExtIEs} } OPTIONAL,
    ... 
}

M5Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... 
}

M5period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }

M6Configuration ::= SEQUENCE {
    m6report-Interval M6report-Interval,
    m6delay-threshold M6delay-threshold  OPTIONAL,
    -- This IE shall be present if the M6 Links to log IE is set to “uplink” or to “both-uplink-and-downlink” --
    m6-links-to-log  Links-to-log,
    iE-Extensions  ProtocolExtensionContainer [ { M6Configuration-ExtIEs} } OPTIONAL,
    ... 
}

M6Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... 
}

M6report-Interval ::= ENUMERATED { ms1024, ms2048, ms5120, ms10240, ... }

M6delay-threshold ::= ENUMERATED { ms30, ms40, ms50, ms60, ms70, ms80, ms90, ms100, ms150, ms300, ms500, ms750, ... }

M7Configuration ::= SEQUENCE {
    m7period   M7period,
    m7-links-to-log  Links-to-log,
    iE-Extensions  ProtocolExtensionContainer [ { M7Configuration-ExtIEs} } OPTIONAL,
    ... 
}

M7Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... 
}

M7period ::= INTEGER(1..60, ...)

MDT-Activation ::= ENUMERATED {
    immediate-MDT-only, immediate-MDT-and-Trace, logged-MDT-only, ...
    logged-MBSFN-MDT
MDT-Location-Info ::= BIT STRING (SIZE (8))

MDT-Configuration ::= SEQUENCE {
    mdt-Activation  MDT-Activation,
    areaScopeOfMDT AreaScopeOfMDT,
    mDTMode        MDTMode,
    iE-Extensions   ProtocolExtensionContainer [ { MDT-Configuration-ExtIEs} ] OPTIONAL,
    ...
}

MDT-Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ID id-SignallingBasedMDTPLMNList   CRITICALITY ignore EXTENSION MDTPLMNList PRESENCE optional},

ManagementBasedMDTAllowed ::= ENUMERATED {allowed, ...}

MBSFN-ResultToLog ::= SEQUENCE (SIZE(1..maxnoofMBSFNAreaMDT)) OF MBSFN-ResultToLogInfo

MBSFN-ResultToLogInfo ::= SEQUENCE {
    mBSFN-AreaId    INTEGER (0..255) OPTIONAL,
    carrierFreq    EARFCN,
    iE-Extensions ProtocolExtensionContainer [ { MBSFN-ResultToLogInfo-ExtIEs} ] OPTIONAL,
    ...
}

MBSFN-ResultToLogInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

MDTPLMNList ::= SEQUENCE (SIZE(1..maxnoofMDTPLMNs)) OF PLMNidentity

PrivacyIndicator ::= ENUMERATED {
    immediate-MDT,  logged-MDT,
    ...
}

MDTMode ::= CHOICE {
    immediateMDT   ImmediateMDT,
    loggedMDT      LoggedMDT,
    ...
}

MDTMode-Extension ::= ProtocolIE-SingleContainer {{ MDTMode-ExtensionIE }}

MDTMode-ExtensionIE S1AP-PROTOCOL-IES ::= {
    ID id-LoggedMBSFNMDT   CRITICALITY ignore TYPE LoggedMBSFNMDT PRESENCE mandatory}

MeasurementsToActivate ::= BIT STRING (SIZE (8))
MeasurementThresholdA2 ::= CHOICE {
  threshold-RSRP    Threshold-RSRP,
  threshold-RSRQ    Threshold-RSRQ,
  ...
}

MessageIdentifier ::= BIT STRING (SIZE (16))

MobilityInformation ::= BIT STRING (SIZE(32))

MMEname ::= PrintableString (SIZE (1..150,...))

MME PagingTarget ::= CHOICE {
  global-ENB-ID  Global-ENB-ID,
  tAI     TAI,
  ...
}

MMERelaySupportIndicator ::= ENUMERATED {true, ...}

MME-Group-ID ::= OCTET STRING (SIZE (2))

MME-Code ::= OCTET STRING (SIZE (1))

MME-UE-S1AP-ID ::= INTEGER (0..4294967295)

M-TMSI ::= OCTET STRING (SIZE (4))

MSClassmark2 ::= OCTET STRING

MSClassmark3 ::= OCTET STRING

MutingAvailabilityIndication ::= ENUMERATED {
  available,
  unavailable,
  ...
}

MutingPatternInformation ::= SEQUENCE {
  muting-pattern-period    ENUMERATED {ms0, ms1280, ms2560, ms5120, ms10240, ...},
  muting-pattern-offset    INTEGER (0..10239, ...) OPTIONAL,
  iE-Extensions      ProtocolExtensionContainer { {MutingPatternInformation-ExtIEs} } OPTIONAL,
  ...
}

MutingPatternInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- N

NAS-PDU ::= OCTET STRING

NASSecurityParametersfromE-UTRAN ::= OCTET STRING
NASSecurityParametersToE-UTRAN ::= OCTET STRING

NB-IoT-DefaultPagingDRX ::= ENUMERATED { v128, v256, v512, v1024, ... }

NB-IoT-Paging-eDRXInformation ::= SEQUENCE {
  nb-IoT-paging-eDRX-Cycle NB-IoT-Paging-eDRX-Cycle,
  nb-IoT-pagingTimeWindow NB-IoT-PagingTimeWindow OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {NB-IoT-Paging-eDRXInformation-ExtIEs} } OPTIONAL,
  ...
}

NB-IoT-Paging-eDRXInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

NB-IoT-Paging-eDRX-Cycle ::= ENUMERATED{hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, ...}

NB-IoT-PagingTimeWindow ::= ENUMERATED{s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, ...}

NB-IoT-UEIdentityIndexValue ::= BIT STRING (SIZE {12})

NextPagingAreaScope ::= ENUMERATED {
  same,
  changed,
  ...
}

NRCellIdentity ::= BIT STRING (SIZE(36))

NR-CGI ::= SEQUENCE {
  plMNIdentity PLMNIdentity,
  nRCellIdentity NRCellIdentity,
  iE-Extensions ProtocolExtensionContainer { {NR-CGI-ExtIEs} } OPTIONAL,
  ...
}

NR-CGI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

NR-Cipher Algorithms ::= BIT STRING (SIZE {16,...})

NRIntegrity Protection Algorithms ::= BIT STRING (SIZE {16,...})

NRrestrictioninEPSasSecondaryRAT ::= ENUMERATED {
  nRrestrictedinEPSasSecondaryRAT,
  ...
}
NRrestrictin5GS ::= ENUMERATED {
  nRrestrictedin5GS,
  ...}

NRUESecurityCapabilities ::= SEQUENCE {
  nRencryptionAlgorithms            NRencryptionAlgorithms,
  nRintegrityProtectionAlgorithms    NRintegrityProtectionAlgorithms,
  iE-Extensions                     ProtocolExtensionContainer ( { NRUESecurityCapabilities-ExtIEs} ) OPTIONAL,
  ...
}

NRUESecurityCapabilities-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

NumberOfBroadcastRequest ::= INTEGER (0..65535)

NumberOfBroadcasts ::= INTEGER (0..65535)

-- O
OldBSS-ToNewBSS-Information ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.

OverloadAction ::= ENUMERATED {
  reject-non-emergency-mo-dt,
  reject-rrc-cr-signalling,
  permit-emergency-sessions-and-mobile-terminated-services-only,
  ...,         
  permit-high-priority-sessions-and-mobile-terminated-services-only,
  reject-delay-tolerant-access,
  permit-high-priority-sessions-and-exception-reporting-and-mobile-terminated-services-only,
  not-accept-mo-data-or-delay-tolerant-access-from-CP-CIoT
}

OverloadResponse ::= CHOICE {
  overloadAction    OverloadAction,
  ...
}

-- P
Packet-LossRate ::= INTEGER(0..1000)

PagingAttemptInformation ::= SEQUENCE {
  pagingAttemptCount    PagingAttemptCount,
  intendedNumberOfPagingAttempts    IntendedNumberOfPagingAttempts,
  nextPagingAreaScope        NextPagingAreaScope OPTIONAL,
  iE-Extensions             ProtocolExtensionContainer ( { PagingAttemptInformation-ExtIEs} ) OPTIONAL,
  ...
PagingAttemptInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... 
}

PagingAttemptCount ::= INTEGER (1..16, ...)

Paging-eDRXInformation ::= SEQUENCE {
    paging-eDRX-Cycle Paging-eDRX-Cycle,
    pagingTimeWindow PagingWindow OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { Paging-eDRXInformation-ExtIEs} } OPTIONAL,
    ... 
}

Paging-eDRXInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... 
}

Paging-eDRX-Cycle ::= ENUMERATED{hfhalf, hf1, hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, ...}

PagingTimeWindow ::= ENUMERATED{s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, ...}

PagingDRX ::= ENUMERATED {
    v32,
    v64,
    v128,
    v256,
    ... 
}

PagingPriority ::= ENUMERATED {
    priolevel1,
    priolevel2,
    priolevel3,
    priolevel4,
    priolevel5,
    priolevel6,
    priolevel7,
    priolevel8,
    ... 
}

PDCP-SN ::= INTEGER (0..4095)

PDCP-SNExtended ::= INTEGER (0..32767)

PDCP-SNLength18 ::= INTEGER (0..262143)

PendingDataIndication ::= ENUMERATED {
    true,
    ... 
}
M1PeriodicReporting ::= SEQUENCE {
    reportInterval    ReportIntervalMDT,
    reportAmount    ReportAmountMDT,
    iE-Extensions    ProtocolExtensionContainer { ( M1PeriodicReporting-ExtIEs) } OPTIONAL,
    ...
}

M1PeriodicReporting-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PLMNidentity ::= TBCD-STRING

PLMNAreaBasedQMC ::= SEQUENCE {
    plmnListforQMC      PLMNListforQMC,
    iE-Extensions    ProtocolExtensionContainer { PLMNAreaBasedQMC-ExtIEs } OPTIONAL,
    ...
}

PLMNAreaBasedQMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PLMNListforQMC ::= SEQUENCE (SIZE(1..maxnoofPLMNforQMC)) OF PLMNidentity

Port-Number ::= OCTET STRING (SIZE (2))

Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
}

Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable
}

PriorityLevel ::= INTEGER { spare (0), highest (1), lowest (14), no-priority (15) } (0..15)

ProSeAuthorized ::= SEQUENCE {
    proSeDirectDiscovery ProSeDirectDiscovery OPTIONAL,
    proSeDirectCommunication ProSeDirectCommunication OPTIONAL,
    iE-Extensions    ProtocolExtensionContainer { ProSeAuthorized-ExtIEs } OPTIONAL,
    ...
}

ProSeAuthorized-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    { ID id-ProSeUEtoNetworkRelaying CRITICALITY ignore EXTENSION ProSeUEtoNetworkRelaying PRESENCE optional},
    ...
}

ProSeDirectDiscovery ::= ENUMERATED {
    authorized,
    not-authorized,
...}

ProSeURtoNetworkRelaying ::= ENUMERATED {
  authorized,
  not-authorized,
  ...
}

ProSeDirectCommunication ::= ENUMERATED {
  authorized,
  not-authorized,
  ...
}

PS-ServiceNotAvailable ::= ENUMERATED {
  ps-service-not-available,
  ...
}

PSCellInformation ::= SEQUENCE {
  nCGI      NR-CGI,
  iE-Extensions    ProtocolExtensionContainer { { PSCellInformation-ExtIEs} } OPTIONAL,
  ...
}

PSCellInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- Q

QCI ::= INTEGER (0..255)

-- R

ReceiveStatusofULPDCPSDUs ::= BIT STRING (SIZE(4096))

ReceiveStatusofULPDCPSDUsExtended ::= BIT STRING (SIZE(1..16384))

ReceiveStatusofULPDCPSDUsPDCPSNLength18 ::= BIT STRING (SIZE(1..131072))

RecommendedCellsForPaging ::= SEQUENCE {
  recommendedCellList    RecommendedCellList,
  iE-Extensions    ProtocolExtensionContainer { { RecommendedCellsForPaging-ExtIEs} } OPTIONAL,
  ...
}

RecommendedCellsForPaging-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

RecommendedCellList ::= SEQUENCE (SIZE(1.. maxnoofRecommendedCells)) OF ProtocolIE-SingleContainer { { RecommendedCellItemIEs } }
RecommendedCellItemIEs S1AP-PROTOCOL-IES ::= {
    { ID id-RecommendedCellItem CRITICALITY ignore TYPE RecommendedCellItem PRESENCE mandatory },
    ...
}

RecommendedCellItem ::= SEQUENCE {
    eUTRAN-CGI    EUTRAN-CGI,
    timeStayedInCell  INTEGER (0..4095) OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { { RecommendedCellsForPagingItem-ExtIEs } } OPTIONAL,
    ...
}

RecommendedCellsForPagingItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

RecommendedENBsForPaging ::= SEQUENCE {
    recommendedENBList   RecommendedENBList,
    iE-Extensions   ProtocolExtensionContainer { { RecommendedENBsForPaging-ExtIEs } } OPTIONAL,
    ...
}

RecommendedENBsForPaging-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

RecommendedENBList ::= SEQUENCE {SIZE(1.. maxnoofRecommendedENBs)} OF ProtocolIE-SingleContainer { { RecommendedENBItemIEs } }

RecommendedENBItemIEs S1AP-PROTOCOL-IES ::= {
    { ID id-RecommendedENBItem CRITICALITY ignore TYPE RecommendedENBItem PRESENCE mandatory },
    ...
}

RecommendedENBItem ::= SEQUENCE {
    mMEPagingTarget   MMEPagingTarget,
    iE-Extensions   ProtocolExtensionContainer { { RecommendedENBItem-ExtIEs } } OPTIONAL,
    ...
}

RecommendedENBItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

RelativeMMECapacity    ::= INTEGER (0..255)

RelayNode-Indicator ::= ENUMERATED {
    true,
    ...
}

RAC     ::= OCTET STRING (SIZE (1))

RAT-Type ::= ENUMERATED {
    nbiot,
ReportAmountMDT ::= ENUMERATED { r1, r2, r4, r8, r16, r32, r64, rinfinity }

ReportIntervalMDT ::= ENUMERATED { ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60 }

M1ReportingTrigger ::= ENUMERATED {
  periodic,
  a2eventtriggered,
  ...
  a2eventtriggered-periodic
}

RequestType ::= SEQUENCE {
  eventType     EventType,
  reportArea     ReportArea,
  iE-Extensions   ProtocolExtensionContainer { { RequestType-ExtIEs} } OPTIONAL,
  ...
}

RequestType-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

RIMTransfer ::= SEQUENCE {
  rIMInformation   RIMInformation,
  rIMRoutingAddress  RIMRoutingAddress  OPTIONAL,
  iE-Extensions   ProtocolExtensionContainer { { RIMTransfer-ExtIEs} } OPTIONAL,
  ...
}

RIMTransfer-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

RIMInformation ::= OCTET STRING

RIMRoutingAddress ::= CHOICE {
  gERAN-Cell-ID   GERAN-Cell-ID,
  ...
  targetRNC-ID   TargetRNC-ID,
  eHRPD-Sector-ID   OCTET STRING (SIZE(16))
}

ReportArea ::= ENUMERATED {
  ecgi,
  ...
}

RepetitionPeriod ::= INTEGER (0..4095)

RLFReportInformation ::= SEQUENCE {
uE-RLF-Report-Container,  
uE-RLF-Report-Container-for-extended-bands,  
iE-Extensions  
...  
}

RLFReportInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...  
}

RNC-ID ::= INTEGER (0..4095)

RRC-Container ::= OCTET STRING

RRC-Establishment-Cause ::= ENUMERATED {
  emergency,
  highPriorityAccess,
  mt-Access,
  mo-Signalling,
  mo-Data,
  ...,
  delay-TolerantAccess,
  mo-VoiceCall,
  mo-ExceptionData
}

ECGIListForRestart ::= SEQUENCE (SIZE{1..maxnoofCellsforRestart}) OF EUTRAN-CSI

Routing-ID ::= INTEGER (0..255)

-- S

SecurityKey ::= BIT STRING (SIZE(256))

SecurityContext ::= SEQUENCE {
  nextHopChainingCount  INTEGER (0..7),
  nextHopParameter  SecurityKey,
  iE-Extensions  ProtocolExtensionContainer { { SecurityContext-ExtIEs} } OPTIONAL,
  ...  
}

SecurityContext-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...  
}

SecondaryRATType ::= ENUMERATED {
  nR,
  ...,
  unlicensed
}
SecondaryRATDataUsageRequest ::= ENUMERATED {
  requested,
  ...
}

SecondaryRATDataUsageReportList ::= SEQUENCE (SIZE(1..maxnoofE-RABs)) OF ProtocolIE-SingleContainer { (SecondaryRATDataUsageReportItemIEs) }

SecondaryRATDataUsageReportItemIEs SIAP-PROTOCOL-IES ::= {
  { ID id-SecondaryRATDataUsageReportItem CRITICALITY ignore TYPE SecondaryRATDataUsageReportItem PRESENCE mandatory },
  ...
}

SecondaryRATDataUsageReportItem ::= SEQUENCE {
  e-RAB-ID            E-RAB-ID,
  secondaryRATType    SecondaryRATType,
  e-RABUsageReportList E-RABUsageReportList,
  iE-Extensions       ProtocolExtensionContainer { ( SecondaryRATDataUsageReportItem-ExtIEs) } OPTIONAL,
  ...
}

SecondaryRATDataUsageReportItem-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

SerialNumber ::= BIT STRING (SIZE (16))

ServiceType ::= ENUMERATED{
  qMC-for-streaming-service,
  qMC-for-MTSI-service,
  ...
}

SONInformation ::= CHOICE{
  sONInformationRequest  SONInformationRequest,
  sONInformationReply    SONInformationReply,
  ...,                   SONInformation-Extension  SONInformation-Extension
}

SONInformation-Extension ::= ProtocolIE-SingleContainer { ( SONInformation-ExtensionIE ) }

SONInformation-ExtensionIE SIAP-PROTOCOL-IES ::= {
  { ID id-SON-Information-Report CRITICALITY ignore TYPE SONInformationReport PRESENCE mandatory}
}

SONInformationRequest ::= ENUMERATED {
  x2TNL-Configuration-Info,
  ..., time-Synchronisation-Info,
  activate-Muting,
  deactivate-Muting}
SONInformationReply ::= SEQUENCE {
  x2TNLConfigurationInfo  X2TNLConfigurationInfo  OPTIONAL,
  iE-Extensions   ProtocolExtensionContainer { SONInformationReply-ExtIEs }  OPTIONAL,
  ... 
}

SONInformationReply-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for Release 9 to transfer Time synchronisation information --
  { ID id-Time-Synchronisation-Info  CRITICALITY ignore EXTENSION TimeSynchronisationInfo  PRESENCE optional},
  ...
  { ID id-Muting-Pattern-Information  CRITICALITY ignore EXTENSION MutingPatternInformation  PRESENCE optional}
}

SONInformationReport ::= CHOICE{
  rLFReportInformation  RLFReportInformation,
  ...
}

SONConfigurationTransfer ::= SEQUENCE {
  targeteNB-ID     TargeteNB-ID,
  sourceeNB-ID     SourceeNB-ID,
  sONInformation     SONInformation,
  iE-Extensions   ProtocolExtensionContainer { SONConfigurationTransfer-ExtIEs }  OPTIONAL,
  ...
}

SONConfigurationTransfer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for Release 10 to transfer the IP addresses of the eNB initiating the ANR action --
  { ID id-x2TNLConfigurationInfo  CRITICALITY ignore EXTENSION X2TNLConfigurationInfo  PRESENCE conditional
    -- This IE shall be present if the SON Information IE contains the SON Information Request IE and the SON Information Request IE is set to "X2TNL Configuration Info" --},
  -- Extension for Release 12 to transfer information concerning the source cell of synchronisation and the aggressor cell --
  { ID id-Synchronisation-Information CRITICALITY ignore EXTENSION SynchronisationInformation  PRESENCE conditional
    -- This IE shall be present if the SON Information IE contains the SON Information Request IE set to " Activate Muting " --},
  ...
}

SynchronisationInformation ::= SEQUENCE {
  sourceStratumLevel    StratumLevel    OPTIONAL,
  listeningSubframePattern  ListeningSubframePattern  OPTIONAL,
  aggressoreCGI-List    ECGI-List     OPTIONAL,
  iE-Extensions   ProtocolExtensionContainer { SynchronisationInformation-ExtIEs }  OPTIONAL,
  ...
}

SynchronisationInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

Source-ToTarget-TransparentContainer ::= OCTET STRING
-- This IE includes a transparent container from the source RAN node to the target RAN node.
-- The octets of the OCTET STRING are encoded according to the specifications of the target system.
SourceBSS-ToTargetBSS-TransparentContainer ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.

SourceeNB-ID ::= SEQUENCE {
global-ENB-ID Global-ENB-ID,
selected-TAI TAI,
iE-Extensions ProtocolExtensionContainer { {SourceeNB-ID-ExtIEs} } OPTIONAL
}

SourceeNB-ID-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
...
}

SRVCCOperationNotPossible ::= ENUMERATED {
  notPossible,
  ...
}

SRVCCOperationPossible ::= ENUMERATED {
  possible,
  ...
}

SRVCCHOIndication ::= ENUMERATED {
  pSandCS,
  cSonly,
  ...
}

SourceeNB-ToTargeteNB-TransparentContainer ::= SEQUENCE {
rRC-Container RRC-Container,
e-RABInformationList E-RABInformationList OPTIONAL,
targetCell-ID EUTRAN-CGI,
subscriberProfileIDforRFP SubscriberProfileIDforRFP OPTIONAL,
uE-HistoryInformation UE-HistoryInformation,
iE-Extensions ProtocolExtensionContainer { {SourceeNB-ToTargeteNB-TransparentContainer-ExtIEs} } OPTIONAL,
...
}

SourceeNB-ToTargeteNB-TransparentContainer-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
{ID id-MobilityInformation CRITICALITY ignore EXTENSION MobilityInformation PRESENCE optional}| 
{ID id-uE-HistoryInformationFromTheUE CRITICALITY ignore EXTENSION UE-HistoryInformationFromTheUE PRESENCE optional},
...
}

SourceRNC-ToTargetRNC-TransparentContainer ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.

SourceNgRanNode-ToTargetNgRanNode-TransparentContainer ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.

ServedGUMMEIs ::= SEQUENCE (SIZE (1..maxnoofRATs)) OF ServedGUMMEIsItem
ServedGUMMEIsItem ::= SEQUENCE {
  servedPLMNss ServedPLMNss,
  servedGroupIDs ServedGroupIDs,
  servedMMECs ServedMMECs,
  iE-Extensions ProtocolExtensionContainer { {ServedGUMMEIsItem-ExtIEs} } OPTIONAL,
  ...
}

ServedGUMMEIsItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

ServedGroupIDs ::= SEQUENCE (SIZE(1.. maxnoofGroupIDs)) OF MME-Group-ID
ServedMMECs ::= SEQUENCE (SIZE(1.. maxnoofMMECs)) OF MME-Code
ServedPLMNss ::= SEQUENCE (SIZE(1.. maxnoofPLMNssPerMME)) OF PLMNidentity

SubscriberProfileIDforRFP ::= INTEGER (1..256)

Subscription-Based-UE-DifferentiationInfo ::= SEQUENCE {
  periodicCommunicationIndicator ENUMERATED {periodically, ondemand, ...} OPTIONAL,
  periodicTime INTEGER (1..3600, ...) OPTIONAL,
  scheduledCommunicationTime ScheduledCommunicationTime OPTIONAL,
  stationaryIndication ENUMERATED {stationary, mobile, ...} OPTIONAL,
  trafficProfile ENUMERATED {single-packet, dual-packets, multiple-packets, ...} OPTIONAL,
  batteryIndication ENUMERATED {battery-powered, battery-powered-not-rechargeable-or-replaceable, not-battery-powered, ...} OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {Subscription-Based-UE-DifferentiationInfo-ExtIEs} } OPTIONAL,
  ...
}

Subscription-Based-UE-DifferentiationInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

ScheduledCommunicationTime ::= SEQUENCE {
  dayOfWeek BIT STRING (SIZE(7)) OPTIONAL,
  timeOfDayStart INTEGER (0..86399, ...) OPTIONAL,
  timeOfDayEnd INTEGER (0..86399, ...) OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {ScheduledCommunicationTime-ExtIEs}} OPTIONAL,
  ...
}

ScheduledCommunicationTime-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

SupportedTAs ::= SEQUENCE (SIZE(1.. maxnoofTACs)) OF SupportedTAs-Item

SupportedTAs-Item ::= SEQUENCE {
  tAC TAC,
  broadcastPLMNss BPLMNss,
  iE-Extensions ProtocolExtensionContainer { {SupportedTAs-Item-ExtIEs} } OPTIONAL,
  ...
}
...}

SupportedTAs-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for Release 13 to transfer RAT-Type per TAC --
  {id-RAT-Type  CRITICALITY reject  EXTENSION RAT-Type  PRESENCE optional},
  ...
}

StratumLevel ::= INTEGER (0..3, ...)

SynchronisationStatus ::= ENUMERATED { synchronous, asynchronous, ... }

TimeSynchronisationInfo ::= SEQUENCE {
  stratumLevel     StratumLevel,
  synchronisationStatus     SynchronisationStatus,
  iE-Extensions     ProtocolExtensionContainer { { TimeSynchronisationInfo-ExtIEs} } OPTIONAL,
  ...
}

TimeSynchronisationInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for Release 12 to transfer Muting Availability Indication --
  {id-Muting-Availability-Indication  CRITICALITY ignore  EXTENSION MutingAvailabilityIndication  PRESENCE optional},
  ...
}

S-TMSI ::= SEQUENCE {
  mMEC     MME-Code,
  m-TMSI    M-TMSI,
  iE-Extensions  ProtocolExtensionContainer { {S-TMSI-ExtIEs} } OPTIONAL,
  ...
}

S-TMSI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- T

TAC ::= OCTET STRING (SIZE (2))

TAIBasedMDT ::= SEQUENCE {
  tAIListforMDT   TAIListforMDT,
  iE-Extensions   ProtocolExtensionContainer { {TAIBasedMDT-ExtIEs} } OPTIONAL,
  ...
}

TAIBasedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

TAIListforMDT ::= SEQUENCE {SIZE(1..maxnoofTAforMDT)} OF TAI

TAIListforWarning ::= SEQUENCE {SIZE(1..maxnoofTAIforWarning)} OF TAI
TAI ::= SEQUENCE {
  plMNidentity  PLMNidentity,
  tAC      TAC,
  iE-Extensions ProtocolExtensionContainer { {TAI-ExtIEs} } OPTIONAL,
  ...
}

TAI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

TAI-Broadcast ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAI-Broadcast-Item

TAI-Broadcast-Item ::= SEQUENCE {
  tAI     TAI,
  completedCellinTAI CompletedCellinTAI,
  iE-Extensions ProtocolExtensionContainer { {TAI-Broadcast-Item-ExtIEs} } OPTIONAL,
  ...
}

TAI-Broadcast-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

TAI-Cancelled ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAI-Cancelled-Item

TAI-Cancelled-Item ::= SEQUENCE {
  tAI     TAI,
  cancelledCellinTAI CancelledCellinTAI,
  iE-Extensions ProtocolExtensionContainer { {TAI-Cancelled-Item-ExtIEs} } OPTIONAL,
  ...
}

TAI-Cancelled-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

TABasedMDT ::= SEQUENCE {
  tAListforMDT  TAListforMDT,
  iE-Extensions ProtocolExtensionContainer { {TABasedMDT-ExtIEs} } OPTIONAL,
  ...
}

TABasedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

TABasedQMC ::= SEQUENCE {
  tAListforQMC  TAListforQMC,
  iE-Extensions ProtocolExtensionContainer { {TABasedQMC-ExtIEs} } OPTIONAL,
  ...
TAIBasedQMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

TAIListforQMC ::= SEQUENCE (SIZE(1..maxnooftAforQMC)) OF TAC

TAIBasedQMC ::= SEQUENCE {
    tAIListforQMC    TAIListforQMC,
    IE-Extensions    ProtocolExtensionContainer { {TAIBasedQMC-ExtIEs} } OPTIONAL,
    ...
}

TAIBasedQMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

TAIListforQMC ::= SEQUENCE (SIZE(1..maxnooftAforQMC)) OF TAI

CompletedCellinTAI ::= SEQUENCE (SIZE(1..maxnooftCellinTAI)) OF CompletedCellinTAI-Item

CompletedCellinTAI-Item ::= SEQUENCE {
    eCGI    EUTRAN-CGI,
    IE-Extensions    ProtocolExtensionContainer { {CompletedCellinTAI-Item-ExtIEs} } OPTIONAL,
    ...
}

CompletedCellinTAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

TBCD-STRING ::= OCTET STRING (SIZE (3))

TargetID ::= CHOICE {
    targeteNB-ID    TargeteNB-ID,
    targetRNC-ID    TargetRNC-ID,
    cGI    CGI,
    ...
    targetgNgRanNode-ID    TargetNgRanNode-ID
}

TargeteNB-ID ::= SEQUENCE {
    global-ENB-ID    Global-ENB-ID,
    selected-TAI    TAI,
    IE-Extensions    ProtocolExtensionContainer { {TargeteNB-ID-ExtIEs} } OPTIONAL,
    ...
}

TargeteNB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

TargetRNC-ID ::= SEQUENCE {
    ...
}
TargetRNC-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}
NG-eNB ::= SEQUENCE {
    global-ng-eNB-ID  Global-ENB-ID,
    iE-Extensions  ProtocolExtensionContainer { { NG-eNB-ExtIEs} } OPTIONAL,
    ... 
}

NG-eNB-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

GNB-ID ::= BIT STRING (SIZE(22..32))

TargeteNB-ToSourceeNB-TransparentContainer ::= SEQUENCE {
    rRC-Container  RRC-Container,
    iE-Extensions  ProtocolExtensionContainer { {TargeteNB-ToSourceeNB-TransparentContainer-ExtIEs} } OPTIONAL,
    ... 
}

TargeteNB-ToSourceeNB-TransparentContainer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Target-ToSource-TransparentContainer ::= OCTET STRING
-- This IE includes a transparent container from the target RAN node to the source RAN node.
-- The octets of the OCTET STRING are coded according to the specifications of the target system.

TargetRNC-ToSourceRNC-TransparentContainer ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.

TargetBSS-ToSourceBSS-TransparentContainer ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.

TargetNgRanNode-ToSourceNgRanNode-TransparentContainer ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.

M1ThresholdEventA2 ::= SEQUENCE {
    measurementThreshold MeasurementThresholdA2,
    iE-Extensions  ProtocolExtensionContainer { { M1ThresholdEventA2-ExtIEs} } OPTIONAL,
    ... 
}

M1ThresholdEventA2-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

Threshold-RSRP ::= INTEGER(0..97)
Threshold-RSRQ ::= INTEGER(0..34)
TimeToWait ::= ENUMERATED {v1s, v2s, v5s, v10s, v20s, v60s, ...}
Time-UE-StayedInCell ::= INTEGER (0..4095)
Time-UE-StayedInCell-EnhancedGranularity ::= INTEGER (0..40950)

TransportInformation ::= SEQUENCE {
    transportLayerAddress  TransportLayerAddress,
    uL-GTP-TEID           GTP-TEID,
    ...
}

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

TraceActivation ::= SEQUENCE {
    e-UTRAN-Trace-ID       E-UTRAN-Trace-ID,
    interfacesToTrace     InterfacesToTrace,
    traceDepth            TraceDepth,
    traceCollectionEntityIPAddress  TransportLayerAddress,
    iE-Extensions         ProtocolExtensionContainer { { TraceActivation-ExtIEs} } OPTIONAL,
    ...
}

TraceActivation-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
    -- Extension for Rel-10 to support MDT --
    { ID id-MDTConfiguration CRITICALITY ignore EXTENSION MDT-Configuration PRESENCE optional }|
    -- Extension for Rel-15 to support QMC --
    { ID id-UEAppLayerMeasConfig CRITICALITY ignore EXTENSION UEAppLayerMeasConfig PRESENCE optional },
    ...
}

TraceDepth ::= ENUMERATED {
    minimum,
    medium,
    maximum,
    minimumWithoutVendorSpecificExtension,
    mediumWithoutVendorSpecificExtension,
    maximumWithoutVendorSpecificExtension,
    ...
}

E-UTRAN-Trace-ID ::= OCTET STRING (SIZE (8))

TrafficLoadReductionIndication ::= INTEGER (1..99)

TunnelInformation ::= SEQUENCE {
    transportLayerAddress  TransportLayerAddress,
    uDP-Port-Number       Port-Number OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {Tunnel-Information-ExtIEs} } OPTIONAL,
    ...
}

Tunnel-Information-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
    ...
}

TypeError ::= ENUMERATED {
    ...
}
TAIListForRestart ::= SEQUENCE {SIZE(1..maxnoofRestartTAIs)} OF TAI

-- U

UEAggregateMaximumBitrate ::= SEQUENCE {
  uEaggregateMaximumBitRateDL  BitRate,
  uEaggregateMaximumBitRateUL  BitRate,
  iE-Extensions  ProtocolExtensionContainer { {UEAggregate-MaximumBitrates-ExtIEs} } OPTIONAL,
  ...
}

UEAggregate-MaximumBitrates-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for maximum bitrate > 10G bps --
  { ID id-extended-uEaggregateMaximumBitRateDL  CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional},
  { ID id-extended-uEaggregateMaximumBitRateUL  CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional},
  ...
}

UEAppLayerMesConfig ::= SEQUENCE {
  containerForAppLayerMesConfig  OCTET STRING (SIZE(1..1000)),
  areaScopeOfQMC  AreaScopeOfQMC,
  iE-Extensions  ProtocolExtensionContainer { {UEAppLayerMesConfig-ExtIEs} } OPTIONAL,
  ...
}

UEAppLayerMesConfig-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  {ID id-serviceType CRITICALITY ignore EXTENSION ServiceType PRESENCE optional},
  ...
}

UECapabilityInfoRequest ::= ENUMERATED {
  requested,
  ...
}

UE-RetentionInformation ::= ENUMERATED {
  ues-retained,
  ...
}

UE-S1AP-IDs ::= CHOICE{
  uE-S1AP-ID-pair  UE-S1AP-ID-pair,
  mM-E-UE-S1AP-ID  mM-E-UE-S1AP-ID,
  ...
}

UE-S1AP-ID-pair ::= SEQUENCE{
  mM-E-UE-S1AP-ID  mM-E-UE-S1AP-ID,
  enB-UE-S1AP-ID  enB-UE-S1AP-ID,
  iE-Extensions  ProtocolExtensionContainer { {UE-S1AP-id-pair-ExtIEs} } OPTIONAL,
UE-associatedLogicalS1-ConnectionItem ::= SEQUENCE {
  mM-UE-S1AP-ID  MME-UE-S1AP-ID OPTIONAL,
  eNB-UE-S1AP-ID  ENB-UE-S1AP-ID OPTIONAL,
  iE-Extensions  ProtocolExtensionContainer { { UE-associatedLogicalS1-ConnectionItemExtIEs} } OPTIONAL,
  ...
}

UE-associatedLogicalS1-ConnectionItemExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

UEIdentityIndexValue ::= BIT STRING (SIZE (10))

UE-HistoryInformation ::= SEQUENCE (SIZE(1..maxnoofCellsinUEHistoryInfo)) OF LastVisitedCell-Item

UE-HistoryInformationFromTheUE ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the VisitedCellInfoList field contained in the UEInformationResponse message as defined in TS 36.331 [16]

UEPagingID ::= CHOICE {
  s-TMSI  S-TMSI,
  iMSI  IMSI,
  ...
}

UERadioCapability ::= OCTET STRING

UERadioCapabilityForPaging ::= OCTET STRING

UE-RLF-Report-Container ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the rlf-Report-r9 field contained in the UEInformationResponse message as defined in TS 36.331 [16]

UE-RLF-Report-Container-for-extended-bands ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the rlf-Report-v9e0 contained in the UEInformationResponse message as defined in TS 36.331 [16]

UESecurityCapabilities ::= SEQUENCE {
  encryptionAlgorithms  EncryptionAlgorithms,
  integrityProtectionAlgorithms  IntegrityProtectionAlgorithms,
  iE-Extensions  ProtocolExtensionContainer { { UESecurityCapabilities-ExtIEs} } OPTIONAL,
  ...
}

UESecurityCapabilities-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}
UESidelinkAggregateMaximumBitrate ::= SEQUENCE {
  uESidelinkAggregateMaximumBitRate  BitRate,
  iE-Extensions ProtocolExtensionContainer [ {UE-Sidelink-Aggregate-MaximumBitrates-ExtIEs} ] OPTIONAL,
  ...
}

UE-Sidelink-Aggregate-MaximumBitrates-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

UE-Usage-Type ::= INTEGER (0..255)

UL-CP-SecurityInformation ::= SEQUENCE {
  ul-NAS-MAC UL-NAS-MAC,
  ul-NAS-Count UL-NAS-Count,
  iE-Extensions ProtocolExtensionContainer [ { UL-CP-SecurityInformation-ExtIEs} ] OPTIONAL,
  ...
}

UL-CP-SecurityInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

UL-NAS-MAC ::= BIT STRING (SIZE (16))

UL-NAS-Count ::= BIT STRING (SIZE (5))

UnlicensedSpectrumRestriction ::= ENUMERATED {
  unlicensed-restricted,
  ...
}

UserLocationInformation ::= SEQUENCE {
  eutran-cgi EUTRAN-CGI,
  tai TAI,
  iE-Extensions ProtocolExtensionContainer [ { UserLocationInformation-ExtIEs} ] OPTIONAL,
  ...
}

UserLocationInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  { ID id-PCellInformation CRITICALITY ignore EXTENSION PCellInformation PRESENCE optional},
  ...
}

UEUserPlaneCIoTSupportIndicator ::= ENUMERATED {
  supported,
  ...
}

UE-Application-Layer-Measurement-Capability ::= BIT STRING (SIZE (8))
-- First bit: QoE Measurement for streaming service
-- Second bit: QoE Measurement for MTSI service

-- Note that undefined bits are considered as a spare bit and spare bits shall be set to 0 by the transmitter and shall be ignored by the receiver.

-- V

VoiceSupportMatchIndicator ::= ENUMERATED {
  supported,
  not-supported,
  ...
}

V2XServicesAuthorized ::= SEQUENCE {
  vehicleUE   VehicleUE           OPTIONAL,
  pedestrianUE   PedestrianUE      OPTIONAL,
  iE-Extensions  ProtocolExtensionContainer { {V2XServicesAuthorized-ExtIEs} } OPTIONAL,
  ...
}

V2XServicesAuthorized-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

VehicleUE ::= ENUMERATED {
  authorized,
  not-authorized,
  ...
}

PedestrianUE ::= ENUMERATED {
  authorized,
  not-authorized,
  ...
}

-- W

WarningAreaCoordinates ::= OCTET STRING (SIZE(1..1024))

WarningAreaList ::= CHOICE {
  cellIDList    ECGIList,
  trackingAreaListforWarning  TAILListforWarning,
  emergencyAreaIDList    EmergencyAreaIDList,
  ...
}

WarningType ::= OCTET STRING (SIZE (2))

WarningSecurityInfo ::= OCTET STRING (SIZE (50))

WarningMessageContents ::= OCTET STRING (SIZE(1..9600))
WLANMeasurementConfiguration ::= SEQUENCE {
  wlanMeasConfig WLANMeasConfig,
  wlanMeasConfigNameList WLANMeasConfigNameList OPTIONAL,
  wlan-rssi ENUMERATED {true, ...} OPTIONAL,
  wlan-rtt ENUMERATED {true, ...} OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { WLANMeasurementConfiguration-ExtIEs } } OPTIONAL,
  ... }

WLANMeasurementConfiguration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... }

WLANMeasConfigNameList ::= SEQUENCE {SIZE(1..maxnoofWLANName)} OF WLANName

WLANMeasConfig ::= ENUMERATED {setup, ...}

WLANName ::= OCTET STRING {SIZE (1..32)}

-- X

X2TNLConfigurationInfo ::= SEQUENCE {
  eNBX2TransportLayerAddresses ENBX2TLAs,
  iE-Extensions ProtocolExtensionContainer { { X2TNLConfigurationInfo-ExtIEs } } OPTIONAL,
  ... }

X2TNLConfigurationInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... }

-- Extension for Release 10 to transfer the IPsec and U-plane addresses during ANR action --
-- {ID id-eNBX2ExtendedTransportLayerAddresses CRITICALITY ignore EXTENSION ENBX2ExtTLAs PRESENCE optional},
-- Extension for Release 12 to transfer the IP addresses of the X2 GW --
-- {ID id-eNBIndirectX2TransportLayerAddresses CRITICALITY ignore EXTENSION ENBIndirectX2TransportLayerAddresses PRESENCE optional},
...

ENBX2ExtTLAs ::= SEQUENCE {SIZE(1.. maxnoofeNBX2ExtTLAs)} OF ENBX2ExtTLA

ENBX2ExtTLA ::= SEQUENCE {
  ipAddress TransportLayerAddress OPTIONAL,
  gTPTLA ENBX2GTPTLAs OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { ENBX2ExtTLA-ExtIEs } } OPTIONAL,
  ... }

ENBX2ExtTLA-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... }

ENBX2GTPTLAs ::= SEQUENCE {SIZE(1.. maxnoofeNBX2GTPTLAs)} OF TransportLayerAddress

ENBIndirectX2TransportLayerAddresses ::= SEQUENCE {SIZE(1..maxnoofeNBX2TLAs)} OF TransportLayerAddress
9.3.5 Common Definitions

-- ******************************************************************
-- Common definitions
-- ******************************************************************

S1AP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-CommonDataTypes (3)
}

DEFINITIONS AUTOMATIC TAGS ::= BEGIN

Criticality ::= ENUMERATED { reject, ignore, notify }
Presence ::= ENUMERATED { optional, conditional, mandatory }

PrivateIE-ID ::= CHOICE {
local INTEGER (0..65535),
global OBJECT IDENTIFIER
}
ProcedureCode ::= INTEGER (0..255)
ProtocolExtensionID ::= INTEGER (0..65535)
ProtocolIE-ID ::= INTEGER (0..65535)
TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome }

END

9.3.6 Constant Definitions

-- ******************************************************************
-- Constant definitions
-- ******************************************************************

S1AP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-Constants (4)
}

DEFINITIONS AUTOMATIC TAGS ::= BEGIN

END

-- ******************************************************************
IMPORTS ProcedureCode, ProtocolIE-ID FROM S1AP-CommonDataTypes;

id-HandoverPreparation ProcedureCode ::= 0
id-HandoverResourceAllocation ProcedureCode ::= 1
id-HandoverNotification ProcedureCode ::= 2
id-PathSwitchRequest ProcedureCode ::= 3
id-HandoverCancel ProcedureCode ::= 4
id-E-RABSetup ProcedureCode ::= 5
id-E-RABModify ProcedureCode ::= 6
id-E-RABRelease ProcedureCode ::= 7
id-E-RABReleaseIndication ProcedureCode ::= 8
id-InitialContextSetup ProcedureCode ::= 9
id-Paging ProcedureCode ::= 10
id-downlinkNASTransport ProcedureCode ::= 11
id-initialUEMessage ProcedureCode ::= 12
id-uplinkNASTransport ProcedureCode ::= 13
id-Reset ProcedureCode ::= 14
id-ErrorIndication ProcedureCode ::= 15
id-NASNonDeliveryIndication ProcedureCode ::= 16
id-S1Setup ProcedureCode ::= 17
id-UEContextReleaseRequest ProcedureCode ::= 18
id-DowlinkS1cdma2000tunnelling ProcedureCode ::= 19
id-UplinkS1cdma2000tunnelling ProcedureCode ::= 20
id-UEContextModication ProcedureCode ::= 21
id-UECapabilityInfoIndication ProcedureCode ::= 22
id-UEContextRelease ProcedureCode ::= 23
id-eNBStatusTransfer ProcedureCode ::= 24
id-MMEStatusTransfer ProcedureCode ::= 25
id-DeactivateTrace ProcedureCode ::= 26
id-TraceStart ProcedureCode ::= 27
id-TraceFailureIndication ProcedureCode ::= 28
id-ENBConfigurationUpdate ProcedureCode ::= 29
id-MMEConfigurationUpdate ProcedureCode ::= 30
id-LocationReportingControl ProcedureCode ::= 31
id-LocationReportingFailureIndication ProcedureCode ::= 32
id-LocationReport ProcedureCode ::= 33
id-OverloadStart ProcedureCode ::= 34
id-OverloadStop ProcedureCode ::= 35
id-WriteReplaceWarning ProcedureCode ::= 36
id-eNBDirectInformationTransfer ProcedureCode ::= 37
id-MMEDirectInformationTransfer ProcedureCode ::= 38
id-PrivateMessage ProcedureCode ::= 39
id-eNBConfigurationTransfer ProcedureCode ::= 40
id-MMEConfigurationTransfer ProcedureCode ::= 41
id-CellTrafficTrace ProcedureCode ::= 42
id-Kill ProcedureCode ::= 43
id-downlinkUEAssociatedLPPaTransport ProcedureCode ::= 44
id-uplinkUEAssociatedLPPaTransport ProcedureCode ::= 45
id-downlinkNonUEAssociatedLPPaTransport ProcedureCode ::= 46
id-uplinkNonUEAssociatedLPPaTransport ProcedureCode ::= 47
id-UERadioCapabilityMatch ProcedureCode ::= 48
id-PWSRestartIndication ProcedureCode ::= 49
id-E-RABModificationIndication ProcedureCode ::= 50
id-PWSFailureIndication ProcedureCode ::= 51
id-RerouteNASRequest ProcedureCode ::= 52
id-UEContextModificationIndication ProcedureCode ::= 53
id-ConnectionEstablishmentIndication ProcedureCode ::= 54
id-UEContextSuspend ProcedureCode ::= 55
id-UEContextResume ProcedureCode ::= 56
id-NASDeliveryIndication ProcedureCode ::= 57
id-RetrieveUEInformation ProcedureCode ::= 58
id-UEInformationTransfer ProcedureCode ::= 59
id-eNBCPRelocationIndication ProcedureCode ::= 60
id-MMECPRelocationIndication ProcedureCode ::= 61
id-SecondaryRATDataUsageReport ProcedureCode ::= 62

-- ************************************************************
-- Extension constants
-- ************************************************************

maxPrivateIEs INTEGER ::= 65535
maxProtocolExtensions INTEGER ::= 65535
maxProtocolIEs INTEGER ::= 65535

-- ************************************************************
-- Lists
-- ************************************************************

maxnoofCSGs INTEGER ::= 256
maxnoofE-RABs INTEGER ::= 256
maxnoofTAIs INTEGER ::= 256
maxnoofTACs INTEGER ::= 256
maxnoofErrors INTEGER ::= 256
maxnoofPLMN INTEGER ::= 6
maxnoofPLMNPerMME INTEGER ::= 15
maxnoofForbLACs INTEGER ::= 4096
maxnoofForbTACs INTEGER ::= 4096
maxnoofIndividualS1ConnectionsToReset INTEGER ::= 256
maxnoofCellsinUEHistoryInfo INTEGER ::= 16
maxnoofCellsineNB INTEGER ::= 256
maxnoofTAlforWarning INTEGER ::= 65535
maxnoofCellID INTEGER ::= 65535
maxnoofDCNs INTEGER ::= 32
maxnoofEmergencyAreaID INTEGER ::= 65535
maxnoofCellinTAI INTEGER ::= 65535
maxnoofCellinEAI INTEGER ::= 65535
maxnoofTAIforWarning INTEGER ::= 65535
maxnoofCellID INTEGER ::= 65535
maxnoofeNBX2TLAs INTEGER ::= 2
maxnoofeNBX2ExtTLAs INTEGER ::= 16
maxnoofeNBX2GTPTLAs INTEGER ::= 16
maxnoofRATs INTEGER ::= 8
maxnoofGroupIDs INTEGER ::= 65535
maxnoofMMECs INTEGER ::= 256
maxnoofCellIDforMDT INTEGER ::= 32
maxnoofTAfMODM INTEGER ::= 8
maxnoofMDTPLMNs INTEGER ::= 16
maxnoofCellsforRestart INTEGER ::= 256
maxnoofRestartTAIs INTEGER ::= 2048
maxnoofRestartEmergencyAreaIDs INTEGER ::= 256
maxEARPCN INTEGER ::= 262143
maxnoofMBSFNAreaMDT INTEGER ::= 8
maxnoofRecommendedCells INTEGER ::= 16
maxnoofRecommendedENBs INTEGER ::= 16
maxnoftimeperiods INTEGER ::= 2
maxnoofCellIDforQMC INTEGER ::= 32
maxnoofTAfQMC INTEGER ::= 8
maxnoofPLMNforQMC INTEGER ::= 16
maxnoofBluetoothName INTEGER ::= 4
maxnoofWLANName INTEGER ::= 4
maxnoofConnectedengNBs INTEGER ::= 256

-- ******************************************************
-- IEs
-- ******************************************************

id-MME-UE-S1AP-ID ProtocolIE-ID ::= 0
id-HandoverType ProtocolIE-ID ::= 1
id-Cause ProtocolIE-ID ::= 2
id-SourceID ProtocolIE-ID ::= 3
id-TargetID ProtocolIE-ID ::= 4
id-eNB-UE-S1AP-ID ProtocolIE-ID ::= 8
id-E-RABSubjecttoDataForwardingList ProtocolIE-ID ::= 12
id-E-RABToReleaseListHOCmd ProtocolIE-ID ::= 13
id-E-RABDataForwardingItem ProtocolIE-ID ::= 14
id-E-RABReleaseItemBearerRelComp ProtocolIE-ID ::= 15
id-E-RABToBeSetupListBearerSUReq ProtocolIE-ID ::= 16
id-E-RABToBeSetupItemBearerSUReq ProtocolIE-ID ::= 17
id-E-RABAdmittedList ProtocolIE-ID ::= 18
id-E-RABFailedToSetupListHOReqAck ProtocolIE-ID ::= 19
id-E-RABAdmittedItem ProtocolIE-ID ::= 20
id-E-RABFailedToSetupItemHOReqAck ProtocolIE-ID ::= 21
id-E-RABToBeSwitchedDLList ProtocolIE-ID ::= 22
id-E-RABToBeSwitchedDListItem ProtocolIE-ID ::= 23
id-E-RABToBeSetupListCtxtSUReq ProtocolIE-ID ::= 24
id-TraceActivation ProtocolIE-ID ::= 25
id-NAS-PDU ProtocolIE-ID ::= 26
id-E-RABFailedToSetupItemHOReq ProtocolIE-ID ::= 27
id-E-RABSetupListBearerSURes ProtocolIE-ID ::= 28
id-E-RABFailedToSetupListBearerSURes ProtocolIE-ID ::= 29
id-E-RABToBeModifiedListBearerModReq ProtocolIE-ID ::= 30
id-E-RABModifyListBearerModRes ProtocolIE-ID ::= 31
id-E-RABFailedToModifyList ProtocolIE-ID ::= 32
id-E-RABFailedToReleaseList ProtocolIE-ID ::= 33
id-E-RABItem ProtocolIE-ID ::= 34
id-E-RABFailedToModifiedItemBearerModReq ProtocolIE-ID ::= 35
id-E-RABModifyItemBearerModRes ProtocolIE-ID ::= 36
id-E-RABReleaseItem ProtocolIE-ID ::= 37
id-E-RABSetupItemBearerSURes ProtocolIE-ID ::= 38
id-SecurityContext ProtocolIE-ID ::= 40
id-HandoverRestrictionList ProtocolIE-ID ::= 41
id-UEPagingID ProtocolIE-ID ::= 43
id-pagingDRX ProtocolIE-ID ::= 44
id-TAIlst ProtocolIE-ID ::= 46
id-TAIItem ProtocolIE-ID ::= 47
id-E-RABFailedToSetupListCtxtSURes ProtocolIE-ID ::= 48
id-E-RABReleaseItemHOCmd ProtocolIE-ID ::= 49
id-E-RABSetupItemCtxtSURes ProtocolIE-ID ::= 50
id-E-RABSetupListCtxtSURes ProtocolIE-ID ::= 51
id-E-RABToBeSetupItemCtxtSUReq ProtocolIE-ID ::= 52
id-E-RABToBeSetupListHOReq ProtocolIE-ID ::= 53
id-GERANtoLTEHOInformationRes ProtocolIE-ID ::= 55
id-UTRANtoLTEHOInformationRes ProtocolIE-ID ::= 57
id-CriticalityDiagnostics ProtocolIE-ID ::= 58
id-Global-ENB-ID ProtocolIE-ID ::= 59
id-eNBname ProtocolIE-ID ::= 60
id-MMEname ProtocolIE-ID ::= 61
id-ServedPLMNs ProtocolIE-ID ::= 63
id-SupportedTAs ProtocolIE-ID ::= 64
id-TimeToWait ProtocolIE-ID ::= 65
id-uEaggregateMaximumBitrate ProtocolIE-ID ::= 66
id-TAI ProtocolIE-ID ::= 67
id-E-RABReleaseListBearerRelComp ProtocolIE-ID ::= 69
id-cdma2000PDU ProtocolIE-ID ::= 70
id-cdma2000RATType ProtocolIE-ID ::= 71
id-cdma2000SectorID ProtocolIE-ID ::= 72
id-SecurityKey ProtocolIE-ID ::= 73
id-UERadioCapability ProtocolIE-ID ::= 74
id-GUMMEI-ID ProtocolIE-ID ::= 75
id-E-RABInformationListItem ProtocolIE-ID ::= 78
id-Direct-Forwarding-Path-Availability ProtocolIE-ID ::= 79
id-UEIdentityIndexValue ProtocolIE-ID ::= 80
id-cdma2000HOStatus
id-cdma2000HORequiredIndication
id-E-UTRAN-Trace-ID
id-RelativeMMECapacity
id-SourceMME-UE-S1AP-ID
id-Bearers-SubjectToStatusTransfer-Item
id-eNB-StatusTransfer-TransparentContainer
id-UE-associatedLogicalS1-ConnectionItem
id-ResetType
id-UE-associatedLogicalS1-ConnectionListResAck
id-E-RA BToswitchedULItem
id-E-RA BToswitchedULList
id-S-TMSI
id-cdma2000OneXRAND
id-RequestType
id-UE-S1AP-IDs
id-EUTRAN-CSI
id-OverloadResponse
id-cdma2000OneXSRVCCInfo
id-E-RA BFailedToBeReleasedList
id-Source-ToTarget-TransparentContainer
id-ServedGUMMELs
id-SubscriberProfileIDforRFP
id-UESecurityCapabilities
id-CSFallbackIndicator
id-CNDomain
id-E-RA BReleasedList
id-MessageIdentifier
id-SerialNumber
id-WarningAreaList
id-RepetitionPeriod
id-NumberofBroadcastRequest
id-WarningType
id-WarningSecurityInfo
id-DataCodingScheme
id-WarningMessageContents
id-BroadcastCompletedAreaList
id-Inter-SystemInformationTransferTypeEDT
id-Inter-SystemInformationTransferTypeMDT
id-Target-ToSource-TransparentContainer
id-SRVCCOperationPossible
id-SRVCCOIndication
id-NAS-DownlinkCount
id-CSG-Id
id-CSG-IdList
id-SonConfigurationTransferECT
id-SonConfigurationTransferMCT
id-TraceCollectionEntityIPAddress
id-MSClassmark2
id-MSClassmark3
id-RRC-Establishment-Cause
id-NASSecurityParametersfromE-UTRAN
id-NASSecurityParameterstoE-UTRAN
id-DefaultPagingDRX
id-Source-ToTarget-TransparentContainer-Secondary ProtocolIE-ID ::= 138
id-Target-ToSource-TransparentContainer-Secondary ProtocolIE-ID ::= 139
id-EUTRANRoundTripDelayEstimationInfo ProtocolIE-ID ::= 140
id-BroadcastCancelledAreaList ProtocolIE-ID ::= 141
id-ConcurrentWarningMessageIndicator ProtocolIE-ID ::= 142
id-Data-Forwarding-Not-Possible ProtocolIE-ID ::= 143
id-ExtendedRepetitionPeriod ProtocolIE-ID ::= 144
id-CellAccessMode ProtocolIE-ID ::= 145
id-CSGMembershipStatus ProtocolIE-ID ::= 146
id-LPPa-PDU ProtocolIE-ID ::= 147
id-Routing-ID ProtocolIE-ID ::= 148
id-Time-Synchronisation-Info ProtocolIE-ID ::= 149
id-P5-ServiceNotAvailable ProtocolIE-ID ::= 150
id-PagingPriority ProtocolIE-ID ::= 151
id-x2TNLConfigurationInfo ProtocolIE-ID ::= 152
id-eNBX2EExtendedTransportLayerAddresses ProtocolIE-ID ::= 153
id-GUMMEIList ProtocolIE-ID ::= 154
id-GW-TransportLayerAddress ProtocolIE-ID ::= 155
id-Correlation-ID ProtocolIE-ID ::= 156
id-SourceMME-GUMMEI ProtocolIE-ID ::= 157
id-MME-UE-S1AP-ID-Z ProtocolIE-ID ::= 158
id-RegisteredLAI ProtocolIE-ID ::= 159
id-RelayNode-Indicator ProtocolIE-ID ::= 160
id-TrafficLoadReductionIndication ProtocolIE-ID ::= 161
id-MDTConfiguration ProtocolIE-ID ::= 162
id-MMERelaySupportIndicator ProtocolIE-ID ::= 163
id-GWContextReleaseIndication ProtocolIE-ID ::= 164
id-ManagementBasedMDTAllowed ProtocolIE-ID ::= 165
id-PrivacyIndicator ProtocolIE-ID ::= 166
id-Time-UE-StayedInCell-EnhancedGranularity ProtocolIE-ID ::= 167
id-HO-Cause ProtocolIE-ID ::= 168
id-VoiceSupportMatchIndicator ProtocolIE-ID ::= 169
id-GUMMEIType ProtocolIE-ID ::= 170
id-M3Configuration ProtocolIE-ID ::= 171
id-M4Configuration ProtocolIE-ID ::= 172
id-M5Configuration ProtocolIE-ID ::= 173
id-MDT-Location-Info ProtocolIE-ID ::= 174
id-MobilityInformation ProtocolIE-ID ::= 175
id-Tunnel-Information-for-BBF ProtocolIE-ID ::= 176
id-ManagementBasedMDTPLMNList ProtocolIE-ID ::= 177
id-SignallingBasedMDTPLMNList ProtocolIE-ID ::= 178
id-UICOUNTValueExtended ProtocolIE-ID ::= 179
id-DLCOUNTValueExtended ProtocolIE-ID ::= 180
id-ReceiveStatusOfULPDPCSDUsExtended ProtocolIE-ID ::= 181
id-ECGIListForRestart ProtocolIE-ID ::= 182
id-SIPTO-L-GW-TransportLayerAddress ProtocolIE-ID ::= 183
id-TransportInformation ProtocolIE-ID ::= 184
id-LHN-ID ProtocolIE-ID ::= 185
id-AdditionalCSFallbackIndicator ProtocolIE-ID ::= 186
id-TAILListForRestart ProtocolIE-ID ::= 187
id-UserLocationInformation ProtocolIE-ID ::= 188
id-EmergencyArea1DLListForRestart ProtocolIE-ID ::= 189
id-KillAllWarningMessages ProtocolIE-ID ::= 190
id-Masked-IMEISV ProtocolIE-ID ::= 192
id-eNBIndirectX2TransportLayerAddresses ProtocolIE-ID ::= 193
id-uE-HistoryInformationFromTheUE ProtocolIE-ID ::= 194
id-ProSeAuthorized ProtocolIE-ID ::= 195
id-ExpectedUE Behaviour ProtocolIE-ID ::= 196
id-LoggedMBSFNMDT ProtocolIE-ID ::= 197
id-UERadioCapabilityForPaging ProtocolIE-ID ::= 198
id-eNBRadioBearerToBeModifiedListBearerModInd ProtocolIE-ID ::= 199
id-E-RABToBeModifiedItemBearerModInd ProtocolIE-ID ::= 200
id-E-RABNotToBeModifiedListBearerModInd ProtocolIE-ID ::= 201
id-E-RABNotToBeModifiedItemBearerModInd ProtocolIE-ID ::= 202
id-E-RABModifyListBearerModConf ProtocolIE-ID ::= 203
id-E-RABModifyItemBearerModConf ProtocolIE-ID ::= 204
id-E-RABFailedToModifyListBearerModConf ProtocolIE-ID ::= 205
id-SON-Information-Report ProtocolIE-ID ::= 206
id-Muting-Availability-Indication ProtocolIE-ID ::= 207
id-Muting-Pattern-Information ProtocolIE-ID ::= 208
id-Synchronisation-Information ProtocolIE-ID ::= 209
id-E-RABToBeReleasedListBearerModConf ProtocolIE-ID ::= 210
id-AssistanceDataForPaging ProtocolIE-ID ::= 211
id-CellIdentifierAndCELevelForCECapableUEs ProtocolIE-ID ::= 212
id-InformationOnRecommendedCellsAndENBsForPaging ProtocolIE-ID ::= 213
id-RecommendedCellItem ProtocolIE-ID ::= 214
id-RecommendedENBItem ProtocolIE-ID ::= 215
id-ProSeUetcNetworkRelaying ProtocolIE-ID ::= 216
id-ULCOUNTValuePDCP-SNlength18 ProtocolIE-ID ::= 217
id-DLCOUNTValuePDCP-SNlength18 ProtocolIE-ID ::= 218
id-ReceiveStatusOfULPDPSDUsPDCP-SNlength18 ProtocolIE-ID ::= 219
id-M6Configuration ProtocolIE-ID ::= 220
id-M7Configuration ProtocolIE-ID ::= 221
id-PNSfailedECGIList ProtocolIE-ID ::= 222
id-MME-Group-ID ProtocolIE-ID ::= 223
id-Additional-GUTI ProtocolIE-ID ::= 224
id-S1-Message ProtocolIE-ID ::= 225
id-CSGMembershipInfo ProtocolIE-ID ::= 226
id-Paging-eDRXInformation ProtocolIE-ID ::= 227
id-UE-RetentionInformation ProtocolIE-ID ::= 228
id-UE-Usage-Type ProtocolIE-ID ::= 229
id-extended-UEIdentityIndexValue ProtocolIE-ID ::= 230
id-RAT-Type ProtocolIE-ID ::= 231
id-BearerType ProtocolIE-ID ::= 232
id-NB-IoT-DefaultPagingDRX ProtocolIE-ID ::= 233
id-E-RABFailedToResumeListResumeReq ProtocolIE-ID ::= 234
id-E-RABFailedToResumeItemResumeReq ProtocolIE-ID ::= 235
id-E-RABFailedToResumeListResumeRes ProtocolIE-ID ::= 236
id-E-RABFailedToResumeItemResumeRes ProtocolIE-ID ::= 237
id-NB-IoT-Paging-eDRXInformation ProtocolIE-ID ::= 238
id-V2XServicesAuthorized ProtocolIE-ID ::= 239
id-UEUserPlaneCIoTSupportIndicator ProtocolIE-ID ::= 240
id-CE-mode-B-SupportIndicator ProtocolIE-ID ::= 241
id-SRvCCOperationNotPossible ProtocolIE-ID ::= 242
id-NB-IoT-UEIdentityIndexValue ProtocolIE-ID ::= 243
id-DCN-ID ProtocolIE-ID ::= 244
9.3.7 Container Definitions

END
-- Container definitions
-- ******************************************************************************
S1AP-Containers {
    itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
    eps-Access (21) modules (3) sla (1) version1 (1) sla-Containers (5) }
DEFINITIONS AUTOMATIC TAGS ::= BEGIN
-- ******************************************************************************
-- IE parameter types from other modules.
-- ******************************************************************************
IMPORTS
   Criticality,
   Presence,
   PrivateIE-ID,
   ProtocolExtensionID,
   ProtocolIE-ID
FROM S1AP-CommonDataTypes
   maxPrivateIEs,
   maxProtocolExtensions,
   maxProtocolIEs
FROM S1AP-Constants;
-- ******************************************************************************
-- Class Definition for Protocol IEs
-- ******************************************************************************
S1AP-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 IEs
S1AP-PROTOCOL-IES-PAIR ::= CLASS {
    &id ProtocolIE-ID UNIQUE,
    &firstCriticality Criticality,
    &FirstValue,
    &secondCriticality Criticality,
    &SecondValue,
    &presence Presence
}
WITH SYNTAX {
    ID &id
    FIRST CRITICALITY &firstCriticality
    FIRST TYPE    &FirstValue
    SECOND CRITICALITY &secondCriticality
    SECOND TYPE    &SecondValue
    PRESENCE    &presence
}

S1AP-PROTOCOL-EXTENSION ::= CLASS {
    &id ProtocolExtensionID UNIQUE,
    &criticality Criticality,
    &Extension,
    &presence Presence
}
WITH SYNTAX {
    ID &id
    CRITICALITY &criticality
    EXTENSION &Extension
    PRESENCE &presence
}

S1AP-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 (S1AP-PROTOCOL-IES : IEsSetParam) ::= SEQUENCE (SIZE (0..maxProtocolIEs)) OF ProtocolIE-Field ({}IesSetParam)

ProtocolIE-SingleContainer (S1AP-PROTOCOL-IES : IEsSetParam) ::= ProtocolIE-Field ({}IesSetParam)

ProtocolIE-Field (S1AP-PROTOCOL-IES : IEsSetParam) ::= SEQUENCE {
  id       S1AP-PROTOCOL-IES.&id    ({}IesSetParam),
  criticality S1AP-PROTOCOL-IES.&criticality  ({}IesSetParam){@id}),
  value    S1AP-PROTOCOL-IES.&Value   ({}IesSetParam){@id})
}

-- *****************************************************
-- Container for Protocol IE Pairs
-- *****************************************************

ProtocolIE-ContainerPair (S1AP-PROTOCOL-IES-PAIR : IEsSetParam) ::= SEQUENCE (SIZE (0..maxProtocolIEs)) OF ProtocolIE-FieldPair ({}IesSetParam)

ProtocolIE-FieldPair (S1AP-PROTOCOL-IES-PAIR : IEsSetParam) ::= SEQUENCE {
  id     S1AP-PROTOCOL-IES-PAIR.&id     ({}IesSetParam),
  firstCriticality S1AP-PROTOCOL-IES-PAIR.&firstCriticality ({}IesSetParam){@id}),
  firstValue   S1AP-PROTOCOL-IES-PAIR.&firstValue   ({}IesSetParam){@id}),
  secondCriticality S1AP-PROTOCOL-IES-PAIR.&secondCriticality ({}IesSetParam){@id}),
  secondValue   S1AP-PROTOCOL-IES-PAIR.&secondValue   ({}IesSetParam){@id})
}

-- *****************************************************
-- Container Lists for Protocol IE Containers
-- *****************************************************


--  *****************************************************************************
--  -- Container for Protocol Extensions
--  --  *****************************************************************************

ProtocolExtensionContainer {S1AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=  
SEQUENCE (SIZE (1..maxProtocolExtensions)) OF  
ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {S1AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {  
  id     S1AP-PROTOCOL-EXTENSION.&id    ({ExtensionSetParam}),  
  criticality   S1AP-PROTOCOL-EXTENSION.&criticality  ({ExtensionSetParam}{@id}),  
  extensionValue  S1AP-PROTOCOL-EXTENSION.&Extension  ({ExtensionSetParam}{@id})
  }

--  *****************************************************************************
--  -- Container for Private IEs
--  --  *****************************************************************************

PrivateIE-Container {S1AP-PRIVATE-IES : IEsSetParam } ::=  
SEQUENCE (SIZE (1.. maxPrivateIEs)) OF  
PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {S1AP-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {  
  id     S1AP-PRIVATE-IES.&id    ({IEsSetParam}),  
  criticality   S1AP-PRIVATE-IES.&criticality  ({IEsSetParam}{@id}),  
  value    S1AP-PRIVATE-IES.&Value    ({IEsSetParam}{@id})
  }

END
9.4 Message Transfer Syntax

S1AP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ITU-T Rec. X.691 [4].

9.5 Timers

TS1\_RELOC\_prep
- Specifies the maximum time for the Handover Preparation procedure in the source eNB.

TS1\_RELOC\_overall
- Specifies the maximum time for the protection of the overall handover procedure in the source eNB.

TX2\_RELOC\_overall
- it is specified in reference TS 36.423 [22].
10 Handling of Unknown, Unforeseen and Erroneous Protocol Data

10.1 General

Protocol Error cases can be divided into three classes:

- Transfer Syntax Error.
- Abstract Syntax Error.
- Logical Error.

Protocol errors can occur in the following functions within a receiving node:

10.2 Transfer Syntax Error

A Transfer Syntax Error occurs when the receiver is not able to decode the received physical message. Transfer syntax errors are always detected in the process of ASN.1 decoding. If a Transfer Syntax Error occurs, the receiver should initiate Error Indication procedure with appropriate cause value for the Transfer Syntax protocol error.

Examples for Transfer Syntax Errors are:

- Violation of value ranges in ASN.1 definition of messages. E.g., if an IE has a defined value range of 0 to 10 (ASN.1: INTEGER (0..10)), and 12 will be received, then this will be treated as a transfer syntax error.
- Violation in list element constraints. E.g., if a list is defined as containing 1 to 10 elements, and 12 elements will be received, then this case will be handled as a transfer syntax error.
- Missing mandatory elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).
- Wrong order of elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).

10.3 Abstract Syntax Error

10.3.1 General

An Abstract Syntax Error occurs when the receiving functional S1AP entity:

1. receives IEs or IE groups that cannot be understood (unknown IE ID);
2. receives IEs for which the logical range is violated (e.g., ASN.1 definition: 0 to 15, the logical range is 0 to 10, while values 11 to 15 are undefined), and 12 will be received; this case will be handled as an abstract syntax error using criticality information sent by the originator of the message);

3. does not receive IEs or IE groups but according to the specified presence of the concerning object, the IEs or IE groups should have been present in the received message.

4. receives IEs or IE groups that are defined to be part of that message in wrong order or with too many occurrences of the same IE or IE group;

5. receives IEs or IE groups but according to the conditional presence of the concerning object and the specified condition, the IEs or IE groups should not have been present in the received message.

Cases 1 and 2 (not comprehended IE/IE group) are handled based on received Criticality information. Case 3 (missing IE/IE group) is handled based on Criticality information and Presence information for the missing IE/IE group specified in the version of the specification used by the receiver. Case 4 (IEs or IE groups in wrong order or with too many occurrences) and Case 5 (erroneously present conditional IEs or IE groups) result in rejecting the procedure.

If an Abstract Syntax Error occurs, the receiver shall read the remaining message and shall then for each detected Abstract Syntax Error that belong to cases 1-3 act according to the Criticality Information and Presence Information for the IE/IE group due to which Abstract Syntax Error occurred in accordance with subclauses 10.3.4 and 10.3.5. The handling of cases 4 and 5 is specified in subclause 10.3.6.

### 10.3.2 Criticality Information

In the S1AP messages there is criticality information set for individual IEs and/or IE groups. This criticality information instructs the receiver how to act when receiving an IE or an IE group that is not comprehended, i.e., the entire item (IE or IE group) which is not (fully or partially) comprehended shall be treated in accordance with its own criticality information as specified in subclause 10.3.4.

In addition, the criticality information is used in case of the missing IE/IE group abstract syntax error (see subclause 10.3.5).

The receiving node shall take different actions depending on the value of the Criticality Information. The three possible values of the Criticality Information for an IE/IE group are:

- Reject IE.
- Ignore IE and Notify Sender.
- Ignore IE.

The following rules restrict when a receiving entity may consider an IE, an IE group, or an EP not comprehended (not implemented), and when action based on criticality information is applicable:

1. IE or IE group: When one new or modified IE or IE group is implemented for one EP from a standard version, then other new or modified IEs or IE groups specified for that EP in that standard version shall be considered comprehended by a receiving entity (some may still remain unsupported).

2. EP: The comprehension of different EPs within a standard version or between different standard versions is not mandated. Any EP that is not supported may be considered not comprehended, even if another EP from that standard version is comprehended, and action based on criticality shall be applied.

### 10.3.3 Presence Information

For many IEs/IE groups which are optional according to the ASN.1 transfer syntax, S1AP specifies separately if the presence of these IEs/IE groups is optional or mandatory with respect to RNS application by means of the presence field of the concerning object of class S1AP-PROTOCOL-IES, S1AP-PROTOCOL-IES-PAIR, S1AP-PROTOCOL-EXTENSION or S1AP-PRIVATE-IES.

The presence field of the indicated classes supports three values:

1. Optional;
If an IE/IE group is not included in a received message and the presence of the IE/IE group is mandatory or the presence is conditional and the condition is true according to the version of the specification used by the receiver, an abstract syntax error occurs due to a missing IE/IE group.

If an IE/IE group is included in a received message and the presence of the IE/IE group is conditional and the condition is false according to the version of the specification used by the receiver, an abstract syntax error occurs due to this erroneously present conditional IE/IE group.

10.3.4 Not comprehended IE/IE group

10.3.4.1 Procedure Code

The receiving node shall treat the different types of received criticality information of the Procedure Code IE according to the following:

Reject IE:

- If a message is received with a Procedure Code IE marked with “Reject IE” which the receiving node does not comprehend, the receiving node shall reject the procedure using the Error Indication procedure.

Ignore IE and Notify Sender:

- If a message is received with a Procedure Code IE marked with “Ignore IE and Notify Sender” which the receiving node does not comprehend, the receiving node shall ignore the procedure and initiate the Error Indication procedure.

Ignore IE:

- If a message is received with a Procedure Code IE marked with “Ignore IE” which the receiving node does not comprehend, the receiving node shall ignore the procedure.

When using the Error Indication procedure to reject a procedure or to report an ignored procedure it shall include the Procedure Code IE, the Triggering Message IE, and the Procedure Criticality IE in the Criticality Diagnostics IE.

10.3.4.1A Type of Message

When the receiving node cannot decode the Type of Message IE, the Error Indication procedure shall be initiated with an appropriate cause value.

10.3.4.2 IEs other than the Procedure Code and Type of Message

The receiving node shall treat the different types of received criticality information of an IE/IE group other than the Procedure Code IE and Type of Message IE according to the following:

Reject IE:

- If a message initiating a procedure is received containing one or more IEs/IE group marked with “Reject IE” which the receiving node does not comprehend; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the rejection of one or more IEs/IE group using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a message initiating a procedure that does not have a message to report unsuccessful outcome is received containing one or more IEs/IE groups marked with “Reject IE” which the receiving node does not comprehend, the receiving node shall terminate the procedure and initiate the Error Indication procedure.
- If a response message is received containing one or more IEs marked with “Reject IE”, that the receiving node does not comprehend, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

**Ignore IE and Notify Sender:**

- If a message initiating a procedure is received containing one or more IEs/IE groups marked with “Ignore IE and Notify Sender” which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and report in the response message of the procedure that one or more IEs/IE groups have been ignored. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a message initiating a procedure that does not have a message to report the outcome of the procedure is received containing one or more IEs/IE groups marked with “Ignore IE and Notify Sender” which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and initiate the Error Indication procedure to report that one or more IEs/IE groups have been ignored.

- If a response message is received containing one or more IEs/IE groups marked with “Ignore IE and Notify Sender” which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups and initiate the Error Indication procedure.

**Ignore IE:**

- If a message initiating a procedure is received containing one or more IEs/IE groups marked with “Ignore IE” which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.

- If a response message is received containing one or more IEs/IE groups marked with “Ignore IE” which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.

When reporting not comprehended IEs/IE groups marked with “Reject IE” or “Ignore IE and Notify Sender” using a response message defined for the procedure, the Information Element Criticality Diagnostics IE shall be included in the Criticality Diagnostics IE for each reported IE/IE group.

When reporting not comprehended IEs/IE groups marked with “Reject IE” or “Ignore IE and Notify Sender” using the Error Indication procedure, the Procedure Code IE, the Triggering Message IE, Procedure Criticality IE, and the Information Element Criticality Diagnostics IE shall be included in the Criticality Diagnostics IE for each reported IE/IE group.

**10.3.5 Missing IE or IE group**

The receiving node shall treat the missing IE/IE group according to the criticality information for the missing IE/IE group in the received message specified in the version of this specification used by the receiver:

**Reject IE:**

- if a received message initiating a procedure is missing one or more IEs/IE groups with specified criticality “Reject IE”; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the missing IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- if a received message *initiating* a procedure that does not have a message to report unsuccessful outcome is missing one or more IEs/IE groups with specified criticality “Reject IE”, the receiving node shall terminate the procedure and initiate the Error Indication procedure.

- if a received *response* message is missing one or more IEs/IE groups with specified criticality “Reject IE, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

**Ignore IE and Notify Sender:**

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality “Ignore IE and Notify Sender”, the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and report in the response message of the procedure that one or more IEs/IE groups were missing. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- if a received *response* message is missing one or more IEs/IE groups with specified criticality “Ignore IE and Notify Sender”, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

**Ignore IE:**

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality “Ignore IE”, the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message.

- if a received *response* message is missing one or more IEs/IE groups with specified criticality “Ignore IE”, the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message.

When reporting missing IEs/IE groups with specified criticality “Reject IE” or “Ignore IE and Notify Sender” using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

When reporting missing IEs/IE groups with specified criticality “Reject IE” or “Ignore IE and Notify Sender” using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

**10.3.6 IEs or IE groups received in wrong order or with too many occurrences or erroneously present**

If a message with IEs or IE groups in wrong order or with too many occurrences is received or if IEs or IE groups with a conditional presence are present when the condition is not met (i.e., erroneously present), the receiving node shall behave according to the following:

- if a message *initiating* a procedure is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the cause value “Abstract Syntax Error (Falsely Constructed Message)” using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- if a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving
node shall terminate the procedure and initiate the Error Indication procedure, and use cause value “Abstract Syntax Error (Falsely Constructed Message)”.

- If a response message is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall consider the procedure as unsuccessfulty terminated and initiate local error handling.

When determining the correct order only the IEs specified in the specification version used by the receiver shall be considered.

10.4 Logical Error

Logical error situations occur when a message is comprehended correctly, but the information contained within the message is not valid (i.e., semantic error), or describes a procedure which is not compatible with the state of the receiver. In these conditions, the following behaviour shall be performed (unless otherwise specified) as defined by the class of the elementary procedure, irrespective of the criticality information of the IEs/IE groups containing the erroneous values.

Class 1:

Where the logical error occurs in a request message of a class 1 procedure, and the procedure has a message to report this unsuccessful outcome, this message shall be sent with an appropriate cause value. Typical cause values are:

- Semantic Error.
- Message not compatible with receiver state.

Where the logical error is contained in a request message of a class 1 procedure, and the procedure does not have a message to report this unsuccessful outcome, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The Procedure Code IE and the Triggering Message IE within the Criticality Diagnostics IE shall then be included in order to identify the message containing the logical error.

Where the logical error exists in a response message of a class 1 procedure, the procedure shall be considered as unsuccessfulty terminated and local error handling shall be initiated.

Class 2:

Where the logical error occurs in a message of a class 2 procedure, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The Procedure Code IE and the Triggering Message IE within the Criticality Diagnostics IE shall then be included in order to identify the message containing the logical error.

10.5 Exceptions

The error handling for all the cases described hereafter shall take precedence over any other error handling described in the other subclauses of clause 10.

- If any type of error (Transfer Syntax Error, Abstract Syntax Error or Logical Error) is detected in the ERROR INDICATION message, it shall not trigger the Error Indication procedure in the receiving Node but local error handling.

- In case a response message or Error Indication message needs to be returned, but the information necessary to determine the receiver of that message is missing, the procedure shall be considered as unsuccessfulty terminated and local error handling shall be initiated.

- If an error that terminates a procedure occurs, the returned cause value shall reflect the error that caused the termination of the procedure even if one or more abstract syntax errors with criticality “ignore and notify” have earlier occurred within the same procedure.

- If an AP ID error is detected, the error handling as described in subclause 10.6 shall be applied.
10.6 Handling of AP ID

NOTE: The “first message”, the “first returned message” and the “last message” as used below correspond to messages for a UE-associated logical connection. The “first message” has a new AP ID from the sending node and the “first returned message” is the first response message, which has a new APID from the node sending the “first returned message”. Thereafter the two APIDs are included in all messages over the UE-associated logical connection unless otherwise allowed by the specification. The “last message” is a message sent by a node in order to complete the termination of a given UE-associated logical connection, such that no other messages for the same connection are expected in either direction.

If a node receives a first message that includes a remote AP ID which is erroneous, e.g., an AP ID which has been stored previously for another UE-associated logical connection for the same peer node, the receiving node shall initiate an Error Indication procedure with inclusion of only the previously received AP ID from the peer node and an appropriate cause value. In this case, both nodes shall initiate a local release of any established UE-associated logical connection having the erroneous AP ID as local or remote identifier.

If a node receives a first returned message that includes a remote AP ID which has been stored previously for another UE-associated logical connection for the same peer node, or that includes an AP ID pair which is inconsistent (e.g., the local AP ID is unknown or already allocated to another UE-associated logical connection), the receiving node shall initiate an Error Indication procedure with inclusion of the received AP IDs from the peer node and an appropriate cause value. Both nodes shall initiate a local release of any established UE-associated logical connection (for the same S1 interface) having these AP IDs as local or remote identifier.

If a node receives a message (other than the first or first returned messages) that includes AP ID(s) identifying a logical connection which is unknown to the node (for the same S1 interface):

- if this message is not the last message for this UE-associated logical connection, the node shall initiate an Error Indication procedure with inclusion of the received AP ID(s) from the peer node and an appropriate cause value. Both nodes shall initiate a local release of any established UE-associated logical connection (for the same S1 interface) having the erroneous AP ID(s) as local or remote identifier.

- if this message is the last message for this UE-associated logical connection, the receiving node shall initiate a local release of any established UE-associated logical connection (for the same S1 interface) that have either the local or remote AP ID(s) as identifiers.
Annex A (informative):
S1AP Transparent containers content

Transparent containers are used in order to transfer information from one RAN node to another RAN node. Depending on the particular scenario the behaviour of both involved RAN nodes may be either specified according to the same radio system or according to different radio systems. During an inter-system handover the source RAN node has to adopt to the target RAN node and its requirements. Therefore the container content is encoded according to the rules which are specified for the target radio system.

In S1AP, there is a single transparent container defined for transporting information from the source to the target RAN node and a single transparent container for transporting information from the target to the source RAN node during handover preparation: the Source to Target Transparent Container IE and the Target to Source Transparent Container IE, which may carry either NG-RAN, E-UTRAN, UTRAN or GERAN specific information.

NOTE: The definition of generic transparent containers for handover purposes allows to transport them through the core network in a RAT-agnostic way.

In subclause 8.4.1.2, it is described how the transparent container shall be encoded with respect to the scenario in which it is used.

The table below is showing all possible scenarios and definitions according to which the content of the transparent container shall be encoded. Additionally the reference to the specification defining particular IE is given.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Source to Target Transparent Container IE in S1AP: HANDOVER REQUIRED</th>
<th>Target to Source Transparent Container IE in S1AP: HANDOVER COMMAND message</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name of the IE</td>
<td>Definition in specification</td>
</tr>
<tr>
<td>Intra E-UTRAN handover</td>
<td>Source eNB to Target eNB Transparent Container</td>
<td>36.413</td>
</tr>
<tr>
<td>Inter-system handover to UTRAN or SRVCC operation to UTRAN</td>
<td>Source RNC to Target RNC Transparent Container</td>
<td>25.413</td>
</tr>
<tr>
<td>Inter-system handover to GERAN (PS domain only)</td>
<td>Source BSS to Target BSS Transparent Container Contents of the Source BSS to Target BSS Transparent Container</td>
<td>48.018</td>
</tr>
<tr>
<td>SRVCC operation to GERAN without DTM support or SRVCC operation to GERAN with DTM but without DTM HO support</td>
<td>Old BSS to New BSS information elements field of the Old BSS to New BSS information</td>
<td>48.008</td>
</tr>
<tr>
<td>SRVCC operation to GERAN with DTM HO support</td>
<td>Source BSS to Target BSS Transparent Container Contents of the Source BSS to Target BSS Transparent Container (in the Source to Target Transparent Container IE); Old BSS to New BSS information elements field of the Old BSS to New BSS information (in the Source to Target Transparent Container Secondary IE)</td>
<td>48.018</td>
</tr>
<tr>
<td>Inter-system handover to NG-RAN</td>
<td>Source NG-RAN Node to Target NG-RAN Node Transparent Container</td>
<td>38.413</td>
</tr>
</tbody>
</table>
Annex B (normative): IEs for SON Transfer

This annex defines IEs used by the SON Transfer RIM application (TS 48.018 [18]).

B.1 Tabular definition

B.1.1 SON Transfer Application Identity

This IE indicates the application identity within the SON Transfer application.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
</tr>
</thead>
</table>

The receiving RAN node, including the eHRPD eAN, shall discard any RAN-INFORMATION-REQUEST/Multiple Report PDU containing this IE with value set to “Cell Load Reporting”, “Multi-Cell Load Reporting”, “HO Reporting”, “E-UTRAN Cell Activation”, “Energy Savings Indication” or “Failure Event Reporting”.

The receiving eHRPD eAN shall discard any RAN-INFORMATION-REQUEST/Single Report PDU containing this IE with value set to “Cell Load Reporting”, “HO Reporting”, “E-UTRAN Cell Activation”, “Energy Savings Indication” or “Failure Event Reporting”.

B.1.2 SON Transfer Request Container

This container transfers request information for the SON Transfer application.

NOTE: The length of the SON Transfer Request Container IE shall remain compatible with the maximum message size on the Gb interface, this maximum size being determined depending on the lower layers used on the interface and on their configuration, a typical (default) limitation being 1600 octets for a Frame Relay sub-network as stated in TS 48.016 [30].
B.1.3 SON Transfer Response Container

This container transfers response information for the SON Transfer application.

NOTE: The length of the SON Transfer Response Container IE shall remain compatible with the maximum message size on the Gb interface, this maximum size being determined depending on the lower layers used on the interface and on their configuration, a typical (default) limitation being 1600 octets for a Frame Relay sub-network as stated in TS 48.016 [30].
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE SON Transfer Application</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Load Reporting</td>
<td>M</td>
<td></td>
<td>B.1.5</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Multi-Cell Load Reporting</td>
<td>M</td>
<td></td>
<td>B.1.9</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Event-Triggered Cell Load Reporting</td>
<td>M</td>
<td></td>
<td>B.1.12</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;HO Reporting</td>
<td>NULL</td>
<td></td>
<td></td>
<td>The Reporting Cell Identifier field in the RAN-INFORMATION Application Container for SON Transfer (TS 48.018 [18]) shall be the same as received in the RAN-INFORMATION-REQUEST Application Container. The RAT Discriminator field shall be set to ‘E-UTRAN’.</td>
</tr>
<tr>
<td>&gt;&gt;E-UTRAN Cell Activation</td>
<td>M</td>
<td></td>
<td>B.1.15</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Energy Savings Indication</td>
<td>NULL</td>
<td></td>
<td></td>
<td>The Reporting Cell Identifier field in the RAN-INFORMATION Application Container for SON Transfer (TS 48.018 [18]) shall be the same as received in the RAN-INFORMATION-REQUEST Application Container. The RAT Discriminator field shall be set to ‘E-UTRAN’.</td>
</tr>
<tr>
<td>&gt;&gt;Failure Event Reporting</td>
<td>NULL</td>
<td></td>
<td></td>
<td>The Reporting Cell Identifier field in the RAN-INFORMATION Application Container for SON Transfer (TS 48.018 [18]) shall be the same as received in the RAN-INFORMATION-REQUEST Application Container. The RAT Discriminator field shall be set to ‘E-UTRAN’.</td>
</tr>
</tbody>
</table>

**B.1.4 SON Transfer Cause**

This container indicates the cause why the Application Error Container IE for the SON Transfer application defined in TS 48.018 [18] is sent.
<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE SON Transfer Application</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Cell Load Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Load Reporting Cause</td>
<td>M</td>
<td></td>
<td>B.1.10</td>
<td></td>
</tr>
<tr>
<td>&gt;Multi-Cell Load Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Load Reporting Cause</td>
<td>M</td>
<td></td>
<td>B.1.10</td>
<td></td>
</tr>
<tr>
<td>&gt;Event-Triggered Cell Load Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Load Reporting Cause</td>
<td>M</td>
<td></td>
<td>B.1.10</td>
<td></td>
</tr>
<tr>
<td>&gt;HO Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;HO Reporting Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Application Container Syntax Error, Inconsistent Reporting Cell Identifier, Unspecified, …)</td>
</tr>
<tr>
<td>&gt;E-UTRAN Cell Activation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Activation Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Application Container Syntax Error, Inconsistent Reporting Cell Identifier, Unspecified, …)</td>
</tr>
<tr>
<td>&gt;Energy Savings Indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell State Indication Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Application Container Syntax Error, Inconsistent Reporting Cell Identifier, Unspecified, …)</td>
</tr>
<tr>
<td>&gt;Failure Event Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Failure Event Reporting Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Application Container Syntax Error, Inconsistent Reporting Cell Identifier, Unspecified, …)</td>
</tr>
</tbody>
</table>

### HO Reporting Cause

<table>
<thead>
<tr>
<th>HO Reporting Cause</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Container Syntax Error</td>
<td>The Application Container IE is syntactically incorrect.</td>
</tr>
</tbody>
</table>
| Inconsistent Reporting Cell Identifier | - In case the reporting RAT is GERAN: the Reporting Cell Identifier in the Application Container IE does not match with the Destination Cell Identifier IE value in the RIM header.  
  - In case the reporting RAT is UTRAN or E-UTRAN: the cell identified by Reporting Cell Identifier in the Application Container IE is unknown in the eNB identified by the Destination Cell Identifier IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU. |
| Unspecified | Sent when none of the above cause values applies. |

### Cell Activation Cause

<table>
<thead>
<tr>
<th>Cell Activation Cause</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Container Syntax Error</td>
<td>The Application Container IE is syntactically incorrect.</td>
</tr>
<tr>
<td>Inconsistent Reporting Cell Identifier</td>
<td>- In case the reporting RAT is E-UTRAN: The Reporting Cell Identifier in the Application Container IE is unknown in the eNB identified by the Destination Cell Identifier IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU or the reporting cell identifier in the Application Container IE does not match with the Source Cell Identifier IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU.</td>
</tr>
<tr>
<td>Unspecified</td>
<td>Sent when none of the above cause values applies.</td>
</tr>
</tbody>
</table>
Cell State Indication Cause | Meaning
--- | ---
Application Container Syntax Error | The Application Container IE is syntactically incorrect.
Inconsistent Reporting Cell Identifier | - In case the reporting RAT is E-UTRAN: The Reporting Cell Identifier in the Application Container IE does not match with the Source Cell Identifier IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU or the reporting cell identifier in the Application Container IE does not match with the Destination Cell Identifier IE value of the RIM header of a RAN-INFORMATION PDU.
Unspecified | Sent when none of the above cause values applies.

Failure Event Reporting Cause | Meaning
--- | ---
Application Container Syntax Error | The Application Container IE is syntactically incorrect.
Inconsistent Reporting Cell Identifier | - In case the reporting RAT is E-UTRAN: The Reporting Cell Identifier in the Application Container IE does not match with the Source Cell Identifier IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU or the reporting cell identifier in the Application Container IE does not match with the Destination Cell Identifier IE value of the RIM header of a RAN-INFORMATION PDU.
Unspecified | Sent when none of the above cause values applies.

### B.1.5 Cell Load Reporting Response

This IE contains response information for inter-RAT cell load reporting.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Reporting RAT</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-UTRAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-UTRAN Response</td>
<td>M</td>
<td></td>
<td>E-UTRAN Cell Load Reporting Response B.1.6</td>
<td></td>
</tr>
<tr>
<td>&gt;UTRAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UTRAN Response</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the Cell Load Information Group IE as defined in TS 25.413. The receiver shall ignore the value of the Source Cell Identifier IE within the Cell Load Information Group IE.</td>
</tr>
<tr>
<td>&gt;GERAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;GERAN Response</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the Cell Load Information Group IE as defined in TS 48.008. The receiver shall ignore the value of the Cell Identifier IE within the Cell Load Information Group IE.</td>
</tr>
<tr>
<td>&gt;eHRPD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;eHRPD Response</td>
<td>M</td>
<td></td>
<td>eHRPD Sector Load Reporting Response B.1.19</td>
<td></td>
</tr>
</tbody>
</table>

### B.1.6 E-UTRAN Cell Load Reporting Response

This IE contains response information for inter-RAT cell load reporting.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Available Capacity Group</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the Composite Available Capacity Group IE as defined in TS 36.423.</td>
</tr>
</tbody>
</table>
B.1.7 Multi-Cell Load Reporting Request

This IE contains request information for inter-RAT multi-cell load reporting.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requested Cell List</td>
<td></td>
<td>1..&lt;maxnoofIRATReportingCells&gt;</td>
<td></td>
<td>One of the IRAT Cell IDs contained in this list shall be carried in the Reporting Cell Identifier field in the RAN-INFORMATION-REQUEST Application Container for SON Transfer (TS 48.018).</td>
</tr>
<tr>
<td>&gt;IRAT Cell ID</td>
<td>M</td>
<td></td>
<td></td>
<td>B.1.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofIRATReportingCells</td>
<td>Maximum no. cells to be included. Value is 128.</td>
</tr>
</tbody>
</table>

B.1.8 IRAT Cell ID

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Reporting RAT</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-UTRAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Identifier</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td>Contains the E-UTRAN CGI IE as defined in 9.2.1.38.</td>
</tr>
<tr>
<td>&gt;UTRAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Identifier</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td>Contains the Source Cell Identifier IE as defined in TS 25.413.</td>
</tr>
<tr>
<td>&gt;GERAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Cell Identifier</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td>Contains the Cell Identifier IE as defined in TS 48.018.</td>
</tr>
<tr>
<td>&gt;eHRPD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;eHRPD Sector ID</td>
<td>M</td>
<td>B.1.18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B.1.9 Multi-Cell Load Reporting Response

This IE contains response information for inter-RAT multi-cell load reporting.
### IE/Group Name | Presence | Range | IE type and reference | Semantics description
--- | --- | --- | --- | ---
Reporting Cell List | 1..<maxnoofIRAT ReportingCells> | |  | 

>CHOICE Reporting RAT

>>E-UTRAN

>>>E-UTRAN Response | M | | 

>>>CELL Identifier | M | OCTET STRING | Contains the E-UTRAN CGI IE as defined in 9.2.1.38.

>>>E-UTRAN Cell Load Reporting Response | M | B.1.6 | 

>>UTRAN

>>>UTRAN Response | M | OCTET STRING | Contains the Cell Load Information Group IE as defined in TS 25.413.

>>GERAN

>>>GERAN Response | M | OCTET STRING | Contains the Cell Load Information Group IE as defined in TS 48.008.

>>eHRPD

>>>eHRPD Sector ID | M | B.1.18 | 

>>>eHRPD Sector Load Reporting Response | M | B.1.19 | 

### B.1.10 Cell Load Reporting Cause

This IE contains request information for inter-RAT cell load reporting.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
--- | --- | --- | --- | ---
Cell Load Reporting Cause | M | | ENUMERATED (Application Container Syntax Error, Inconsistent Reporting Cell Identifier, Unspecified, …) | 

The meaning of the different cause values is described in the following table.

| Cell Load Reporting Cause | Meaning |
--- | ---
Application Container Syntax Error | The Application Container IE is syntactically incorrect. |
Inconsistent Reporting Cell Identifier | - In case the reporting RAT is GERAN or eHRPD: the Reporting Cell Identifier in the Application Container IE does not match with the Destination Cell Identifier IE value (in the case of a RANI-REQUEST PDU) or with the Source Cell Identifier IE value (in the case of a RANI-INFORMATION PDU) of the RIM header.  
- In case the reporting RAT is UTRAN or E-UTRAN: the cell identified by Reporting Cell Identifier in the Application Container IE is unknown in the RNC (UTRAN case) or in the eNodeB (E-UTRAN case) identified by the Destination Cell Identifier IE value in the RANI-INFORMATION-REQUEST PDU. |
Unspecified | Sent when none of the above cause values applies |
B.1.11 Event-Triggered Cell Load Reporting Request

This IE contains request information for inter-RAT cell load reporting.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Of Measurement Reporting Levels</td>
<td>M</td>
<td>ENUMERATED(2, 3, 4, 5, 10, ...)</td>
<td>The reporting node divides the cell load scale into the indicated number of reporting levels, evenly distributed on a linear scale below the reporting node's threshold for overload. The reporting node sends a report each time the cell load changes from one reporting level to another, and when the cell load enters and exits overload state. If the reporting RAT is eHRPD, triggering is based on sector load.</td>
<td></td>
</tr>
</tbody>
</table>

B.1.12 Event-triggered Cell Load Reporting Response

This IE contains response information for event-triggered inter-RAT cell load reporting.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Load</td>
<td>M</td>
<td>Cell Load Reporting Response B.1.5</td>
<td>If the reporting RAT is eHRPD, when this IE is present the sector load exceeds the threshold for overload. For other reporting RATs, when this IE is present the cell load exceeds the threshold for overload.</td>
<td></td>
</tr>
<tr>
<td>Overload Flag</td>
<td>O</td>
<td>ENUMERATED(Overload, ...)</td>
<td>If the reporting RAT is eHRPD, when this IE is present the sector load exceeds the threshold for overload. For other reporting RATs, when this IE is present the cell load exceeds the threshold for overload.</td>
<td></td>
</tr>
</tbody>
</table>

B.1.13 HO Report

This IE contains information for too early inter-RAT HO without connection failure.
### HO Type

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO Type</td>
<td>M</td>
<td></td>
<td>ENUMERATED (LTE to UTRAN, LTE to GERAN, …)</td>
<td>The &quot;Early IRAT Handover&quot; code-point shall be used by the RNC according to TS 25.413 [19].</td>
</tr>
</tbody>
</table>

### HO Report Type

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO Source ID</td>
<td>M</td>
<td>IRAT Cell ID B.1.8</td>
<td>Contains the cell ID of the source cell for the HO. This IE shall contain an E-UTRAN CGI, and shall be set to the same value as the Reporting Cell Identifier IE in TS 48.018 [18].</td>
<td></td>
</tr>
</tbody>
</table>

### HO Target ID

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO Source ID</td>
<td>M</td>
<td>IRAT Cell ID B.1.8</td>
<td>Contains the cell ID of the target cell for the HO. This IE shall contain either a UTRAN Cell ID or a GERAN Cell ID.</td>
<td></td>
</tr>
</tbody>
</table>

### Candidate Cell List

- **Candidate Cell ID**
  - M
  - IRAT Cell ID B.1.8
  - This IE contains an E-UTRAN CGI.

### Candidate PCI List

- **Candidate PCI**
  - M
  - B.1.23
  - This IE includes the Primary Cell Identifier and the EARFCN of detected cells not included in the Candidate Cell List IE and for which an E-UTRAN CGI could not be derived.

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCandidateCells</td>
<td>Maximum no. of candidate cells.</td>
</tr>
</tbody>
</table>

### B.1.14 Cell Activation Request

This IE contains request information for inter-RAT Cell Activation.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cells to Activate List</td>
<td></td>
<td>1..&lt;maxnoofCellineNB&gt;</td>
<td></td>
<td>One of the cell IDs contained in this list shall be carried in the Reporting Cell Identifier field in the RAN-INFORMATION-REQUEST Application Container for SON Transfer (TS 48.018 [18]).</td>
</tr>
<tr>
<td>&gt;Cell Identifier</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td>Contains the E-UTRAN CGI IE as defined in 9.2.1.38.</td>
</tr>
<tr>
<td>Minimum Activation Time</td>
<td>O</td>
<td>INTEGER (1..60)</td>
<td></td>
<td>Seconds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCellineNB</td>
<td>Maximum no. cells that can be served by an eNB. Value is 256.</td>
</tr>
</tbody>
</table>
B.1.15 Cell Activation Response

This IE contains response information for inter-RAT Cell Activation.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated Cells List</td>
<td></td>
<td>0 .. &lt;maxnoofCellineNB&gt;</td>
<td>OCTET STRING</td>
<td>Contains the E-UTRAN CGI IE as defined in 9.2.1.38.</td>
</tr>
<tr>
<td>&gt;Cell Identifier</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range bound | Explanation
--- | ---
maxnoofCellineNB | Maximum no. cells that can be served by an eNB. Value is 256.

B.1.16 Cell State Indication

This IE contains notification information for inter-RAT Cell Activation and Deactivation.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notification Cell List</td>
<td></td>
<td>1 .. &lt;maxnoofCellineNB&gt;</td>
<td>OCTET STRING</td>
<td>One of the cell IDs contained in this list shall be carried in the Reporting Cell Identifier field in the RAN-INFORMATION-REQUEST Application Container for SON Transfer (TS 48.018 [18]).</td>
</tr>
<tr>
<td>&gt;Cell Identifier</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Notify Flag</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the E-UTRAN CGI IE as defined in 9.2.1.38.</td>
</tr>
</tbody>
</table>

Range bound | Explanation
--- | ---
maxnoofCellineNB | Maximum no. cells that can be served by an eNB. Value is 256.

B.1.17 Failure Event Report

This IE contains information for inter-RAT handover with connection failure.
### B.1.18 eHRPD Sector ID

This IE contains the eHRPD Sector ID.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eHRPD Sector ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(16))</td>
<td>Defined in 3GPP2 C.S0024-B [27] subsection 13.9</td>
</tr>
</tbody>
</table>

### B.1.19 eHRPD Sector Load Reporting Response

This IE indicates the overall available resource level in the eHRPD sector in downlink and uplink.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eHRPD Composite Available Capacity Downlink</td>
<td>M</td>
<td></td>
<td>eHRPD Composite Available Capacity B.1.20</td>
<td>For the downlink</td>
</tr>
<tr>
<td>eHRPD Composite Available Capacity Uplink</td>
<td>M</td>
<td></td>
<td>eHRPD Composite Available Capacity B.1.20</td>
<td>For the uplink</td>
</tr>
</tbody>
</table>

### B.1.20 eHRPD Composite Available Capacity

This IE indicates the overall available resource level in the eHRPD sector in either Downlink or Uplink.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eHRPD Sector Capacity Class Value</td>
<td>M</td>
<td></td>
<td>B.1.21</td>
<td></td>
</tr>
<tr>
<td>eHRPD Capacity Value</td>
<td>M</td>
<td></td>
<td>B.1.22</td>
<td>‘0’ indicates no resource is available, Measured on a linear scale.</td>
</tr>
</tbody>
</table>
B.1.21 eHRPD Sector Capacity Class Value

This IE indicates the value that-classifies the eHRPD sector capacity with regards to cells in other RATs. The IE only indicates resources that are configured for traffic purposes.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eHRPD Sector Capacity Class Value</td>
<td>M</td>
<td>INTEGER (1..100,...)</td>
<td></td>
<td>Value 1 indicates the minimum sector capacity, and 100 indicates the maximum sector capacity. There should be a linear relation between sector capacity and eHRPD Sector Capacity Class Value.</td>
</tr>
</tbody>
</table>

B.1.22 eHRPD Capacity Value

This IE indicates the amount of resources that are available for load balancing relative to the total eHRPD resources. A sector is expected to accept traffic corresponding to the indicated available capacity.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eHRPD Capacity Value</td>
<td>M</td>
<td>INTEGER (0..100)</td>
<td></td>
<td>Value 0 indicates no available capacity, and 100 indicates maximum available capacity. Capacity Value should be measured on a linear scale.</td>
</tr>
</tbody>
</table>

B.1.23 Candidate PCI

This IE contains the Primary Cell Identity and the frequency of a detected LTE cell.

<table>
<thead>
<tr>
<th>IE/Group Name</th>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI</td>
<td>M</td>
<td></td>
<td>INTEGER (0..503)</td>
<td>Physical Cell Identifier of the detected cell</td>
</tr>
<tr>
<td>EARFCN</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the EARFCN IE as defined in 9.2.1.95.</td>
</tr>
</tbody>
</table>

B.2 ASN.1 definition

-- ******************************************************************************
-- IE definitions for the SON Transfer application
-- The IEs in this ASN.1 module shall be defined and encoded
-- using the same rules as applicable for the S1AP-IEs module.
-- ******************************************************************************
SonTransfer-IEs

DEFINITIONS AUTOMATIC TAGS ::= BEGIN

--
-- Generic IEs for the SON Transfer application
--
SONtransferApplicationIdentity ::= ENUMERATED {
  cell-load-reporting, ...
  multi-cell-load-reporting,
  event-triggered-cell-load-reporting,
  ho-reporting,
  eutran-cell-activation,
  energy-savings-indication,
  failure-event-reporting

SONtransferRequestContainer ::= CHOICE{
  cellLoadReporting     NULL,
  multiCellLoadReporting MultiCellLoadReportingRequest,
  eventTriggeredCellLoadReporting EventTriggeredCellLoadReportingRequest,
  hOReporting          HOREport,
  eutranCellActivation  CellActivationRequest,
  energySavingsIndication CellStateIndication,
  failureEventReporting FailureEventReport
}

SONtransferResponseContainer ::= CHOICE{
  cellLoadReporting     CellLoadReportingResponse,
  multiCellLoadReporting MultiCellLoadReportingResponse,
  eventTriggeredCellLoadReporting EventTriggeredCellLoadReportingResponse,
  hOReporting          NULL,
  eutranCellActivation  CellActivationResponse,
  energySavingsIndication NULL,
  failureEventReporting NULL
}

SONtransferCause ::= CHOICE {
  cellLoadReporting     CellLoadReportingCause,
  multiCellLoadReporting CellLoadReportingCause,
  eventTriggeredCellLoadReporting CellLoadReportingCause,
  hOReporting          HOREportingCause,
  eutranCellActivation  CellActivationCause,
  energySavingsIndication CellStateIndicationCause,
  failureEventReporting FailureEventReportingCause
}

CellLoadReportingCause ::= ENUMERATED {
  application-container-syntax-error,
  inconsistent-reporting-cell-identifier,
  unspecified,
  ...
}

HOREportingCause ::= ENUMERATED {
  application-container-syntax-error,
  inconsistent-reporting-cell-identifier,
  unspecified,
  ...
}

CellActivationCause ::= ENUMERATED {
  application-container-syntax-error,
  inconsistent-reporting-cell-identifier,
  unspecified,
  ...
}

CellStateIndicationCause ::= ENUMERATED {
  application-container-syntax-error,
  inconsistent-reporting-cell-identifier,
  unspecified,
  ...
}

FailureEventReportingCause ::= ENUMERATED {
  application-container-syntax-error,
  inconsistent-reporting-cell-identifier,
  unspecified,
  ...
}

-- IEs for Cell Load Reporting application
--

CellLoadReportingResponse ::= CHOICE{
  eUTRAN    EUTRANcellLoadReportingResponse,
  uTRAN     OCTET STRING,
---
---
---
---
---
---
---
---
---
... 

EventTriggeredCellLoadReportingResponse ::= SEQUENCE {
    cellLoadReportingResponse CellLoadReportingResponse,
    overloadFlag OverloadFlag OPTIONAL,
    ...
  }

-- IEs for HO Reporting application
--

HOReport ::= SEQUENCE {
    hoType HoType,
    hoReportType HoReportType,
    hosourceID IRAT-Cell-ID,
    hoTargetID IRAT-Cell-ID,
    candidateCellList CandidateCellList,
    ..., candidatePCIList CandidatePCIList OPTIONAL
  }

HoType ::= ENUMERATED {
    ltetoutran,
    ltetogeran,
    ...
  }

HoReportType ::= ENUMERATED {
    unnecessaryhotoanotherrat,
    ... earlyirathandover
}

CandidateCellList ::= SEQUENCE (SIZE(1..maxnoofcandidateCells)) OF IRAT-Cell-ID

CandidatePCIList ::= SEQUENCE (SIZE(1..maxnoofcandidateCells)) OF CandidatePCI

CandidatePCI ::= SEQUENCE {
    pCI INTEGER (0..503),
    eARFCN OCTET STRING,
    ...
}

-- IEs for E-UTRAN Cell Activation application
--

CellActivationRequest ::= SEQUENCE {
    cellsToActivateList CellsToActivateList,
    minimumActivationTime INTEGER (1..60) OPTIONAL,
    ...
  }

CellsToActivateList ::= SEQUENCE (SIZE(1..maxnoofCellineNB)) OF CellsToActivateList-Item

CellsToActivateList-Item ::= SEQUENCE {
    cell-ID OCTET STRING,
    ...
}

CellActivationResponse ::= SEQUENCE {
    activatedCellsList ActivatedCellsList,
    ...
  }

ActivatedCellsList ::= SEQUENCE (SIZE(0..maxnoofCellineNB)) OF ActivatedCellsList-Item

ActivatedCellsList-Item ::= SEQUENCE {
    cell-ID OCTET STRING,
    ...
}

-- IEs for Energy Savings Indication application
CellStateIndication ::= SEQUENCE {
  notificationCellList   NotificationCellList,
  ...}

NotificationCellList ::= SEQUENCE (SIZE(1.. maxnoofCellineNB)) OF NotificationCellList-Item

NotificationCellList-Item ::= SEQUENCE {
  cell-ID     OCTET STRING,
  notifyFlag    NotifyFlag,
  ...}

NotifyFlag ::= ENUMERATED {
  activated,
  deactivated,
  ...}

FailureEventReport::= CHOICE {
  tooEarlyInterRATHOReportReportFromEUTRAN TooEarlyInterRATHOReportReportFromEUTRAN,
  ...}

TooEarlyInterRATHOReportReportFromEUTRAN ::= SEQUENCE {
  uERLFReportContainer OCTET STRING, -- as defined in TS 36.331 [16] --
  mobilityInformation MobilityInformation OPTIONAL,
  ...}

MobilityInformation ::= BIT STRING (SIZE(32))

--
-- IEs for reporting of eHRPD load
--

EHRPDCompositeAvailableCapacity ::= SEQUENCE {
  eHRPD-Sector-ID       EHRPD-Sector-ID,
  eHRPDCapabilityValue   EHRPDCapabilityValue,
  ...}

EHRPDCompositeAvailableCapacity ::= SEQUENCE {
  eHRPD-Sector-ID       EHRPD-Sector-ID,
  eHRPDCapabilityValue   EHRPDCapabilityValue,
  ...}

EHRPDMultiSectorLoadReportingResponseItem ::= SEQUENCE {
  eHRPD-Sector-ID       EHRPD-Sector-ID,
  eHRPDCapabilityValue   EHRPDCapabilityValue,
  ...}

-- ***********************************************************
--
-- Constants
--
-- ***********************************************************

maxnoofIRATReportingCells     INTEGER ::= 128
maxnoofCandidateCells      INTEGER ::= 16
maxnoofCellineNB       INTEGER ::= 256

END
Annex C (informative):
Processing of Transparent Containers at the MME

The encoding of the Source to Target Transparent Container and Target to Source Transparent Container IEs in this specification is different from the one specified in TS 25.413 [19].

Irrespective of the mobility scenario (inter-RAT or intra-LTE), the MME always processes these IEs in the following way:

- The MME shall convey to the eNodeB the information received within
  - the GTPv1-C "UTRAN transparent field" of the "UTRAN Transparent Container" IE across the Gn-interface (see subclause 7.7.38 of TS 29.060 [35]), or
  - the GTPv1-C "BSS Container" (value part octets 4-n) of the "BSS Container" IE across the Gn-interface (see subclause 7.7.72 of TS 29.060 [35]), or
  - the GTPv2 "F-container field" of the "F-Container" IE across the S3/S10-interface (see subclause 8.48 of TS 29.274 [36]).

by including it in the octets of the OCTET STRING of the Source to Target Transparent Container IE, the Target to Source Transparent Container IE or the Target to Source Transparent Container Secondary IE of the corresponding S1AP message.

- The MME shall convey to the GTP peer the information received within the octets of the OCTET STRING of the Source to Target Transparent Container IE, the Target to Source Transparent Container IE or the Target to Source Transparent Container Secondary IE by including it in
  - the GTPv1-C "UTRAN transparent field" of the "UTRAN Transparent Container" IE across the Gn-interface (see subclause 7.7.38 of TS 29.060 [35]), or
  - the GTPv1-C "BSS Container" (value part octets 4-n) of the "BSS Container" IE across the Gn-interface (see subclause 7.7.72 of TS 29.060 [35]), or
  - the GTPv2 "F-container field" of the "F-Container" IE across the S3/S10-interface (see subclause 8.48 of TS 29.274 [36]).
Annex D (informative):
Change history
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June 2009

90/2009

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Subject/Comment
Introduction of eDECOR in RAN
Overload control for CP CIoT EPS optimization
Handling of NB-IOT UE capabilities
Reliable DL NAS delivery based on hop-by-hop acknowledgements
Support of Redirection for VoLTE
Support of V2X over S1
Introduction of New types of eNB ID
Introduction of coverage level for location service
Introduction of Coverage Enhancement Authorization
Introduction of S1 UE information retrieve procedure
Correction on the presence of Extended UE Identity Index Value
Correction on Overload action for exception reporting
Impact on paging from NB-IoT enhancements
Correction of missing security information in Suspend and Resume
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Correction on UE-AMBR for NB-IoT UE using CP solution
Correction to Path Switch Request for RRC Resume Cause
Support of RLF for CP CIoT Optimisation
Correction of the mismatched code points of overload action
Remove the description of Inter RAT Redirection value for MMTEL

S1AP Cause for E-UTRAN Pre-emption operations
Baseline CR to TS 36.413 covering agreements of RAN3
#98
Introduction of QoE Measurement Collection for LTE
Add NR UE Security Capabilities to DL NAS Transport message
Clarification and correction on S1 for EN-DC
Correct ASN.1 error for NAS DELIVERY INDICATION
Support for unlicensed access as secondary RAT in S1AP
Stage-3 impacts to support "voice centric" UE in CE mode B
Enhanced Coverage Restricted Indication for Paging
MDT correction
Add missing range for secondary RAT data volume
Support of Enhanced VoLTE Performance
Introduction of QMC for MTSI in EUTRAN
Triggering UE capability info retrieval using DL NAS TRANSPORT
Introduction of SA NR (36.413 Baseline CR covering RAN3
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Introduction of early data transmission
Introduction of LTE-M (eMTC) traffic Differentiation
Baseline CR: Introduction of the Aerial Usage Indication
Clarification on Connection Establishment Indication procedure
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Correction of applicability of Secondary RAT Data Usage report for
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Introduction of Warning Area Coordinates in S1AP: WRITEREPLACE WARNING REQUEST
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CR to S1AP to introduce Bluetooth and WLAN measurement in MDT
Introduction of Subscription based UE differentiation
Correction on Handover Type
Pending Data Indication
Extending GUMMEI Type
Correction of EPC interworking
Transfer of the PSCell information to Core Network
Correction on Initial UE Message to include EDT for MTC
Change of Interfaces to Trace IE in S1AP
Addition of procedural text for Warning Area Coordinates IE
Introduction of TNL Address discovery for EN-DC (using new
container)
Correction of Core Network Type Restrictions
5G to 4G Handover with non eligible PDU sessions
Adding PSCell to the User Location Information
NB-IoT Correction: inconsistent between tabular and ASN.1

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