LTE;
Evolved Universal Terrestrial
Radio Access Network (E-UTRAN);
S1 Application Protocol (S1AP)
(3GPP TS 36.413 version 12.5.0 Release 12)
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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:

- 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.

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

- 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 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA), User Equipment (UE) procedures in idle mode".

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".
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].

**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].

**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].

- ACL: Access Control List
- BBF: Broadband Forum
- CCO: Cell Change Order
- CDMA: Code Division Multiple Access
- CID: Cell-ID (positioning method)
- CS: Circuit Switched
- CSG: Closed Subscriber Group
- CN: Core Network
- DL: Downlink
- eAN: evolved Access Network
- ECGI: E-UTRAN Cell Global Identifier
- E-CID: Enhanced Cell-ID (positioning method)
- eHRPD: evolved High Rate Packet Data
- eNB: E-UTRAN NodeB
- EP: Elementary Procedure
- EPC: Evolved Packet Core
- E-RAB: E-UTRAN Radio Access Bearer
- E-SMLC: Evolved Serving Mobile Location Centre
- E-UTRAN: Evolved UTRAN
- GBR: Guaranteed Bit Rate
- GNSS: Global Navigation Satellite System
- GUMMEI: Globally Unique MME Identifier
- GTP: GPRS Tunnelling Protocol
- HFN: Hyper Frame Number
- HRPD: High Rate Packet Data
- IE: Information Element
- L-GW: Local GateWay
- LHN: Local Home Network
- LHN ID: Local Home Network ID
- LIPA: Local IP Access
- LPPa: LTE Positioning Protocol Annex
- MBSFN: Multimedia Broadcast multicast service Single Frequency Network
- MDT: Minimization of Drive Tests
- MME: Mobility Management Entity
- NAS: Non Access Stratum
- NNSF: NAS Node Selection Function
- OTDOA: Observed Time Difference of Arrival
- PS: Packet Switched
- ProSe: Proximity Services
4 General

4.1 Procedure Specification Principles

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

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

- The procedure text discriminates between:
  1) Functionality which ‘shall’ be executed

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

  2) Functionality which ‘shall, if supported’ be executed

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

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

4.2 Forwards and Backwards Compatibility

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

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

- Procedure: When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word 'procedure', e.g., 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 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.

- **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.
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 Response message</th>
<th>Unsuccessful Outcome Response message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handover Preparation</td>
<td>HANDOVER REQUIRED</td>
<td>HANDOVER COMMAND</td>
<td>HANDOVER PREPARATION FAILURE</td>
</tr>
<tr>
<td>Handover Resource Allocation</td>
<td>HANDOVER REQUEST</td>
<td>HANDOVER REQUEST ACKNOWLEDGE</td>
<td>HANDOVER 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>HANDOVER CANCEL</td>
<td>HANDOVER CANCEL ACKNOWLEDGE</td>
<td></td>
</tr>
<tr>
<td>E-RAB Setup</td>
<td>E-RAB SETUP REQUEST</td>
<td>E-RAB SETUP RESPONSE</td>
<td></td>
</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>
<td>E-RAB MODIFICATION INDICATION</td>
<td>E-RAB MODIFICATION CONFIRM</td>
<td></td>
</tr>
<tr>
<td>E-RAB Release</td>
<td>E-RAB RELEASE COMMAND</td>
<td>E-RAB RELEASE RESPONSE</td>
<td></td>
</tr>
<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>
</tr>
<tr>
<td>UE Context Release</td>
<td>UE CONTEXT RELEASE COMMAND</td>
<td>UE CONTEXT RELEASE COMPLETE</td>
<td></td>
</tr>
<tr>
<td>UE Context Modification</td>
<td>UE CONTEXT MODIFICATION REQUEST</td>
<td>UE CONTEXT MODIFICATION RESPONSE</td>
<td>UE CONTEXT MODIFICATION FAILURE</td>
</tr>
<tr>
<td>eNB Configuration Update</td>
<td>ENB CONFIGURATION UPDATE</td>
<td>ENB CONFIGURATION UPDATE ACKNOWLEDGE</td>
<td>ENB CONFIGURATION UPDATE FAILURE</td>
</tr>
<tr>
<td>MME Configuration Update</td>
<td>MME CONFIGURATION UPDATE</td>
<td>MME CONFIGURATION UPDATE ACKNOWLEDGE</td>
<td>MME CONFIGURATION UPDATE FAILURE</td>
</tr>
<tr>
<td>Write-Replace Warning</td>
<td>WRITE-REPLACE WARNING REQUEST</td>
<td>WRITE-REPLACE WARNING RESPONSE</td>
<td></td>
</tr>
<tr>
<td>Kill</td>
<td>KILL REQUEST</td>
<td>KILL RESPONSE</td>
<td></td>
</tr>
<tr>
<td>UE Radio Capability Match</td>
<td>UE RADIO CAPABILITY MATCH REQUEST</td>
<td>UE RADIO CAPABILITY MATCH RESPONSE</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Class 2 procedures

<table>
<thead>
<tr>
<th>Elementary Procedure</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handover Notification</td>
<td>HANOVER NOTIFY</td>
</tr>
<tr>
<td>E-RAB Release Indication</td>
<td>E-RAB RELEASE INDICATION</td>
</tr>
<tr>
<td>Paging</td>
<td>PAGING</td>
</tr>
<tr>
<td>Initial UE Message</td>
<td>INITIAL UE MESSAGE</td>
</tr>
<tr>
<td>Downlink NAS Transport</td>
<td>DOWNLINK NAS TRANSPORT</td>
</tr>
<tr>
<td>Uplink NAS Transport</td>
<td>UPLINK NAS TRANSPORT</td>
</tr>
<tr>
<td>NAS non delivery indication</td>
<td>NAS NON DELIVERY INDICATION</td>
</tr>
<tr>
<td>Error Indication</td>
<td>ERROR INDICATION</td>
</tr>
<tr>
<td>UE Context Release Request</td>
<td>UE CONTEXT RELEASE REQUEST</td>
</tr>
<tr>
<td>Downlink S1 CDMA2000 Tunnelling</td>
<td>DOWNLINK S1 CDMA2000 TUNNELLING</td>
</tr>
<tr>
<td>Uplink S1 CDMA2000 Tunnelling</td>
<td>UPLINK S1 CDMA2000 TUNNELLING</td>
</tr>
<tr>
<td>UE Capability Info Indication</td>
<td>UE CAPABILITY INFO INDICATION</td>
</tr>
<tr>
<td>eNB Status Transfer</td>
<td>eNB STATUS TRANSFER</td>
</tr>
<tr>
<td>MME Status Transfer</td>
<td>MME STATUS TRANSFER</td>
</tr>
<tr>
<td>Deactivate Trace</td>
<td>DEACTIVATE TRACE</td>
</tr>
<tr>
<td>Trace Start</td>
<td>TRACE START</td>
</tr>
<tr>
<td>Trace Failure Indication</td>
<td>TRACE FAILURE INDICATION</td>
</tr>
<tr>
<td>Location Reporting Control</td>
<td>LOCATION REPORTING CONTROL</td>
</tr>
<tr>
<td>Location Reporting Failure Indication</td>
<td>LOCATION REPORTING FAILURE INDICATION</td>
</tr>
<tr>
<td>Location Report</td>
<td>LOCATION REPORT</td>
</tr>
<tr>
<td>Overload Start</td>
<td>OVERLOAD START</td>
</tr>
<tr>
<td>Overload Stop</td>
<td>OVERLOAD STOP</td>
</tr>
<tr>
<td>eNB Direct Information Transfer</td>
<td>eNB DIRECT INFORMATION TRANSFER</td>
</tr>
<tr>
<td>MME Direct Information Transfer</td>
<td>MME DIRECT INFORMATION TRANSFER</td>
</tr>
<tr>
<td>eNB Configuration Transfer</td>
<td>eNB CONFIGURATION TRANSFER</td>
</tr>
<tr>
<td>MME Configuration Transfer</td>
<td>MME CONFIGURATION TRANSFER</td>
</tr>
<tr>
<td>Cell Traffic Trace</td>
<td>CELL TRAFFIC TRACE</td>
</tr>
<tr>
<td>Downlink UE Associated LPPa Transport</td>
<td>DOWNLINK UE ASSOCIATED LPPA TRANSPORT</td>
</tr>
<tr>
<td>Uplink UE Associated LPPa Transport</td>
<td>UPLINK UE ASSOCIATED LPPA TRANSPORT</td>
</tr>
<tr>
<td>Downlink Non UE Associated LPPa Transport</td>
<td>DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT</td>
</tr>
<tr>
<td>Uplink Non UE Associated LPPa Transport</td>
<td>UPLINK NON UE ASSOCIATED LPPA TRANSPORT</td>
</tr>
<tr>
<td>PWS Restart Indication</td>
<td>PWS RESTART INDICATION</td>
</tr>
</tbody>
</table>

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

Figure 8.2.1.2-1: E-RAB Setup procedure. 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.

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.

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'.

---

**ETSI**
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

![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.

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.

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].
8.2.3.2.2 E-RAB Release Indication – eNB initiated

![Diagram](image)

**Figure 8.2.3.2.2-1: E-RAB Release INDICATION procedure. Successful operation.**

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].

**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.

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.

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.

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.

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 IEs set to the same value, 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

![Initial Context Setup procedure](image)

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 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 **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 **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 **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.

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]);
- 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 IE is applied, no suitable target is found, in which case it shall process according to TS 23.272 [17];
- the CS Fallback Indicator IE is set to 'CS Fallback High Priority' and the Additional CS Fallback Indicator IE is set to 'no restriction', in which case it shall process according to TS 23.272 [17].

If the Trace Activation IE is included in the INITIAL CONTEXT SETUP REQUEST message then 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 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 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 SIAP 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].

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

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., 'TX2RELOCOverall 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', for the requested UE-associated logical S1-connection release.

Interactions with UE Context Release procedure:

The UE Context Release procedure should be initiated upon reception of a UE CONTEXT RELEASE REQUEST message.

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

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 *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].

8.3.3.3 Abnormal Conditions

If the UE Context Release procedure is not initiated towards the eNB before the expiry of the timer TS1_{RELOCOvreal}, 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 TS1_{RELOCOvreal}, the eNB shall stop the TS1_{RELOCOvreal} 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]

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.

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].
- 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 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 '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).

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 to the MME 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.

8.4 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].

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].

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 with DTM but 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 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
  - 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

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 TS1_RELOCprep 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

![Diagram of Handover Resource Allocation]

Figure 8.4.2.2-1: Handover resource allocation: 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;
- 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 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 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.

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 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 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).

### 8.4.2.3 Unsuccessful Operation

![Handover Resource Allocation: Unsuccessful Operation](image)

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 \textit{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 an \textit{E-RAB Level QoS Parameters} IE which contains a \textit{QCI} IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the \textit{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 \textit{E-RAB ID} IEs (in the \textit{E-RABs To Be Setup List} IE) set to the same value, the target eNB shall not admit the corresponding E-RABs.

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

\textbf{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 \textit{Encryption Algorithms} IE in the \textit{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 \textit{Integrity Protection Algorithms} IE in the \textit{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 \textit{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 \textit{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

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{handover_notification.png}
\caption{Handover notification}
\end{figure}

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 \textit{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].

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.

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 ACKNOWLEDGE 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].

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**Figure 8.4.4.2-1: Path switch request: successful operation**

The eNB initiates the procedure by sending the PATH SWITCH REQUEST message to the MME.

If a source MME GUMMEI IE is not included in the PATH SWITCH REQUEST message, the eNB shall include it in the PATH SWITCH REQUEST message.
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).

8.4.4.3 Unsuccessful Operation

![Figure 8.4.4.3-1: Path switch request: unsuccessful operation](image)

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

![Figure 8.4.5.2-1: Handover Cancel procedure. Successful operation.](image)

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.

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 the Receive Status Of UL PDCP SDUs Extended IE 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

![Diagram](image)

Figure 8.4.7.2-1: MME Status Transfer procedure

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 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 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 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 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 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

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 TAI 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 TAI 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.

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 or UPLINK NAS TRANSPORT messages.
8.6.2 Successful Operations

8.6.2.1 Initial UE Message

When the eNB has received from the radio interface the first UL NAS message transmitted on an RRC connection 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].

NOTE: The first UL NAS message is always received in the RRC CONNECTION SETUP COMPLETE message.
8.6.2.2 DOWNLINK NAS TRANSPORT

Figure 8.6.2.2-1: DOWNLINK NAS Transport Procedure

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].

8.6.2.3 UPLINK NAS TRANSPORT

Figure 8.6.2.3-1: UPLINK NAS TRANSPORT Procedure
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 \textit{NAS-PDU} IE. The eNB shall include the TAI and ECGI of the current cell in every S1-AP UPLINK NAS TRANSPORT message.

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

If the eNB has a L-GW function for LIPA operation, it shall include the \textit{GW Transport Layer Address} IE in the UPLINK NAS TRANSPORT message.

If the \textit{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 \textit{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].

\subsection*{8.6.2.4 NAS NON DELIVERY INDICATION}

![Figure 8.6.2.4-1: NAS NON DELIVERY INDICATION Procedure](image)

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 \textit{NAS-PDU} IE and an appropriate cause value within an appropriate \textit{Cause} IE, e.g., 'S1 intra system Handover Triggered', 'S1 inter system Handover Triggered' or 'X2 Handover Triggered'.

\section*{8.6.3 Unsuccessful Operation}

Not applicable.

\section*{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.

\section*{8.7 Management procedures}

\subsection*{8.7.1 Reset}

\subsubsection*{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

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 theRESET 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 S1AP ID** IE and/or the **eNB UE S1AP 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** 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 eNB 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 the **UE-associated logical S1-connection Item** IE for a UE association, the eNB 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.
8.7.1.2.2 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 S1AP 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 the `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 list** IE in the RESE TACKNOWLEDGE 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 SIAP ID** IE nor the **eNB UE SIAP 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 list** IE in the RESE TACKNOWLEDGE 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 RESE TACKNOWLEDGE 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 RESE TACKNOWLEDGE 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

![Figure 8.7.2.2-1: Error Indication procedure, MME originated. Successful operation.](image1)

![Figure 8.7.2.2-2: Error Indication procedure, eNB originated. Successful operation.](image2)

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 SIAP ID** IE and the **eNB UE SIAP ID** IE shall be included in the ERROR INDICATION message. If one or both of **MME UE SIAP 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. 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, and clears MME overload state information at the eNB. 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.
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

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.

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

![Diagram](image.png)

**Figure 8.7.4.3-1: ENB Configuration Update procedure: 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

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.

8.7.5.3 Unsuccessful Operation

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' 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' 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]),

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 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.
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 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. 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

![Diagram of Downlink S1 CDMA2000 Tunnelling Procedure]

Figure 8.8.2.1-1: Downlink S1 CDMA2000 Tunnelling Procedure

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-PDU IE based on 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

![Diagram of Uplink S1 CDMA2000 Tunnelling Procedure]

Figure 8.8.2.2-1: Uplink S1 CDMA2000 Tunnelling Procedure

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 any previously stored UE capability information in the MME for the UE.
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

![Figure 8.10.1.2-1: Trace Start procedure.](image)

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 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, 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].

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.]

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.]

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

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

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.

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

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

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.

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

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 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 send this IE together with the Warning Type IE 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].

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.

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

Figure 8.12.3.2-1: PWS Restart Indication procedure. Successful operation.
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.

### 8.13 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**

![Figure 8.13.1.2-1: ENB Direct Information Transfer procedure. Successful operation.](image)

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

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

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.
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 of MME Configuration Transfer procedure.](image)

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, the SON Information IE containing the SON Information Request IE, it may transfer back the requested information towards the eNB indicated in the Source eNB-ID IE of the 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.

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' or 'Deactivate Muting', the eNB should consider activating or deactivating muting 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.

### 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

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

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

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.
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></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB to be Setup List</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-RAB To Be Setup Item IEs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EACH</td>
<td>reject</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></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></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>EPC TEID.</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>EPC TEID.</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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Correlation ID</td>
<td></td>
<td></td>
<td>9.2.1.80</td>
<td>Correlation ID</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;SIPTO Correlation ID</td>
<td></td>
<td></td>
<td>9.2.1.80</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

**Range bound** | **Explanation**
---|---
maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.
9.1.3.2 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></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>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>E-RAB Setup List</td>
<td></td>
<td>0..1</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-RAB Setup Item IEs</td>
<td></td>
<td></td>
<td></td>
<td>EACH</td>
<td>ignore</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>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed to Setup 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 Setup List IE and in E-RAB Failed to Setup List IE.</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>

<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>9.2.1.1</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES reject</td>
<td></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 reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB to be Modified List</td>
<td></td>
<td>1</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB To be Modified Item IEs</td>
<td></td>
<td></td>
<td>EACH 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;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;NAS-PDU</td>
<td>M</td>
<td>9.2.3.5</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Information</td>
<td>O</td>
<td></td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UL GTP TEID</td>
<td>M</td>
<td>GTP-TEID 9.2.2</td>
<td>-</td>
<td></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.

9.1.3.4 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 reject</td>
<td></td>
<td></td>
<td></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></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Modify List</td>
<td></td>
<td>0..1</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Modify Item IEs</td>
<td></td>
<td></td>
<td>EACH 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></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>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></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></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>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 Aggregate Maximum Bit Rate</td>
<td>O</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 Released List</td>
<td>M</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 Released List IE.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>NAS-PDU</td>
<td>O</td>
<td></td>
<td>9.2.3.5</td>
<td>YES</td>
<td></td>
<td>ignore</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></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 Release List</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;E-RAB Release Item IEs</td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td></td>
<td>EACH</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>E-RAB ID</td>
<td>M</td>
<td></td>
<td>9.2.1.2</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>E-RAB Failed to Release 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 Release List IE and E-RAB Failed to Release List IE.</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></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></td>
<td>ignore</td>
</tr>
</tbody>
</table>
### 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>
</tbody>
</table>

**Range bound:**

| 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>E-RAB to be Modified List</td>
<td>1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></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>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 9.2.2.2</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB not to be Modified List</td>
<td>0..1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&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 9.2.2.2</td>
<td>-</td>
<td></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></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>E-RAB Modify List</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;E-RAB Modify 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>E-RAB Failed to Modify 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 Modify List IE + E-RAB Failed to Modify List IE.</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>

#### Range bound

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

### 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></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>M</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>
<tr>
<td>&gt;E-RAB to Be Setup 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;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></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

#### Range bound

<p>| maxnoofE-RABs | Maximum no. of E-RAB allowed towards one UE, the maximum value is 256. |</p>
<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>Correlation ID</td>
<td>9.2.1.80</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Security Capabilities</td>
<td>M</td>
<td>9.2.1.40</td>
<td></td>
<td>YES reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>Security Key</td>
<td>M</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 reject</td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>Trace Activation</td>
<td>O</td>
<td>9.2.1.4</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Handover Restriction List</td>
<td>O</td>
<td>9.2.1.22</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>UE Radio Capability</td>
<td>O</td>
<td>9.2.1.27</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</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>ignore</td>
</tr>
<tr>
<td>CS Fallback Indicator</td>
<td>O</td>
<td>9.2.3.21</td>
<td></td>
<td>YES reject</td>
<td></td>
<td>reject</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>ignore</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>ignore</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>ignore</td>
</tr>
<tr>
<td>GUMMEI</td>
<td>O</td>
<td>9.2.3.9</td>
<td></td>
<td>This IE indicates the MME serving the UE.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>MME UE S1AP ID 2</td>
<td>O</td>
<td>9.2.3.3</td>
<td></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>9.2.1.83</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Management Based MDT PLMN List</td>
<td>O</td>
<td>MDT PLMN List 9.2.1.89</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Additional CS Fallback Indicator</td>
<td>C- ifCSFBHighPriority</td>
<td>9.2.3.37</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Masked IMEISV</td>
<td>O</td>
<td>9.2.3.38</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Expected UE Behaviour</td>
<td>O</td>
<td>9.2.1.96</td>
<td></td>
<td>YES ignore</td>
<td></td>
<td>ignore</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>ignore</td>
</tr>
</tbody>
</table>

**Range bound**

maxnoofE-RABs

**Explanation**

Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.

**Condition**

ifCSFBHighPriority

**Explanation**

This IE shall be present if the CS Fallback Indicator IE is set to 'CS Fallback High Priority'.

### 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
### 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></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>
</tbody>
</table>

**Criticality Diagnostics**

<table>
<thead>
<tr>
<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>O</td>
<td></td>
<td>9.2.1.21</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

---

**Range bound**

<table>
<thead>
<tr>
<th>MaxnoofE-RABs</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.</td>
<td></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></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>
<tr>
<td>GW Context Release Indication</td>
<td>O</td>
<td></td>
<td>9.2.1.84</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>
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>9.2.1.1</td>
<td>YES reject</td>
<td></td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>CHOICE UE S1AP IDs</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>&gt;&gt;UE S1AP ID pair</td>
<td>M</td>
<td>9.2.3.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;MME UE S1AP ID</td>
<td>M</td>
<td>9.2.3.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td>YES ignore</td>
<td></td>
<td></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>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>YES ignore</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>User Location Information</td>
<td>O</td>
<td>9.2.1.93</td>
<td>YES ignore</td>
<td></td>
<td></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>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 reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Key</td>
<td>O</td>
<td>9.2.1.41</td>
<td></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</td>
<td>reject</td>
</tr>
<tr>
<td>Subscriber Profile ID for RAT/Frequency priority</td>
<td>O</td>
<td>9.2.1.39</td>
<td>YES ignore</td>
<td></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 ignore</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>CS Fallback Indicator</td>
<td>O</td>
<td>9.2.3.21</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Security Capabilities</td>
<td>O</td>
<td>9.2.1.40</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td>9.2.1.73</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Registered LAI</td>
<td>O</td>
<td>9.2.3.1</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Additional CS Fallback Indicator</td>
<td>C- ifCSFBhigh hpriority</td>
<td>9.2.3.37</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProSe Authorized</td>
<td>O</td>
<td>9.2.1.99</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td>ignore</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</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>
</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

<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>

### 9.1.4.11 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>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 Radio Capability</td>
<td>O</td>
<td></td>
<td>9.2.1.27</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
9.1.5 Handover Signalling Messages

9.1.5.1 HANOVER REQUIRED

This message is sent by the source eNB to the MME to request the preparation of resources at the target.

Direction: eNB → MME.

---

**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 HANOVER 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 $\rightarrow$ 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>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>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>C-ifoUTRANGERAN</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>
<tr>
<td>E-RABs Subject to Forwards List</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;E-RABs Subject to Forwarding Item IEs</td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td>YES</td>
<td></td>
<td></td>
<td>EACH</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>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</td>
<td>9.2.1.36</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</td>
<td>O</td>
<td></td>
<td>Target to Source Transparent Container</td>
<td>9.2.1.57</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>

**Condition**

<table>
<thead>
<tr>
<th>Explanation</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>

**Range bound**

<table>
<thead>
<tr>
<th>Explanation</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></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>
9.1.5.4 HANOVER REQUEST

This message is sent by the MME to the target eNB to request the preparation of resources. Direction: MME → eNB.

### Table: E-RABs To Be Setup 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>Message Type</td>
<td>M</td>
<td></td>
<td>M  9.2.1.1</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MME UE STAP ID</td>
<td>M</td>
<td></td>
<td>M  9.2.3.3</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover Type</td>
<td>M</td>
<td></td>
<td>M  9.2.1.13</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td></td>
<td>M  9.2.1.3</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Aggregate Maximum Bit Rate</td>
<td>M</td>
<td></td>
<td>M  9.2.1.20</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**E-RABs To Be Setup List**

<table>
<thead>
<tr>
<th>&gt;E-RABs To Be Setup Item IE s</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 ID</td>
<td>M</td>
<td>M  9.2.1.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport Layer Address</td>
<td>M</td>
<td>M  9.2.2.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTP-TEID</td>
<td>M</td>
<td>M  9.2.2.2</td>
<td>To deliver UL PDUs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB Level QoS Parameters</td>
<td>M</td>
<td>M  9.2.1.15</td>
<td>Includes necessary QoS parameters.</td>
<td>YES ignore</td>
<td></td>
</tr>
<tr>
<td>Data Forwarding Not Possible</td>
<td>O</td>
<td>M  9.2.1.76</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Source to Target Transparent Container</td>
<td>M</td>
<td>M  9.2.1.56</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Security Capabilities</td>
<td>M</td>
<td>M  9.2.1.40</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover Restriction List</td>
<td>O</td>
<td>M  9.2.1.22</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trace Activation</td>
<td>O</td>
<td>M  9.2.1.4</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Request Type</td>
<td>O</td>
<td>M  9.2.1.34</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRVCC Operation Possible</td>
<td>O</td>
<td>M  9.2.1.58</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Context</td>
<td>M</td>
<td>M  9.2.1.26</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAS Security Parameters to E-UTRAN</td>
<td>C-</td>
<td>C-iffromUTRANGERAN 9.2.3.31</td>
<td>The eNB shall use this IE as specified in TS 33.401 [15].</td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CSG Id</td>
<td>O</td>
<td>M  9.2.1.62</td>
<td>YES reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td>M  9.2.1.73</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GUMMEI</td>
<td>O</td>
<td>M  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>M  9.2.3.3</td>
<td>This IE indicates the MME UE STAP ID assigned by the MME.</td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Management Based MDT Allowed</td>
<td>O</td>
<td>M  9.2.1.83</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Based MDT PLMN List</td>
<td>O</td>
<td>M  9.2.1.89</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masked IMEISV</td>
<td>O</td>
<td>M  9.2.3.38</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected UE Behaviour</td>
<td>O</td>
<td>M  9.2.1.96</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProSe Authorized</td>
<td>O</td>
<td>M  9.2.1.99</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>C-iffromUTRANGERAN</td>
<td>This IE shall be present if the Handover Type IE is set to the value 'UTRANtoLTE' or 'GERANtoLTE'.</td>
</tr>
</tbody>
</table>

### Range bound

<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>
9.1.5.5  HANDOVER REQUEST ACKNOWLEDGE

This message is sent by the target eNB to inform the MME about the prepared resources at the target.

<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>ignore</td>
<td></td>
</tr>
<tr>
<td>eNB UE STAP ID</td>
<td>M</td>
<td></td>
<td>9.2.3.4</td>
<td>Allocated at the target eNB.</td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

E-RABs Admitted 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>&gt;E-RABs Admitted Item IEs</td>
<td>1..&lt;maxnoofE-RABs&gt;</td>
<td>EACH</td>
<td>ignore</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;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></td>
<td>9.2.2.2</td>
<td>To deliver DL PDUs.</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></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>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></td>
<td>9.2.2.2</td>
<td>To deliver forwarded UL PDCP SDUs.</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

E-RABs Failed to Setup 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 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>
</tbody>
</table>

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>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target to Source Transparent Container</td>
<td>M</td>
<td>9.2.1.57</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CSG 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>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>

Criticality Diagnostics

<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>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>

Cell Access Mode

<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 Access Mode</td>
<td>O</td>
<td>9.2.1.74</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.5.6  HANDOVER FAILURE

This message is sent by the target eNB to inform the MME that the preparation of resources has failed.

<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>ignore</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>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>
9.1.5.7 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></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>Tunnel Information for BBF</td>
<td>O</td>
<td></td>
<td>9.2.2.3</td>
<td>Tunnel Information 9.2.2.3 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>LHN ID</td>
<td>O</td>
<td></td>
<td>9.2.1.92</td>
<td></td>
<td>YES</td>
<td>ignore</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>9.2.1.1</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>M</td>
<td>9.2.3.4</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-RAB To Be Switched in Downlink List</td>
<td>1</td>
<td>YES reject</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;E-RABs Switched in Downlink 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;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>Source 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>E-UTRAN CGI</td>
<td>M</td>
<td>9.2.1.38</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAI</td>
<td>M</td>
<td>9.2.3.16</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Security Capabilities</td>
<td>M</td>
<td>9.2.1.40</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSG Id</td>
<td>O</td>
<td>9.2.1.62</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell Access Mode</td>
<td>O</td>
<td>9.2.1.74</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source MME GUMMEI</td>
<td>O</td>
<td>9.2.3.9</td>
<td>YES ignore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSG Membership Status</td>
<td>O</td>
<td>9.2.1.73</td>
<td>YES ignore</td>
<td></td>
<td></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>YES ignore</td>
<td></td>
<td></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></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>UE Aggregate Maximum Bit Rate</td>
<td>O</td>
<td></td>
<td>9.2.1.20</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>E-RAB To Be Switched in Uplink List</td>
<td>0..1</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;E-RABs Switched in Uplink Item IEs</td>
<td>1...&lt;maxnofE-RABs&gt;</td>
<td>EACH</td>
<td></td>
<td></td>
<td>EACH</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>ignore</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>ignore</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>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></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Security Context</td>
<td>M</td>
<td></td>
<td>9.2.1.26</td>
<td>One pair of (NCC, NH) is provided.</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>
<tr>
<td>MME UE S1AP 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>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>ProSe Authorized</td>
<td>O</td>
<td></td>
<td>9.2.1.99</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>maxnofE-RABs</td>
<td>Maximum no. of E-RABs for one UE. Value is 256.</td>
</tr>
</tbody>
</table>

### 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></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>

### 9.1.5.11 HANDOVER CANCEL

This message is sent by the source eNB to the MME to request the cancellation of an ongoing handover.
9.1.5.12 HANOVER 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>YES</td>
<td>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>M</td>
<td>YES</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>YES</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>YES</td>
<td>9.2.1.3</td>
<td>YES</td>
<td>ignore</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>YES</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>YES</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>YES</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB Status Transfer</td>
<td>M</td>
<td>YES</td>
<td>9.2.1.31</td>
<td>YES</td>
<td>reject</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

<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>YES</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>YES</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>YES</td>
<td>9.2.3.4</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB Status Transfer</td>
<td>M</td>
<td>YES</td>
<td>9.2.1.31</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
</tbody>
</table>

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>9.2.1.1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Identity Index value</td>
<td>M</td>
<td>9.2.3.10</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Paging Identity</td>
<td>M</td>
<td>9.2.3.13</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paging DRX</td>
<td>O</td>
<td>9.2.1.16</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN Domain</td>
<td>M</td>
<td>9.2.3.22</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>List of TAls</td>
<td>1</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;TAI List Item</td>
<td>1..&lt;maxnoofTAls&gt;</td>
<td></td>
<td>EACH</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;TAI</td>
<td>M</td>
<td>9.2.3.16</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSG Id List</td>
<td>0..1</td>
<td></td>
<td>GLOBAL</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;CSG Id</td>
<td>1..&lt;maxnoofCSGId&gt;</td>
<td></td>
<td>9.2.1.62</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paging Priority</td>
<td>O</td>
<td>9.2.1.78</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE Radio Capability for Paging</td>
<td>O</td>
<td>9.2.1.98</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range bound |
---|
maxnoofTAls  | Maximum no. of TAI. 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></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>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>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></td>
<td>YES</td>
<td>Ignore</td>
</tr>
<tr>
<td>S-TMSI</td>
<td>O</td>
<td></td>
<td>9.2.3.6</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CSG Id</td>
<td>O</td>
<td></td>
<td>9.2.1.62</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>GUMMEI</td>
<td>O</td>
<td></td>
<td>9.2.3.9</td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cell Access Mode</td>
<td>O</td>
<td></td>
<td>9.2.1.74</td>
<td></td>
<td>YES</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, ...)</td>
<td></td>
<td>YES</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></td>
<td>YES</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>
</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

<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 M</td>
<td>M</td>
<td>9.2.1.1</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID M</td>
<td>M</td>
<td>9.2.3.3</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID M</td>
<td>M</td>
<td>9.2.3.4</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>NAS-PDU M</td>
<td>M</td>
<td>9.2.3.5</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>E-UTRAN CGI M</td>
<td>M</td>
<td>9.2.1.38</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>TAI M</td>
<td>M</td>
<td>9.2.3.16</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>GW Transport Layer Address O</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 ignore</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIPTO L-GW Transport Layer Address O</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 ignore</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LHN ID O</td>
<td>9.2.1.92</td>
<td></td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

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 M</td>
<td>M</td>
<td>9.2.1.1</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>MME UE S1AP ID M</td>
<td>M</td>
<td>9.2.3.3</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>eNB UE S1AP ID M</td>
<td>M</td>
<td>9.2.3.4</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>NAS-PDU M</td>
<td>M</td>
<td>9.2.3.5</td>
<td></td>
<td>YES reject</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Cause M</td>
<td>M</td>
<td>9.2.1.3</td>
<td></td>
<td>YES ignore</td>
<td>ignore</td>
<td></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>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>CHOICE Reset Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;S1 interface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Reset All</td>
<td>M</td>
<td>ENUMERATED</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Part of S1 interface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UE-associated logical S1-connection list</td>
<td>1</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;UE-associated logical S1-connection item</td>
<td>0..1</td>
<td>9.2.3.3</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>9.2.3.3</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;eNB UE S1AP ID</td>
<td>O</td>
<td>9.2.3.4</td>
<td></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>9.2.1.1</td>
<td>YES</td>
<td>reject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE-associated logical S1-connection list</td>
<td></td>
<td>0..1</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;UE-associated logical S1-connection item</td>
<td>0..1</td>
<td>9.2.3.3</td>
<td>EACH</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;MME UE S1AP ID</td>
<td>O</td>
<td>9.2.3.3</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;eNB UE S1AP ID</td>
<td>O</td>
<td>9.2.3.4</td>
<td></td>
<td>-</td>
<td></td>
<td></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
### 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>YES</td>
<td></td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>MME UE S1AP ID</td>
<td>O</td>
<td>9.2.3.3</td>
<td>YES</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>eNB UE S1AP ID</td>
<td>O</td>
<td>9.2.3.4</td>
<td>YES</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Cause</td>
<td>O</td>
<td>9.2.1.3</td>
<td>YES</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td>9.2.1.21</td>
<td>YES</td>
<td></td>
<td></td>
<td>ignore</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>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>Global eNB ID</td>
<td>M</td>
<td>9.2.1.37</td>
<td>YES</td>
<td></td>
<td></td>
<td>reject</td>
</tr>
<tr>
<td>eNB Name</td>
<td>O</td>
<td>PrintableString(SIZE(1..150,…))</td>
<td>YES</td>
<td>ignore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supported TAs</td>
<td>1..&lt;maxnofTACs</td>
<td></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;maxnofPLMNs</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>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Default Paging DRX</td>
<td>M</td>
<td>9.2.1.16</td>
<td>YES</td>
<td></td>
<td></td>
<td>ignore</td>
</tr>
<tr>
<td>CSG Id List</td>
<td>0..1</td>
<td>9.2.1.62</td>
<td>GLOBAL</td>
<td></td>
<td></td>
<td>reject</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnofTACs</td>
<td>Maximum no. of TACs. Value is 256.</td>
</tr>
<tr>
<td>maxnofPLMNs</td>
<td>Maximum no. of Broadcast PLMNs. Value is 6.</td>
</tr>
<tr>
<td>maxnofCSGIds</td>
<td>Maximum no. of CSG Ids within the CSG Id List. Value is 256.</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 → 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 → MME
### 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

<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>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>

**Range bound**
- maxnoofTACs: Maximum no. of TACs. Value is 256.
- maxnoofBPLMNs: Maximum no. of Broadcast PLMNs. Value is 6.
- maxnoofCSGIds: Maximum no. of CSG Ids within the CSG Id List. Value is 256.

### 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></td>
<td>YES</td>
<td>reject</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>Time to wait</td>
<td>O</td>
<td>9.2.1.61</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>

### 9.1.8.10  **MME CONFIGURATION UPDATE**

This message is sent by the MME to transfer updated information for a TNL association.

**Direction:** MME → eNB
### 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

<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>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>

### 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></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>Cause</td>
<td>M</td>
<td>9.2.1.3</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>Time to wait</td>
<td>O</td>
<td>9.2.1.61</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</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>

### OVERLOAD START

This message is sent by the MME and is used to indicate to the eNB that the MME is overloaded.
### 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></td>
<td>YES</td>
<td>reject</td>
<td>ignore</td>
</tr>
<tr>
<td>Overload Response</td>
<td>M</td>
<td>9.2.3.19</td>
<td></td>
<td>YES</td>
<td>reject</td>
<td>ignore</td>
</tr>
<tr>
<td>GUMMEI List</td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>GUMMEI List Item</td>
<td>1..&lt;maxnoofMMECs&gt;</td>
<td></td>
<td></td>
<td>EACH</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Traffic Load Reduction</td>
<td>O</td>
<td>9.2.3.36</td>
<td></td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**

| maxnoofMMECs | Maximum no. of MMECs per node per RAT. Value is 256. |

**Explanation**

**Range bound**

| maxnoofMMECs | Maximum no. of MMECs per node per RAT. Value is 256. |
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 → 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></td>
<td>0..1</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>&gt;&gt;E-RABs Subject to Forwarding Item IEs</td>
<td>1..&lt;maxnoof E-RABs&gt;</td>
<td>EACH</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</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;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;DL GTP-TEID</td>
<td>O</td>
<td>9.2.2.2</td>
<td></td>
<td>This IE indicates the tunnel endpoint for forwarding of DL data.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;UL GTP-TEID</td>
<td>O</td>
<td>9.2.2.2</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CDMA2000 HO Status</td>
<td>O</td>
<td>9.2.1.28</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CDMA2000 RAT Type</td>
<td>M</td>
<td>9.2.1.24</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000-PDU</td>
<td>M</td>
<td>9.2.1.23</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
</tbody>
</table>

**Range bound**

- 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 → 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>9.2.1.24</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 Sector ID</td>
<td>M</td>
<td>9.2.1.25</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 HO Required Indication</td>
<td>O</td>
<td>9.2.1.29</td>
<td></td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>CDMA2000 1xRTT SRVCC Info</td>
<td>O</td>
<td>9.2.1.35</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000 1xRTT RAND</td>
<td>O</td>
<td>9.2.1.33</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>CDMA2000-PDU</td>
<td>M</td>
<td>9.2.1.23</td>
<td></td>
<td></td>
<td>YES</td>
<td>reject</td>
</tr>
<tr>
<td>E-UTRAN Round Trip Delay Estimation Info</td>
<td>O</td>
<td>9.2.1.69</td>
<td></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 → MME
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></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>UE Radio Capability</td>
<td>M</td>
<td></td>
<td>9.2.1.27</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
<tr>
<td>UE Radio Capability for Paging</td>
<td>O</td>
<td></td>
<td>9.2.1.98</td>
<td></td>
<td>YES</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

<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>

9.1.11.3 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>
</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>
</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
### 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>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Message Identifier</td>
<td>M</td>
<td></td>
<td>9.2.1.44</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Serial Number</td>
<td>M</td>
<td></td>
<td>9.2.1.45</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Warning Area List</td>
<td>O</td>
<td></td>
<td>9.2.1.46</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Repetition Period</td>
<td>M</td>
<td></td>
<td>9.2.1.48</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Extended Repetition Period</td>
<td>O</td>
<td></td>
<td>9.2.1.75</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Number of Broadcasts Requested</td>
<td>M</td>
<td></td>
<td>9.2.1.49</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Warning Type</td>
<td>O</td>
<td></td>
<td>9.2.1.50</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Warning Security Information</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>Data Coding Scheme</td>
<td>O</td>
<td></td>
<td>9.2.1.52</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Warning Message Contents</td>
<td>O</td>
<td></td>
<td>9.2.1.53</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Concurrent Warning Message Indicator</td>
<td>O</td>
<td></td>
<td>9.2.1.72</td>
<td>YES</td>
<td>reject</td>
<td></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.

**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>Message Identifier</td>
<td>M</td>
<td></td>
<td>9.2.1.44</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Serial Number</td>
<td>M</td>
<td></td>
<td>9.2.1.45</td>
<td>YES</td>
<td>reject</td>
<td></td>
</tr>
<tr>
<td>Broadcast Completed Area List</td>
<td>O</td>
<td></td>
<td>9.2.1.54</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>Criticality Diagnostics</td>
<td>O</td>
<td></td>
<td>9.2.1.21</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

### 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
### 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>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>Broadcast Cancelled Area List</td>
<td>O</td>
<td>9.2.1.70</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**
- maxnoofCellsforRestart: Maximum no. of Cell ID subject for reloading warning messages broadcast. Value is 256.
- maxnoofRestartTAls: Maximum no. of TAI subject for reloading warning message broadcast. Value is 2048.
- maxnoofRestartEmergencyAreaViewID: Maximum no. of Emergency Area ID subject for reloading warning message broadcast. 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.
### 9.1.16 eNB CONFIGURATION TRANSFER

This message is sent by the eNB in order to transfer RAN configuration information.

**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>Inter-system Information Transfer Type</td>
<td>M</td>
<td></td>
<td>9.2.1.55</td>
<td></td>
<td>YES</td>
<td>reject</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 \(\rightarrow\) 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>SON Configuration Transfer</td>
<td>O</td>
<td></td>
<td>9.2.3.26</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 \(\rightarrow\) 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>E-UTRAN Trace ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(8))</td>
<td>The E-UTRAN Trace ID IE is composed of the following: Trace Reference defined in TS 32.422 [10] (leftmost 6 octets, with PLMN information coded as in 9.2.3.8), and Trace Recording Session Reference defined in TS 32.422 [10] (last 2 octets).</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 $\rightarrow$ 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>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 $\rightarrow$ 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>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>

9.1.19.3 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 $\rightarrow$ 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>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>

9.1.19.4 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 $\rightarrow$ 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>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>
9.2  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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Message</td>
<td>M</td>
<td></td>
<td>CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, …)</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</td>
<td>(0..15, …)</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></td>
<td></td>
</tr>
<tr>
<td>&gt;Radio Network Layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Radio Network Layer Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Unspecified, TX2RELOCoveral 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, TS1RELOCoveral Expiry, TS1RELOCprep 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, X2 Handover triggered, ..., Redirection towards 1xRTT, Not supported QCI value, invalid CSG Id)</td>
</tr>
<tr>
<td>&gt;Transport Layer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Transport Layer Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Transport Resource Unavailable, Unspecified, ...)</td>
</tr>
<tr>
<td>&gt;NAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;NAS Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Normal Release, Authentication failure, Detach, Unspecified, ..., CSG Subscription Expiry)</td>
</tr>
<tr>
<td>&gt;Protocol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Protocol Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(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>&gt;Misc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Miscellaneous Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>(Control Processing Overload, Not enough User Plane Processing Resources, Hardware Failure, ...)</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.

<table>
<thead>
<tr>
<th>Radio Network Layer cause</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified</td>
<td>Sent for radio network layer cause when none of the specified cause values applies.</td>
</tr>
<tr>
<td>TX2RELOCOverall Expiry</td>
<td>The timer guarding the handover that takes place over X2 has abnormally expired.</td>
</tr>
<tr>
<td>Successful Handover</td>
<td>Successful handover.</td>
</tr>
<tr>
<td>Release due to E-UTRAN generated reason</td>
<td>Release is initiated due to E-UTRAN generated reason.</td>
</tr>
<tr>
<td>Handover Cancelled</td>
<td>The reason for the action is cancellation of Handover.</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>
</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>
</tr>
<tr>
<td>Handover Target not allowed</td>
<td>Handover to the indicated target cell is not allowed for the UE in question.</td>
</tr>
<tr>
<td>TS1RELOCoverall Expiry</td>
<td>The reason for the action is expiry of timer TS1RELOCoverall.</td>
</tr>
<tr>
<td>TS1RELOCprep Expiry</td>
<td>Handover Preparation procedure is cancelled when timer TS1RELOCprep expires.</td>
</tr>
<tr>
<td>Cell not available</td>
<td>The concerned cell is not available.</td>
</tr>
<tr>
<td>Unknown Target ID</td>
<td>Handover rejected because the target ID is not known to the EPC.</td>
</tr>
<tr>
<td>No radio resources available in target cell</td>
<td>Load on target cell is too high.</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>
</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>
</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>
</tr>
<tr>
<td>Handover Desirable for Radio Reasons</td>
<td>The reason for requesting handover is radio related.</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>
</tr>
<tr>
<td>Resource Optimisation Handover</td>
<td>The reason for requesting handover is to improve the load distribution with the neighbour cells.</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>
</tr>
<tr>
<td>Condition</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>User Inactivity</td>
<td>The action is requested due to user inactivity on all E-RABs.</td>
</tr>
<tr>
<td>Radio Connection With UE Lost</td>
<td>The action is requested due to losing the radio connection to the UE.</td>
</tr>
<tr>
<td>Load Balancing TAU Required</td>
<td>The action is requested for all load balancing and offload cases in the MME.</td>
</tr>
<tr>
<td>CS Fallback triggered</td>
<td>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.</td>
</tr>
<tr>
<td>UE Not Available for PS Service</td>
<td>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.</td>
</tr>
<tr>
<td>Radio resources not available</td>
<td>No requested radio resources are available.</td>
</tr>
<tr>
<td>Invalid QoS combination</td>
<td>The action was failed because of invalid QoS combination.</td>
</tr>
<tr>
<td>Inter-RAT Redirection</td>
<td>The release is requested due to inter-RAT redirection. When it is included in UE CONTEXT RELEASE REQUEST message, it indicates the PS service suspension is not required in the EPC.</td>
</tr>
<tr>
<td>Failure in the Radio Interface Procedure</td>
<td>Radio interface procedure has failed.</td>
</tr>
<tr>
<td>Interaction with other procedure</td>
<td>The action is due to an ongoing interaction with another procedure.</td>
</tr>
<tr>
<td>Unknown E-RAB ID</td>
<td>The action failed because the E-RAB ID is unknown in the eNB.</td>
</tr>
<tr>
<td>Multiple E-RAB ID Instances</td>
<td>The action failed because multiple instance of the same E-RAB had been provided to the eNB.</td>
</tr>
<tr>
<td>Encryption and/or integrity protection algorithms not supported</td>
<td>The eNB is unable to support any of the encryption and/or integrity protection algorithms supported by the UE.</td>
</tr>
<tr>
<td>S1 Intra system Handover triggered</td>
<td>The action is due to a S1 intra system handover that has been triggered.</td>
</tr>
<tr>
<td>S1 Inter system Handover triggered</td>
<td>The action is due to a S1 inter system handover that has been triggered.</td>
</tr>
<tr>
<td>X2 Handover triggered</td>
<td>The action is due to an X2 handover that has been triggered.</td>
</tr>
<tr>
<td>Redirection towards 1xRTT</td>
<td>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.</td>
</tr>
<tr>
<td>Not supported QCI Value</td>
<td>The E-RAB setup failed because the requested QCI is not supported.</td>
</tr>
<tr>
<td>Invalid CSG Id</td>
<td>The CSG ID provided to the target eNB was found invalid.</td>
</tr>
</tbody>
</table>

<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. The encoding is the same as that of the Establishment Cause IE 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, ... delayedTolerantAccess)</td>
<td></td>
</tr>
</tbody>
</table>

#### 9.2.1.4 Trace Activation

Defines parameters related to a trace 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>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-UTRAN Trace ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(8))</td>
<td>The E-UTRAN Trace ID IE is composed of the following: Trace Reference defined in TS 32.422 [10] (leftmost 6 octets, with PLMN information coded as in 9.2.3.8), and Trace Recording Session Reference defined in TS 32.422 [10] (last 2 octets).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interfaces To Trace</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(8))</td>
<td>Each position in the bitmap represents a eNB interface: first bit =S1-MME, second bit =X2, third bit =Uu; other bits reserved for future use. Value &quot;1&quot; indicates &quot;should be traced&quot;. Value &quot;0&quot; indicates &quot;should not be traced&quot;.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trace depth</td>
<td>M</td>
<td></td>
<td>ENUMERATED(</td>
<td>Defined in TS 32.422 [10].</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trace Collection</td>
<td>M</td>
<td></td>
<td>Transport Layer Address 9.2.2.1</td>
<td>Defined in TS 32.422 [10].</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entity IP Address</td>
<td>O</td>
<td></td>
<td>9.2.1.81</td>
<td>YES ignore</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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.

<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>CHOICE Target ID</strong></td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Target eNB-ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Global 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; Selected TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Target RNC-ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; LAI</td>
<td>M</td>
<td></td>
<td>9.2.3.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; RAC</td>
<td>O</td>
<td>9.2.3.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; RNC-ID</td>
<td>M</td>
<td></td>
<td>INTEGER (0..4095)</td>
<td>If the Extended RNC-ID IE is included in the Target ID IE, the RNC-ID IE shall be ignored.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Extended RNC-ID</td>
<td>O</td>
<td>9.2.1.14</td>
<td></td>
<td>The Extended RNC-ID IE shall be used if the RNC identity has a value larger than 4095.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; CGI</td>
<td></td>
<td></td>
<td></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;&gt; LAC</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td>0000 and FFFE not allowed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; CI</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; RAC</td>
<td>O</td>
<td>9.2.3.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality
--- | --- | --- | --- | --- | --- | ---
RRC Container | M | OCTET STRING | Includes the RRC Handover Preparation Information message as defined in subclause 10.2.2 of TS 36.331 [16]. | - | -

### E-RABs Information List

| IE type and reference | Semantics description | Criticality | Assigned Criticality |
--- | --- | --- | ---
TARGET 런본 | - | - | -

### >E-RABs Information Item

| IE type and reference | Semantics description | Criticality | Assigned Criticality |
--- | --- | --- | ---
>>E-RAB ID | M | 9.2.1.2 | - | -
>>DL Forwarding | O | 9.2.3.14 | - | -
Target Cell ID | M | E-UTRAN CGI 9.2.1.38 | - | -
Subscriber Profile ID for RAT/Frequency priority | O | 9.2.1.39 | - | -
UE History Information | M | 9.2.1.42 | - | -
Mobility Information | O | BIT STRING (SIZE (32)) | Information related to the handover; the external handover source provides it in order to enable later analysis of the conditions that led to a wrong HO. | YES | ignore

### UE History Information from the UE

| IE type and reference | Semantics description | Criticality | Assigned Criticality |
--- | --- | --- | ---
O | OCTET STRING | VisitedCellInfoList contained in the UEInformationResponse message (TS 36.331 [16]) | YES | ignore

### Range bound

<table>
<thead>
<tr>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximumE-RABs Maximum no. of E-RABs for one UE. Value is 256.</td>
</tr>
</tbody>
</table>

#### 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.

### IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality
--- | --- | --- | --- | --- | --- | ---
RRC Container | M | OCTET STRING | Includes the RRC E-UTRA Handover Command message as defined in subclause 10.2.2 of TS 36.331 [16]. | - | -
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 for 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 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 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 (IntraLTE, LTEtoUTRAN, LTEtoGERAN, UTRANtoLTE, GERANtoLTE)</td>
<td></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></td>
<td>INTEGER (4096..65535)</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>
</tr>
</thead>
<tbody>
<tr>
<td>Paging DRX</td>
<td>M</td>
<td>ENUMERATED(32, 64, 128, 256, ...)</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 Downlink</td>
<td>M</td>
<td>Bit Rate 9.2.1.19</td>
<td>Desc.: This IE indicates the maximum downlink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer.</td>
<td></td>
</tr>
<tr>
<td>E-RAB Maximum Bit Rate Uplink</td>
<td>M</td>
<td>Bit Rate 9.2.1.19</td>
<td>Desc.: This IE indicates the maximum uplink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer.</td>
<td></td>
</tr>
<tr>
<td>E-RAB Guaranteed Bit Rate Downlink</td>
<td>M</td>
<td>Bit Rate 9.2.1.19</td>
<td>Desc.: 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>
<td></td>
</tr>
<tr>
<td>E-RAB Guaranteed Bit Rate Uplink</td>
<td>M</td>
<td>Bit Rate 9.2.1.19</td>
<td>Desc.: 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>
<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 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.
### IE/Group Name: Bit Rate

<table>
<thead>
<tr>
<th>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
</table>
|          |       | INTEGER (0..10,000,000,000) | The unit is: bit/s.

#### 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></td>
<td></td>
</tr>
<tr>
<td>&gt;UE Aggregate Maximum Bit Rate Downlink</td>
<td>M</td>
<td></td>
<td>Bit Rate 9.2.1.19</td>
<td>This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the downlink direction.</td>
</tr>
<tr>
<td>&gt;UE Aggregate Maximum Bit Rate Uplink</td>
<td>M</td>
<td></td>
<td>Bit Rate 9.2.1.19</td>
<td>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.</td>
</tr>
</tbody>
</table>

#### 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).
### 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></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></td>
<td></td>
<td>ENUMERATED(initialing 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></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>
</tbody>
</table>

### Information Element Criticality Diagnostics

| IE Criticality | M   | ENUMERATED(reject, ignore, notify) | The IE Criticality is used for reporting the criticality of the triggering IE. The value “ignore” shall not be used. |
| IE ID         | M   | INTEGER (0..65535)   | The IE ID of the not understood or missing IE. |
| Type of Error | M   | ENUMERATED(not understood, missing, …) |

<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.
### IE/Group Name | Presence | Range | IE type and reference | Semantics description
--- | --- | --- | --- | ---
Serving PLMN | M | | | 
Equivalent PLMNs | | 0..<maxnoofEPLMNs> | 9.2.3.8 | 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.

>PLMN Identity | M | | | 
Forbidden TAs | | 0..<maxnoofEPLMNsPlusOne> | 9.2.3.8 | Intra LTE roaming restrictions.

>PLMN Identity | M | | | 
>Forbidden TACs | | 1..<maxnoofForbTACs> | 9.2.3.7 | The TAC of the forbidden TAI.

Forbidden LAs | | 0..<maxnoofForbLACs> | | Inter-3GPP RAT roaming restrictions.

>PLMN Identity | M | | | 
>Forbidden LACs | | 1..<maxnoofForbLACs> | | 

>>LAC | M | OCTET STRING (SIZE(2)) | 
Forbidden inter RATs | O | | ENUMERATED(AL, GERAN, UTRAN, CDMA2000, ..., GERAN and UTRAN, CDMA2000 and UTRAN) | Inter-3GPP and 3GPP2 RAT access restrictions.

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofEPLMNs</td>
<td>Maximum no. of equivalent PLMN Ids. Value is 15.</td>
</tr>
<tr>
<td>maxnoofEPLMNsPlusOne</td>
<td>Maximum no. of equivalent PLMN Ids plus one. Value is 16.</td>
</tr>
<tr>
<td>maxnoofForbTACs</td>
<td>Maximum no. of forbidden Tracking Area Codes. Value is 4096.</td>
</tr>
<tr>
<td>maxnoofForbLACs</td>
<td>Maximum no. of forbidden Location Area Codes. Value is 4096.</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></td>
<td>OCTET 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.
### 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 = '0'.</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 the UERadioAccessCapabilityInfo message as defined in 10.2.2 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</td>
<td>(HO Success, HO Failure, ...)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></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</td>
<td>(true, ...)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></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.
<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 List</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;E-RABs Subject to Status Transfer Item</td>
<td>1 .. &lt;maxnoof E-RABs&gt;</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;UL COUNT value</td>
<td>M</td>
<td>COUNT Value 9.2.1.32</td>
<td>PDCP-SN and HFN of first missing UL PDCP SDU in case of 12 bit long PDCP-SN.</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL COUNT value</td>
<td>M</td>
<td>COUNT Value 9.2.1.32</td>
<td>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.</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Receive Status Of UL PDCP SDUs</td>
<td>O</td>
<td>BIT STRING (SIZE(4096))</td>
<td>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.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UL COUNT Value Extended</td>
<td>O</td>
<td>COUNT Value Extended 9.2.1.90</td>
<td>PDCP-SN and HFN of first missing UL PDCP SDU in case of 15 bit long PDCP-SN.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;DL COUNT Value Extended</td>
<td>O</td>
<td>COUNT Value Extended 9.2.1.90</td>
<td>PDCP-SN and HFN that the target eNB should assign for the next DL SDU not having an SN yet in case of 15 bit long PDCP-SN.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Receive Status Of UL PDCP SDUs Extended</td>
<td>O</td>
<td>BIT STRING (SIZE(1..16384 ))</td>
<td>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.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

**Range bound**
maxnoofE-RABs

**Explanation**
Maximum no. of E-RABs for one UE. Value is 256.
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>
<th>Criticality</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 registration, eCSFB to 1xRTT or handover from E-UTRAN to CDMA2000 1xRTT RAT. This IE is coded as the RAND (32bits) of the Authentication Challenge Parameter (RAND) in 3GPP2 A.S0008-C [25].</td>
<td></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>&gt;Event Type</td>
<td>M</td>
<td></td>
<td>ENUMERATED(Direct, Change of service cell, Stop Change of service cell, …)</td>
<td></td>
</tr>
<tr>
<td>&gt;Report Area</td>
<td>M</td>
<td></td>
<td>ENUMERATED(ECGI, …)</td>
<td></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.
IE/Group Name | Presence | Range | IE type and reference | Semantics description
---|---|---|---|---
CDMA2000 1xRTT SRVCC Info | | | OCTET STRING | 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.

>CDMA2000 1xRTT MEID | M | | OCTET STRING | 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.

>CDMA2000 1xRTT Mobile Subscription Information | M | | OCTET STRING | 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].

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.

IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality
---|---|---|---|---|---|---
E-RAB List Item | | 1 .. <maxnoofE-RABs> | EACH | ignore

| >E-RAB ID | M | | 9.2.1.2 | - | - |
| >Cause | M | | 9.2.1.3 | - | - |

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

9.2.1.37 Global eNB ID

This information element is used to globally identify an eNB (see TS 36.401 [2]).

IE/Group Name | Presence | Range | IE type and reference | Semantics description
---|---|---|---|---
PLMN Identity | M | | 9.2.3.8 | 

CHOICE eNB ID | M | | 

Macro eNB ID | M | | BIT STRING (SIZE(20)) | 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.

Home eNB ID | M | | BIT STRING (SIZE(28)) | 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.
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 [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></td>
<td></td>
</tr>
<tr>
<td>&gt;Encryption Algorithms</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 algorithm than EEA0, 'first bit' – 128-EEA1, 'second bit' – 128-EEA2, 'third bit' – 128-EEA3, other bits reserved for future use. Value &quot;1&quot; indicates support and value &quot;0&quot; indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].</td>
</tr>
<tr>
<td>&gt;Integrity Protection Algorithms</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 algorithm than EIA0, 'first bit' – 128-EIA1, 'second bit' – 128-EIA2, 'third bit' – 128-EIA3, other bits reserved for future use. Value &quot;1&quot; indicates support and value &quot;0&quot; indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].</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].
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>
</tr>
</thead>
<tbody>
<tr>
<td>Security Key</td>
<td>M</td>
<td>BIT STRING</td>
<td>(SIZE(256))</td>
<td>Key material for KeNB or Next Hop Key as defined in TS 33.401 [15]</td>
</tr>
</tbody>
</table>

9.2.1.43 Last Visited Cell Information

The Last Visited Cell Information may contain E-UTRAN or UTRAN 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>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE Last Visited Cell Information</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Last Visited E-UTRAN Cell Information</td>
<td>M</td>
<td>9.2.1.43a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Last Visited UTRAN Cell Information</td>
<td>M</td>
<td>OCTET STRING</td>
<td>Defined in TS 25.413 [19].</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Last Visited GERAN Cell Information</td>
<td>M</td>
<td>9.2.1.43b</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.
### 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.

<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 GERAN Cell Information</td>
<td>M</td>
<td>&gt;Undefined</td>
<td>NULL</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### 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>Message Identifier</td>
<td>M</td>
<td></td>
<td>BIT STRING (SIZE(16))</td>
<td>This IE is set by the EPC, transferred to the UE by the eNB. The eNB shall treat it as an identifier of the message.</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 Warning Area</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Cell ID List</td>
<td>M</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;&gt;TAI</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;TAI List for Warning</td>
<td>M</td>
<td>1 .. &lt;maxnoofTAIforWarning&gt;</td>
<td>9.2.3.16</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Emergency Area ID List</td>
<td>M</td>
<td>1 .. &lt;maxnoofEmergencyAreaID&gt;</td>
<td>9.2.1.47</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

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofCellID</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Maximum no. of TAI subject for warning message broadcast. Value is 65535.</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofTAIforWarning</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Explanation</th>
<th>Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofEmergencyAreaID</td>
<td></td>
</tr>
</tbody>
</table>

#### 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.
### 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 Contents** 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 broadcast was 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>9.2.1.38 &gt;Broadcast Completed Area</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2.3.16 &gt;&gt;&gt;Completed Cell in TAI List</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2.1.47 &gt;&gt;&gt;Completed Cell in Emergency Area ID List</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range bound</td>
<td>Explanation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxnoofCellID</td>
<td>Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxnoofTAIforWarning</td>
<td>Maximum no. of TAI subject for warning message broadcast. Value is 65535.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxnoofEmergencyAreaID</td>
<td>Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxnoofCellinTAI</td>
<td>Maximum no. of Cell ID within a TAI. Value is 65535.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxnoofCellinEAI</td>
<td>Maximum no. of Cell ID within an Emergency Area. Value is 65535.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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;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].</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.
### 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.
### Allocation/Retention Priority

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

### 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</td>
<td>(verysmall, small, medium, large, ...)</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 16 \tau_s (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 | Presence | Range | IE Type and Reference | Semantics Description
--- | --- | --- | --- | ---
**CHOICE Broadcast Cancelled Area**

> CID Cancelled

> >> Cell ID Cancelled

>>> E-CGI | M | 9.2.1.38

>>> Number of Broadcasts | M | 9.2.1.71

> TAI Cancelled

> >> TAI Cancelled

>>> Cancelled Cell in TAI List

>>>> E-CGI | M | 9.2.3.16

>> Number of Broadcasts | M | 9.2.1.71

> Emergency Area Cancelled

> >> Emergency Area ID Cancelled

>>> Emergency Area ID | M | 9.2.1.47

>>> Cancelled Cell in Emergency Area ID List

>>>> E-CGI | M | 9.2.1.71

>>>> Number of Broadcasts | M | 9.2.1.71

<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>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</td>
<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>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>Concurrent Warning Message Indicator</td>
<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 (SIZE(4))</td>
<td></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>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDT Activation</td>
<td>M</td>
<td></td>
<td>ENUMERATED(Imm ediate 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>1 ..</td>
<td>&lt;maxno ofCellID for MDT &gt;</td>
<td></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>1 ..</td>
<td>&lt;maxno ofTAfor MDT &gt;</td>
<td></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>The TAI is derived using the current serving PLMN.</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;PLMN Wide</td>
<td>NULL</td>
<td></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>1 ..</td>
<td>&lt;maxno ofTAfor MDT &gt;</td>
<td></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. Other bits are reserved for future use and are ignored if received. 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-</td>
<td>ifM1A2trigger</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;&gt;CHOICE Threshold</td>
<td>M</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;RSRP</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&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;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>C-ifperiodic MDT</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;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;Logged MBSFN MDT</td>
<td></td>
<td>YES ignore</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 ignore</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Range bound</td>
<td>Explanation</td>
<td></td>
<td></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>maxnoofCellIDforMDT</td>
<td>Maximum no. of Cell ID subject for MDT scope. Value is 32.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxnoofTARforMDT</td>
<td>Maximum no. of TA subject for MDT scope. Value is 8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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>
</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 Indication</td>
<td>M</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>
<td></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>ENUMERATED (Supported, Not Supported ...)</td>
<td></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,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ms10000, ...)</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,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ms5120, ms10240, min1, ...)</td>
<td></td>
</tr>
<tr>
<td>M4 Links to log</td>
<td>M</td>
<td></td>
<td>ENUMERATED (uplink, downlink,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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.

<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>M5 Collection Period</td>
<td>M</td>
<td></td>
<td>ENUMERATED (ms1024, ms2048,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ms5120, ms10240, min1, ...)</td>
<td></td>
</tr>
<tr>
<td>M5 Links to log</td>
<td>M</td>
<td></td>
<td>ENUMERATED (uplink, downlink,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>both-uplink-and-downlink, ...)</td>
<td></td>
</tr>
</tbody>
</table>

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></td>
<td>1..&lt;maxnoofMDTPLMNs&gt;</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.
### 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>
<th>Criticality Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kill-all Warning Message Indicator</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE (32..256))</td>
<td>Identifies the Local Home Network.</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></td>
<td>OCTET STRING (SIZE (32..256))</td>
<td>Identifies the Local Home Network.</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>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;E-UTRAN CGI</td>
<td>M</td>
<td></td>
<td>9.2.1.38</td>
<td></td>
</tr>
<tr>
<td>&gt;TAI</td>
<td>M</td>
<td></td>
<td>9.2.3.16</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></td>
<td>f..&lt;maxnoof MBSFNArea MDT &gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>INTEGER (0..255)</td>
<td></td>
</tr>
<tr>
<td>&gt;MBSFN-AreaId</td>
<td>O</td>
<td></td>
<td>9.2.1.95</td>
<td></td>
</tr>
<tr>
<td>&gt;CarrierFreq</td>
<td>M</td>
<td></td>
<td>9.2.1.95</td>
<td></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.
### 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></td>
<td>INTEGER (1..30</td>
<td>40</td>
</tr>
<tr>
<td>Expected Idle Period</td>
<td>O</td>
<td></td>
<td>INTEGER (1..30</td>
<td>40</td>
</tr>
<tr>
<td>Source of UE Activity Behaviour Information</td>
<td>O</td>
<td></td>
<td>ENUMERATED (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>

---

**Range bound**

| maxEARFCN | Maximum value of EARFCNs. Value is 262143. |
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></td>
<td>OCTET STRING</td>
<td>Includes the UERadioPagingInformation message as defined in 10.2.2 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.

<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>ProSe Direct Discovery</td>
<td>O</td>
<td></td>
<td>ENUMERATED</td>
<td>Indicates whether the UE is authorized for ProSe Direct Discovery</td>
</tr>
<tr>
<td>ProSe Direct Communication</td>
<td>O</td>
<td></td>
<td>ENUMERATED</td>
<td>Indicates whether the UE is authorized for ProSe Direct Communication</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 [12].</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.
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>INTEGER (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>OCTET STRING</td>
<td>M-TMSI is unique within MME that allocated it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M-TMSI</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE (4))</td>
<td></td>
<td></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></td>
</tr>
</tbody>
</table>

- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet. - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n

- The PLMN identity consists of 3 digits from MCC followed by either - a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or - 3 digits from MNC (in case of a 3 digit MNC).

9.2.3.9  GUMMEI

This information element indicates the globally unique MME identity.
### 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>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>
<td></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.

<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>MMEC</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(1))</td>
<td></td>
</tr>
</tbody>
</table>
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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&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;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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;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>M</td>
<td></td>
<td>9.2.3.8</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>9.2.3.20</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)</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</td>
<td>(CS Fallback required, … , CS Fallback High Priority)</td>
</tr>
</tbody>
</table>

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>(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.
### 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></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

Contains the BSSGP RIM PDU as defined in TS 48.018 [18].

### RIM Routing Address

This IE identifies the destination node where the RIM Information needs to be routed by 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>
<th>Criticality</th>
<th>Assigned Criticality</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE RIM Routing Address</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;GERAN-Cell-ID</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;LAI</td>
<td>M</td>
<td></td>
<td>9.2.3.1</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;RAC</td>
<td>M</td>
<td></td>
<td>9.2.3.2</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;CI</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(2))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Target RNC-ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;LAI</td>
<td>M</td>
<td></td>
<td>9.2.3.1</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;RAC</td>
<td>O</td>
<td></td>
<td>9.2.3.2</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;RNC-ID</td>
<td>M</td>
<td></td>
<td>INTEGER (0..4095)</td>
<td>If the Extended RNC-ID IE is included in the Target ID IE, the RNC-ID IE shall be ignored.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Extended RNC-ID</td>
<td>O</td>
<td></td>
<td>9.2.1.14</td>
<td>The Extended RNC-ID IE shall be used if the RNC identity has a value larger than 4095.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>&gt;eHRPD Sector ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;eHRPD Sector ID</td>
<td>M</td>
<td></td>
<td>OCTET STRING (SIZE(16))</td>
<td>Contains the eHRPD Sector ID as defined in 3GPP2 C.S0024-B [27] sub-section 13.9.</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### 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.
### 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.

<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 SON Information</td>
<td>M</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></td>
<td>Source 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></td>
<td>9.2.3.28</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></td>
<td>9.2.3.39</td>
<td></td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

### 9.2.3.28 SON Information Reply

This IE contains the configuration information to be replied to the eNB.
### 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.

#### eNB X2 Transport Layer Addresses

<table>
<thead>
<tr>
<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>O</td>
<td>1 .. &lt;maxnoofeNBX2TLAs&gt;</td>
<td>9.2.3.29</td>
<td>X2 TNL Configuration Info</td>
<td>YES</td>
<td>ignore</td>
</tr>
</tbody>
</table>

#### eNB X2 Extended Transport Layer Addresses

<table>
<thead>
<tr>
<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>9.2.2.1</td>
<td>Transport Layer Addresses for X2 SCTP end-point.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

#### eNB IP-Sec Transport Layer Address

<table>
<thead>
<tr>
<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>O</td>
<td>9.2.2.1</td>
<td>Transport Layer Addresses for IP-Sec end-point.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

#### eNB GTP Transport Layer Addresses

<table>
<thead>
<tr>
<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>9.2.2.1</td>
<td>GTP Transport Layer Addresses for GTP end-points (used for data forwarding over X2).</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

#### eNB Indirect X2 Transport Layer Addresses

<table>
<thead>
<tr>
<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>O</td>
<td>9.2.2.1</td>
<td>Transport Layer Addresses for Indirect X2 SCTP end-point.</td>
<td>YES</td>
<td>ignore</td>
<td></td>
</tr>
</tbody>
</table>

#### Range bound

<table>
<thead>
<tr>
<th>Range bound</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxnoofeNBX2TLAs</td>
<td>Maximum no. of eNB X2 Transport Layer Addresses for an SCTP end-point. Value is 2.</td>
</tr>
<tr>
<td>maxnoofeNBX2ExtTLAs</td>
<td>Maximum no. of eNB X2 Extended Transport Layer Addresses in the message. Value is 16.</td>
</tr>
<tr>
<td>maxnoofeNBX2GTPTLAs</td>
<td>Maximum no. of eNB X2 GTP Transport Layer Addresses for an GTP end-point in the message. Value is 16.</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.
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.

<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 to E-UTRAN</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Coded as the value part of NAS security parameters to E-UTRA IE defined in TS 24.301 [24].</td>
</tr>
</tbody>
</table>

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 (0..255)</td>
<td></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>Synchronisation Info</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Stratum Level</td>
<td>M</td>
<td></td>
<td>INTEGER (0..3, ...)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Synchronisation status</td>
<td>M</td>
<td></td>
<td>ENUMERATED (Synchronous, Asynchronous, ...)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Muting Availability Indication</td>
<td>O</td>
<td></td>
<td>ENUMERATED (Available, Unavailable, ...)</td>
<td>Indicates availability of muting activation.</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 Indication</td>
<td>M</td>
<td></td>
<td>INTEGER (1..99)</td>
<td></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 Indicator</td>
<td>M</td>
<td></td>
<td>ENUMERATED(no restriction, restriction, ...)</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></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.</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 Report</td>
<td>M</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.
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.

<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>Muting Pattern Period</td>
<td>M</td>
<td>ENUMERATED</td>
<td>(0, 1280, 2560, 5120, 10240, ...)</td>
<td>Period for repetition of muted subframe in milliseconds. Value &quot;0&quot; indicates that the muting request is not fulfilled.</td>
</tr>
<tr>
<td>Muting Pattern Offset</td>
<td>O</td>
<td>INTEGER</td>
<td>(0..10239, ...)</td>
<td>Offset in number of subframes of the muting pattern starting from subframe 0 in a radio frame where SFN = 0.</td>
</tr>
</tbody>
</table>

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>INTEGER</td>
<td>(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>9.2.3.43</td>
<td></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 &gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-CGI</td>
<td>M</td>
<td>9.2.1.38</td>
<td></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>
9.3 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

DEFINITIONS AUTOMATIC TAGS ::= 
BEGIN

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,
S1SetupFailure,
S1SetupRequest,
S1SetupResponse,
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,
UERadioCapabilityMatchRequest,
UERadioCapabilityMatchResponse,
UplinkUEAssociatedLPPaTransport,
UplinkNASTransport,
UplinkNonUEAssociatedLPPaTransport,
UplinkS1cdma2000tunnelling,
WriteReplaceWarningRequest,
WriteReplaceWarningResponse,
ENBConfigurationTransfer,
MMEConfigurationTransfer,
PWSRestartIndication

FROM S1AP-PDU-Contents

id-CellTrafficTrace,
id-DeactivateTrace,
id-downlinkUEAssociatedLPPaTransport,
id-downlinkNASTransport,
id-downlinkNonUEAssociatedLPPaTransport,
id-DownlinkS1cdma2000tunnelling,
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-MMEConfigurationUpdate,
id-MMEDirectInformationTransfer,
id-MMEStatusTransfer,
id-NASNonDeliveryIndication,
id-OverloadStart,
id-OverloadStop,
id-Paging,
id-PathSwitchRequest,
id-PrivateMessage,
id-Reset,
id-S1Setup,
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

FROM S1AP-Constants;

S1AP-ELEMENTARY-PROCEDURE ::= CLASS {

--- ################################################################################
---
--- Interface Elementary Procedure Class
---
--- ################################################################################

ETS
WITH SYNTAX {

INITIATING MESSAGE &InitiatingMessage

[SUCCESSFUL OUTCOME &SuccessfulOutcome]

[UNSUCCESSFUL OUTCOME &UnsuccessfulOutcome]

PROCEDURE CODE &procedureCode

[CRITICALITY &criticality]

}

-- Interface PDU Definition

--
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}
}
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 |
  uEContextModification |
  uEContextRelease |
}
S1AP-ELEMENTARY-PROCEDURES-CLASS-2 S1AP-ELEMENTARY-PROCEDURE ::= {{
  handoverNotification
  e-RABReleaseIndication
  paging
  downlinkNASTransport
  initialUEMessage
  uplinkNASTransport
  errorIndication
  NASNonDeliveryIndication
  uEContextReleaseRequest
  downlinkS1cdma2000tunnelling
  uplinkS1cdma2000tunnelling
  uECapabilityInfoIndication
  eNBStatusTransfer
  mMEStatusTransfer
  deactivateTrace
}}
traceStart
traceFailureIndication
\cellTrafficTrace
\locationReportingControl
\locationReportingFailureIndication
\locationReport
\overloadStart
\overloadStop
\eNBDirectInformationTransfer
\mMEDirectInformationTransfer
\eNBConfigurationTransfer
\mMEConfigurationTransfer
\privateMessage
...
downlinkUEAssociatedLPPaTransport
uplinkUEAssociatedLPPaTransport
downlinkNonUEAssociatedLPPaTransport
uplinkNonUEAssociatedLPPaTransport
\pWSRestartIndication

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

--
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
}

ETSI
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
}
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
}
CRITICALITY reject

}  

downlinkS1cdma2000tunnelling S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE DownlinkS1cdma2000tunnelling
  PROCEDURE CODE id-DownlinkS1cdma2000tunnelling
  CRITICALITY ignore
}

uplinkS1cdma2000tunnelling S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UplinkS1cdma2000tunnelling
  PROCEDURE CODE id-UplinkS1cdma2000tunnelling
  CRITICALITY ignore
}

UEContextModification S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE UEContextModificationRequest
  SUCCESSFUL OUTCOME UEContextModificationResponse
  UNSUCCESSFUL OUTCOME UEContextModificationFailure
  PROCEDURE CODE id-UEContextModification
  CRITICALITY reject
}

uECapabilityInfoIndication S1AP-ELEMENTARY-PROCEDURE ::= {

ETSI
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
}

mMEEstatusTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  MMEStatusTransfer
    PROCEDURE CODE       id-MMEStatusTransfer
    CRITICALITY          ignore
}
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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 ::= {

ETS1
INITIATING MESSAGE LocationReportingControl
PROCEDURE CODE id-LocationReportingControl
CRITICALITY ignore
}

code = LocationReportingFailureIndication

locationReportingFailureIndication S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE LocationReportingFailureIndication
  PROCEDURE CODE id-LocationReportingFailureIndication
  CRITICALITY ignore

}

code = LocationReport

locationReport S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE LocationReport
  PROCEDURE CODE id-LocationReport
  CRITICALITY ignore

}

code = OverloadStart

overloadStart S1AP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE OverloadStart
  PROCEDURE CODE id-OverloadStart
  CRITICALITY ignore

}

code = OverloadStop

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
uE-RadioCapabilityMatch 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
}
9.3.3 PDU Definitions

---

-- PDU definitions for S1AP.

---

S1AP-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,
Cause,  
CellAccessMode,  
Cdma2000HORequiredIndication,  
Cdma2000HOstatus,  
Cdma2000OneXRVCCInfo,  
Cdma2000OneXRAND,  
Cdma2000PDU,  
Cdma2000RATType,  
Cdma2000SectorID,  
EUTRANRoundTripDelayEstimationInfo,  
CNDomain,  
ConcurrentWarningMessageIndicator,  
CriticalityDiagnostics,  
CSFallbackIndicator,  
CSG-Id,  
CSG-IdList,  
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,
LPPa-PDU,
ManagementBasedMDTAllowed,
MDTPLMNList,
MMEname,
MMERelaySupportIndicator,
MME-UE-S1AP-ID,
MSClassmark2,
MSClassmark3,
NAS-PDU,
NASSecurityParametersfromE-UTRAN,
NASSecurityParametersE-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,
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-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

FROM S1AP-IEs
PrivateIE-Container{},
ProtocolExtensionContainer{},
ProtocolIE-Container{},
ProtocolIE-ContainerList{},
ProtocolIE-ContainerPair{},
ProtocolIE-ContainerPairList{},
ProtocolIE-SingleContainer{},
S1AP-PRIVATE-IES,
S1AP-PROTOCOL-EXTENSION,
S1AP-PROTOCOL-IES,
S1AP-PROTOCOL-IES-PAIR
FROM S1AP-Containers

id-uEaggregateMaximumBitrate,
id-Cause,
id-CellAccessMode,
id-cdma2000HORequiredIndication,
id-cdma2000HOSstatus,
id-cdma2000OneXRVCCInfo,
id-cdma2000OneXRAND,
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-InitialContextSetup,
id-Inter-SystemInformationTransferTypeEDT,
id-Inter-SystemInformationTransferTypeMDT,
id-LPPa-PDU,
id-NAS-DownlinkCount,
id-ManagementBasedMDTAllowed,
id-ManagementBasedMDTPLMNList,
id-MMName,
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-RABFailedToSetupListBearerSURes,
id-E-RABFailedToSetupListCtxtSURes,
id-E-RABFailedToSetupListHOReqAck,
id-E-RABFailedToBeReleasedList,
id-E-RABModify,
id-E-RABModifyItemBearerModRes,
id-E-RABModifyListBearerModRes,
id-E-RABRelease,
id-E-RABReleaseItemBearerRelComp,
id-E-RABReleaseItemHOCmd,
id-E-RABReleaseListBearerRelComp,
id-E-RABReleaseIndication,
id-E-RABSetup,
id-E-RABSetupItemBearerSURes,
id-E-RABSetupItemCtxtSURes,
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-RABToBeReleasedList,
id-E-RABReleasedList,
id-E-RABToBeSetupItemBearerSUReq,
id-E-RABToBeSetupItemCtxtSUReq,
id-E-RABToBeSetupItemHOReq,
id-E-RABToBeSetupListBearerSUReq,
id-E-RABToBeSetupListCtxtSUReq,
id-E-RABToBeSetupListHOReq,
id-E-RABToBeSwitchedDLItem,
id-E-RABToBeSwitchedDLList,
id-E-RABToBeSwitchedULList,
id-E-RABToBeSwitchedULItem,
id-E-RABtoReleaseListHOCmd,
id-ProSeAuthorized,
id-SecurityKey,
id-SecurityContext,
id-ServedGUMMEIs,
id-SONConfigurationTransferECT,
id-SONConfigurationTransferMCT,
id-Source-ToTarget-TransparentContainer,
id-Source-ToTarget-TransparentContainer-Secondary,
id-SourceMME-UE-S1AP-ID,
id-SRVCCOperationPossible,
id-SRVCCOHIndication,
id-SubscriberProfileIDforRFP,
id-SupportedTAs,
id-S-TMSI,
id-NAI,
id-TAIIItem,
id-TAIList,
id-Target-ToSource-TransparentContainer,
id-Target-ToSource-TransparentContainer-Secondary,
id-TargetID,
id-TimeToWait,
id-TraceActivation,
id-TrafficLoadReductionIndication,
id-E-UTRAN-Trace-ID,
id-UEIdentityIndexValue,
id-UEPagingID,
id-UERadioCapability,
id-UERadioCapabilityForPaging,
id-UTRANtoLTEHOInformationRes,
id-UE-associatedLogicalS1-ConnectionListResAck,
id-UE-associatedLogicalS1-ConnectionItem,
id-UESecurityCapabilities,
id-UE-S1AP-IDs,
id-ResetType,
id-MessageIdentifier,
id-SerialNumber,
id-WarningAreaList,
id-RepititionPeriod,
id-NumberOfBroadcastRequest,
id-WarningType,
id-WarningSecurityInfo,
id-DataCodingScheme,
id-WarningMessageContents,
id-BroadcastCompletedAreaList,
id-BroadcastCancelledAreaList,
id-RRC-Establishment-Cause,
id-TraceCollectionEntityIPAddress,
maxnoofTAIs,
maxnoofErrors,
maxnoofE-RABs,
maxnoofIndividualS1ConnectionsToReset,
maxnoofEmergencyAreaID,
maxnoofCellID,
maxnoofTAIforWarning,
maxnoofCellinTAI,
maxnoofCellinEAI,
id-ExtendedRepetitionPeriod,
id-PS-ServiceNotAvailable,
id-RegisteredLAI,
id-GUMMEIList,
id-SourceMME-GUMMEI,
id-MME-UE-S1AP-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-LHN-ID,
id-UserLocationInformation,
id-AdditionalCSFallbackIndicator,
id-ECGIListForRestart,
id-TAILListForRestart,
id-EmergencyAreaIDListForRestart,
FROM S1AP-Constants;

-- ******************************************************************************
--
-- Common Container Lists
--
-- ******************************************************************************

E-RAB-IE-ContainerList  { S1AP-PROTOCOL-IES : IEsSetParam } ::= ProtocolIE-ContainerList  { 1, maxnooE-RABs,  {IEsSetParam} }

E-RAB-IE-ContainerPairList { S1AP-PROTOCOL-IES-PAIR : IEsSetParam } ::= ProtocolIE-ContainerPairList  { 1, maxnooE-RABs,  {IEsSetParam} }

ProtocolError-IE-ContainerList  { S1AP-PROTOCOL-IES : IEsSetParam } ::= ProtocolIE-ContainerList  { 1, maxnooE-RABs,  {IEsSetParam} }

-- ******************************************************************************
--
-- HANDOVER PREPARATION ELEMENTARY PROCEDURE
--
-- ******************************************************************************

--

-- Handover Required
HandoverRequired ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { { HandoverRequiredIEs} },
    ...
}

HandoverRequiredIEs 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-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
        PRESENCE conditional}|
}
{ 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},

...
{ ID id-HandoverType CRITICALITY reject TYPE HandoverType PRESENCE mandatory } |
{ ID id-NASSecurityParametersfromE-UTRAN CRITICALITY reject TYPE NASSecurityParametersfromE-UTRAN PRESENCE conditional
-- This IE shall be present if HandoverType IE is set to value "LTEtoUTRAN" or "LTEtoGERAN" -- |
{ ID id-E-RABSubjecttoDataForwardingList CRITICALITY ignore TYPE E-RABSubjecttoDataForwardingList PRESENCE optional } |
{ ID id-E-RABtoReleaseListHOCmd CRITICALITY ignore TYPE E-RABList PRESENCE optional } |
{ ID id-Target-ToSource-TransparentContainer CRITICALITY reject TYPE Target-ToSource-TransparentContainer PRESENCE mandatory } |
{ ID id-Target-ToSource-TransparentContainer-Secondary CRITICALITY reject TYPE Target-ToSource-TransparentContainer PRESENCE optional } |
{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
...
}

E-RABSubjecttoDataForwardingList ::= E-RAB-IE-ContainerList { E-RABDataForwardingItemIEs } 

E-RABDataForwardingItemIEs S1AP-PROTOCOL-IES ::= {
{ ID id-E-RABDataForwardingItem CRITICALITY ignore TYPE E-RABDataForwardingItem PRESENCE mandatory },
...
}

E-RABDataForwardingItem ::= SEQUENCE { e-RAB-ID E-RAB-ID,}
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**dL-transportLayerAddress**

TransportLayerAddress

**OPTIONAL,**

**dL-gTP-TEID**

GTP-TEID

**OPTIONAL,**

**uL-TransportLayerAddress**

TransportLayerAddress

**OPTIONAL,**

**uL-GTP-TEID**

GTP-TEID

**OPTIONAL,**

**iE-Extensions**

ProtocolExtensionContainer { { E-RABDataForwardingItem-ExtIEs} }   OPTIONAL,

...

}

E-RABDataForwardingItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {

...

}

-- ************************************************************
-- -- 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 },
...}
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
  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-ExpectedUE Behaviour
  CRITICALITY ignore  TYPE ExpectedUE Behaviour
  PRESENCE optional }
{ ID id-ProSeAuthorized
  CRITICALITY ignore  TYPE ProSeAuthorized
  PRESENCE optional },
...
}

E-RABToBeSetupListHOReq ::= E-RAB-IE-ContainerList { {E-RABToBeSetupItemHOReqIEs} }

E-RABToBeSetupItemHOReqIEs S1AP-PROTOCOL-IES ::= 

ETSI
{ 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 S1AP-PROTOCOL-EXTENSION ::= {
  { ID id-Data-Forwarding-Not-Possible   CRITICALITY ignore   EXTENSION Data-Forwarding-Not-Possible   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-RABFailedToSetupListHOReqAck CRITICALITY ignore TYPE E-RABFailedToSetupListHOReqAck
    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 },
  ...
}

E-RABAdmittedList ::= E-RAB-IE-ContainerList { {E-RABAdmittedItemIEs} }

E-RABAdmittedItemIEs S1AP-PROTOCOL-IES ::= {
  ...
}
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-RABFailedtoSetupItemHOReqAck CRITICALITY ignore TYPE E-RABFailedToSetupItemHOReqAck PRESENCE mandatory },
  ...
}
E-RABFailedToSetupItemHOReqAck ::= SEQUENCE {
    e-RAB-ID        E-RAB-ID,
    cause          Cause,
    iE-Extensions   ProtocolExtensionContainer { { E-RABFailedToSetupItemHOReqAckExtIEs} } OPTIONAL,
    ... }

E-RABFailedToSetupItemHOReqAckExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ... }

-- **********************************************************************
-- Handover Failure
-- **********************************************************************

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 },
... }
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} ,
          ...
        }

-- ************************************************************
-- -- PATH SWITCH REQUEST ELEMENTARY PROCEDURE -- --
-- ************************************************************

--
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-TAI CRITICALITY ignore TYPE TAI PRESENCE mandatory }|
    { ID id-UESecurityCapabilities CRITICALITY ignore TYPE UESecurityCapabilities PRESENCE mandatory }|
    { ID id-CSG-IId CRITICALITY ignore TYPE CSG-IId 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 }|
    -- 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 },
...
}

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 ::= [
  ... ]
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
    mandatory}]|  
  { ID id-uEaggregateMaximumBitrate 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 mandatory}]|  
  { 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}]

-- *************************************************************
-- Path Switch Request Acknowledge
-- *************************************************************

--  **************************************************
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{ ID id-CSGMembershipStatus CRITICALITY ignore TYPE CSGMembershipStatus PRESENCE optional },
{ ID id-ProSeAuthorized CRITICALITY ignore TYPE ProSeAuthorized PRESENCE optional },
...

E-RABToBeSwitchedULItem ::= SEQUENCE {
  e-RAB-ID E-RAB-ID,
  transportLayerAddress TransportLayerAddress,
  gTP-TEID GTP-TEID,
  iE-Extensions ProtocolExtensionContainer { { 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   },
  ...
}

--  **************************************************************************************
--

ETSI
-- HANOVER CANCEL ELEMENTARY PROCEDURE

--

-- *********************************************************************************************

-- *********************************************************************************************

-- Handover Cancel

--

-- *********************************************************************************************

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
    mandatory },
  { ID id-Cause CRITICALITY ignore TYPE Cause
    PRESENCE mandatory },
...
}
HandoverCancelAcknowledge ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container { { HandoverCancelAcknowledgeIEs} },
  ...
}

HandoverCancelAcknowledgeIEs 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
    mandatory           }],
  { ID id-CriticalityDiagnostics  CRITICALITY ignore  TYPE CriticalityDiagnostics
    PRESENCE optional   },
  ...
}
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-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 ignore EXTENSION Correlation-ID PRESENCE optional }|
  { ID id-SIPTO-Correlation-ID  CRITICALITY ignore EXTENSION Correlation-ID 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-RABSetupItemBearerSUEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABSetupItemBearerSUEs CRITICALITY ignore TYPE E-RABSetupItemBearerSUEs PRESENCE mandatory },
    ...
}

E-RABSetupItemBearerSUEs ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
    transportLayerAddress TransportLayerAddress,
    gTP-TEID GTP-TEID,
    iE-Extensions ProtocolExtensionContainer { {E-RABSetupItemBearerSUEsExtIEs} } OPTIONAL,
    ...
}

E-RABSetupItemBearerSUEsExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

--  **************************************************************
--  -- E-RAB MODIFY ELEMENTARY PROCEDURE
--  --
-- **************************************************
-- 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 ENB-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 },
} ...

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-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 }|
    ... }

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-RAB Release Command

---

--- **************************************************************

--- E-RAB Release Command

--- **************************************************************

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
  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

--

-- ******************************************************************************

E-RABReleaseResponse ::= 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         },
    ...
}

-- Extension for Release 12 to support User Location Information --

--
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 ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {E-RABReleaseIndicationIEs} },
    ...
}

E-RABReleaseIndicationIEs 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
        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-uEaggregateMaximumBitrate  CRITICALITY reject  TYPE UEAggregateMaximumBitrate  PRESENCE}
{ 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}
{ ID id-HandoverRestrictionList  CRITICALITY ignore  TYPE HandoverRestrictionList  PRESENCE optional}
{ ID id-UERadioCapability  CRITICALITY ignore  TYPE UERadioCapability  PRESENCE}
{ ID id-SubscriberProfileIDforRFP  CRITICALITY ignore  TYPE SubscriberProfileIDforRFP  PRESENCE optional}
{ ID id-CSFallbackIndicator  CRITICALITY reject  TYPE CSFallbackIndicator  PRESENCE}
{ ID id-SRVCCOperationPossible  CRITICALITY ignore  TYPE SRVCCOperationPossible  PRESENCE optional}
{ ID id-CSGMembershipStatus  CRITICALITY ignore  TYPE CSGMembershipStatus  PRESENCE}
{ ID id-RegisteredLAI  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}
{ ID id-ManagementBasedMDTPLMNList  CRITICALITY ignore  TYPE MDTPLMNList  PRESENCE}
{ ID id-AdditionalCSFallbackIndicator  CRITICALITY ignore  TYPE AdditionalCSFallbackIndicator  PRESENCE conditional}
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

ProtocolIEs

...
{ 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,

ETSI
E-RABSetupItemCtxtSRESExtIEs 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 }||
Paging ::= SEQUENCE {
  protocollIEs ProtocolIE-Container {{PagingIEs}},
  ...
}
{ 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 },

... 

TAIList ::= SEQUENCE (SIZE(1.. maxnoofTAIs)) OF ProtocolIE-SingleContainer { {TAIItemIEs} }

TAIItemIEs ::=
{ ID id-TAIItem  CRITICALITY ignore  TYPE TAIItem  PRESENCE mandatory },

... 

TAIItem ::= SEQUENCE {
  tAI  TAI,
  iE-Extensions  ProtocolExtensionContainer { {TAIItemExtIEs} } OPTIONAL,

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 ]},
...

-- ******************************************************************************
-- -- UE Context Release Command -- -- ******************************************************************************
--
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 ]}
-- UE Context Release Complete --

-- Extension for Release 12 to support User Location Information --

{ 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   },

...
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-aEaggregateMaximumBitrate
  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 ],

... }

--******************************************************************************

--

-- UE Context Modification Response

--

--******************************************************************************

UEContextModificationResponse ::= SEQUENCE {
  protocolIEs ProtocolIE-Container  
    { UEContextModificationResponseIEs } ,

... }

ETS1
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 }|
    ...
}
UERadioCapabilityMatchRequest ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { { UERadioCapabilityMatchRequestIEs} },
  ... 
}

UERadioCapabilityMatchRequestIEs S1AP-PROTOCOL-IES ::= {
  ... 
}
UE Radio Capability Match Response

-- UERadioCapabilityMatchResponse ::= SEQUENCE {  protocolIEs   ProtocolIE-Container       { { UERadioCapabilityMatchResponseIEs} },  ...  }

-- UERadioCapabilityMatchResponseIEs S1AP-PROTOCOL-IES ::= {

}
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 }|
]
-- ************************************************************** -- -- 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-HandoverRestrictionList CRITICALITY ignore TYPE HandoverRestrictionList PRESENCE optional }]

    { ID id-SubscriberProfileIDforRFP CRITICALITY ignore TYPE SubscriberProfileIDforRFP 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}]

...
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 },
    ...
}

-- ************************************************************************************************************

-- NAS NON DELIVERY INDICATION
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 },
    ...
}

-- ************************************************************** --
-- RESET ELEMENTARY PROCEDURE --
--
-- ************************************************************** --
Reset ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { {ResetIEs} },
  ... 
}

ResetIEs S1AP-PROTOCOL-IES ::= {
  [ ID id-Cause
    CRITICALITY ignore   TYPE Cause
    mandatory ]
  [ ID id-ResetType
    CRITICALITY reject   TYPE ResetType
    mandatory ]
  ...
}

ResetType ::= CHOICE {
  s1-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 },
    ...
}

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 {
    protoctIEs               ProtocolIE-Container   {{ErrorIndicationIEs}},
    ...
}

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          } |
    ...
}

-- ****************************

--

-- S1 Setup Response

--
S1SetupResponse ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {S1SetupResponseIEs} },
    ...
}

S1SetupResponseIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MMName CRITICALITY ignore TYPE MMName PRESENCE optional }|
    { ID id-ServedGUMMEIs CRITICALITY reject TYPE ServedGUMMEIs PRESENCE mandatory }|
    { ID id-RelativeMMECapacity CRITICALITY ignore TYPE RelativeMMECapacity PRESENCE mandatory }|
    { ID id-MMERelaySupportIndicator CRITICALITY ignore TYPE MMERelaySupportIndicator PRESENCE optional }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *******************************

-- S1 Setup Failure
-- *******************************

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 },

...

}

-- **************************************************************
-- ENB CONFIGURATION UPDATE ELEMENTARY PROCEDURE
--
-- **************************************************************

-- cNB Configuration Update
--
-- **************************************************************
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-DefaultPagingDRX CRITICALITY ignore TYPE PagingDRX PRESENCE optional },
  ...
}

-- ************************************************************

-- eNB Configuration Update Acknowledge

-- 

-- ************************************************************

ENBConfigurationUpdateAcknowledge ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {ENBConfigurationUpdateAcknowledgeIEs} },
  ...
}
ENBConfigurationUpdateAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
   { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
   ...
}

-- Adam Kamel
-- eNB Configuration Update Failure

--
-- Adam Kamel

ENBConfigurationUpdateFailure ::= SEQUENCE {
   protocolIEs ProtocolIE-Container { {ENBConfigurationUpdateFailureIEs} },
   ...
}

ENBConfigurationUpdateFailureIEs S1AP-PROTOCOL-IES ::= {
   { ID id-Cause mandatory CRITICALITY ignore TYPE Cause PRESENCE
   optional },
   { ID id-TimeToWait CRITICALITY ignore TYPE TimeToWait PRESENCE
   optional },
   { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
   ...
}
-- **************************************************************
-- MME CONFIGURATION UPDATE ELEMENTARY PROCEDURE
-- **************************************************************

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 },
  ...
}
MMEConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {MMEConfigurationUpdateAcknowledgeIEs} },
    ...}

MMEConfigurationUpdateAcknowledgeIEs S1AP-PROTOCOL-IIES ::= {
    { 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
-- -- ********************************************************************
DownlinkS1cdma2000tunnelling ::= SEQUENCE {
  protocolIEs                     ProtocolIE-Container { {DownlinkS1cdma2000tunnellingIEs} },

  ...}

DownlinkS1cdma2000tunnellingIEs 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-RABSubjecttoDataForwardingList CRITICALITY ignore TYPE E-RABSubjecttoDataForwardingList PRESENCE optional }|

  { ID id-cdma2000HOStatus CRITICALITY ignore TYPE Cdma2000HOStatus
    PRESENCE optional }|

  { ID id-cdma2000RATType CRITICALITY reject TYPE Cdma2000RATType
    PRESENCE mandatory }|

  { ID id-cdma2000PDU CRITICALITY reject TYPE Cdma2000PDU
    PRESENCE mandatory },

  ...}

-- 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-cdma2000OneXSRVCCInfo
    CRITICALITY reject TYPE Cdma2000OneXSRVCCInfo
    PRESENCE optional } |
  ... 
}
{ ID id-cdma2000OneXRAND }
    CRITICALITY reject  TYPE Cdma2000OneXRAND
    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 --

... 

"

-- Extension for Release 9 to assist target HRPD access with the acquisition of the UE --

UECapabilityInfoIndication ::= SEQUENCE {
    protocolIEs ProtocolIE-Container  { { UECapabilityInfoIndicationIEs} },

    -- UE CAPABILITY INFO INDICATION ELEMENTARY PROCEDURE

    --

    -- UE Capability Info Indication

    --
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 },

    ... }
ENBStatusTransfer ::= SEQUENCE {
    protocolIEs ProtocolIE-Container { {ENBStatusTransferIEs} },
    ...
}

ENBStatusTransferIEs S1AP-PROTOCOL-IES ::= {
    ...}

-- ************************************************************
--
-- MME STATUS TRANSFER ELEMENTARY PROCEDURE

--
MMEStatusTransfer ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container       { {MMEStatusTransferIEs} },
  ...
}

MMEStatusTransferIEs 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 }]

StatusTransfer-TransparentContainer

TransparentContainer
mandatory},

...
TraceFailureIndication ::= SEQUENCE {
  protocolIEs   ProtocolIE-Container   { {TraceFailureIndicationIEs} },

  ...
}

TraceFailureIndicationIEs 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-Cause                 CRITICALITY ignore    TYPE Cause                 PRESENCE mandatory   },

  ...
}
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 }|
}
OverloadStart ::= SEQUENCE {
  protocolIEs ProtocolIE-Container  { {OverloadStartIEs} },
  ... }
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{ ID id-OverloadResponse CRITICALITY reject TYPE OverloadResponse PRESENCE mandatory }

{ ID id-GUMMEList CRITICALITY ignore TYPE GUMMEList 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-GUMMEList CRITICALITY ignore TYPE GUMMEList PRESENCE optional },
...

-- **************************************************************
-- WRITE-REPLACE WARNING ELEMENTARY PROCEDURE

--

-- Write-Replace Warning Request

--

--- 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 mandatory },

  { ID id-ExtendedRepetitionPeriod   CRITICALITY reject     TYPE ExtendedRepetitionPeriod   PRESENCE optional }|

}
WriteReplaceWarningResponse ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {WriteReplaceWarningResponseIEs} },
  ...
}

WriteReplaceWarningResponseIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MessageIdentifier   CRITICALITY reject   TYPE MessageIdentifier   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
  }
  ...
}

-- Write-Replace Warning Response

-- WriteReplaceWarningResponse ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {WriteReplaceWarningResponseIEs} },
  ...
}

WriteReplaceWarningResponseIEs S1AP-PROTOCOL-IES ::= {
  { ID id-MessageIdentifier   CRITICALITY reject   TYPE MessageIdentifier   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
  }|
  ...
}
ENBDirectInformationTransfer ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ ENBDirectInformationTransferIEs }},
  ...
}

-- **************************************************************************
  --
  --  eNB DIRECT INFORMATION TRANSFER ELEMENTARY PROCEDURE
  --
  -- **************************************************************************
  --

ENBDirectInformationTransferIEs S1AP-PROTOCOL-IES ::= {  
  { ID id-Inter-SystemInformationTransferTypeEDT CRITICALITY reject TYPE Inter-SystemInformationTransferType PRESENCE mandatory },
  ...
}

Inter-SystemInformationTransferType ::= CHOICE {  
  rIMTransfer RIMTransfer,
  ...
}

-- ******************************************************************************
-- -- MME DIRECT INFORMATION TRANSFER ELEMENTARY PROCEDURE
-- ******************************************************************************

MMEDirectInformationTransfer ::= SEQUENCE {

protocolIEs ProtocolIE-Container { { MMEDirectInformationTransferIEs }, }

... }

MMEDirectInformationTransferIEs S1AP-PROTOCOL-IES ::= { 
   { ID id-Inter-SystemInformationTransferTypeMDT CRITICALITY reject TYPE Inter-SystemInformationTransferType PRESENCE mandatory },
   ...
}

-- ************************************************************

-- eNB CONFIGURATION TRANSFER ELEMENTARY PROCEDURE

--

-- eNB Configuration Transfer

--

ENBConfigurationTransfer ::= SEQUENCE { 
   protocolIEs ProtocolIE-Container { { ENBConfigurationTransferIEs } },
   ...
}

ETSI
MMEConfigurationTransfer ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ MMEConfigurationTransferIEs }},
  ...
}

MMEConfigurationTransferIEs S1AP-PROTOCOL-IES ::= {
  { ID id-SONConfigurationTransferECT CRITICALITY ignore TYPE SONConfigurationTransfer PRESENCE optional },
  ...
}

-- ************************************************************
-- -- MME CONFIGURATION TRANSFER ELEMENTARY PROCEDURE -- -- ************************************************************

--
-- MME Configuration Transfer
--
-- ************************************************************
{ ID id-SONConfigurationTransferMCT CRITICALITY ignore TYPE SONConfigurationTransfer PRESENCE optional },


-- **************************************************************
-- PRIVATE MESSAGE ELEMENTARY PROCEDURE
-- 
-- **************************************************************

-- Private Message
-- 
-- **************************************************************

PrivateMessage ::= SEQUENCE {
    privateIEs PrivateIE-Container { {PrivateMessageIEs} },

    ... 
}

PrivateMessageIEs S1AP-PRIVATE-IES ::= {
    ... 
}
-- ###########################################################
--
-- KILL PROCEDURE
--
-- ###########################################################

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},}
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

--

-- **************************************************************

-- **************************************************************

-- PWS Restart Indication

--

-- **************************************************************

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 },
    ...
}

ETSI
-- ************************************************************

-- LPPA TRANSPORT ELEMENTARY PROCEDURES

-- ************************************************************

-- DOWNLINK UE ASSOCIATED LPPA TRANSPORT

-- ************************************************************

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
      }|
    { 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
      },
-- UPLINK UE ASSOCIATED LPPA TRANSPORT

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 },
    ...
}
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
    },
    ...
}
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},
    ...}

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-To-Be-Modified-Item-Bearer-Mod-Ind ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
    transportLayerAddress TransportLayerAddress,
    dL-GTP-TEID GTP-TEID,
    iE-Extensions ProtocolExtensionContainer { { E-RAB-To-Be-Modified-Item-Bearer-Mod-Ind-ExtIEs} } OPTIONAL,
    ... }

E-RAB-To-Be-Modified-Item-Bearer-Mod-Ind-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

E-RAB-Not-To-Be-Modified-List-Bearer-Mod-Ind ::= E-RAB-IE-ContainerList { { E-RAB-Not-To-Be-Modified-Item-Bearer-Mod-IndIEs} }
E-RABNotToBeModifiedItemBearerModInd-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 }|
}
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 ::= {
  ...
}

END
9.3.4 Information Element Definitions

S1AP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) s1ap (1) version1 (1) s1ap-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-ReceiveStatusOfULPDCPSDUsExtended,
id-eNBIndirectX2TransportLayerAddresses,
id-Muting-Availability-Indication,
id-Muting-Pattern-Information,
id-Synchronisation-Information,
id-uE-HistoryInformationFromTheUE,
id-LoggedMBSFNMĐT,
id-SON-Information-Report,
maxnoofCSGs,
maxnoofE-RABs,
maxnoofErrors,
maxnoofBPLMNs,
maxnoofPLMNsPerMME,
maxnoofTACs,
maxnoofEPLMNs,
maxnoofEPLMNsPlusOne,
maxnoofForbLACs,
maxnoofForbTACs,
maxnoofCells,
maxnoofCellID,
maxnoofEmergencyAreaID,
maxnoofTAforWarning,
maxnoofCellinTAI,
maxnoofCellinEAI,
maxnoofeNBX2TLAs,
maxnoofeNBX2ExtTLAs,
maxnoofeNBX2GTPTLAs,
maxnoofRATs,
maxnoofGroupIDs,
maxnoofMMECs,
maxnoofTAforMDT,
maxnoofCellIDforMDT,
maxnoofMDTPLMNs,
maxnoofCellsforRestart,
maxnoofRestartTAIs,
maxnoofRestartEmergencyAreaIDs,
maxnoofMBSFNAreaMDT,
maxEARFCN,
maxnoofCellsinENB
FROM S1AP-Constants

Criticality,
ProcedureCode,
ProtocolIE-ID,
TriggeringMessage
FROM S1AP-CommonDataTypes

ProtocolExtensionContainer{},
S1AP-PROTOCOL-EXTENSION,
ProtocolIE-SingleContainer{},
S1AP-PROTOCOL-IES
FROM S1AP-Containers;

-- A

AreaScopeOfMDT ::= CHOICE {
cellBased CellBasedMDT,
tABased TABasedMDT,
pLMNWide NULL,
}
...,
tAIBased TAIBasedMDT
}

AllocationAndRetentionPriority ::= SEQUENCE {
priorityLevel PriorityLevel,
pre-emptionCapability Pre-emptionCapability,
pre-emptionVulnerability Pre-emptionVulnerability,
iE-Extensions ProtocolExtensionContainer { {AllocationAndRetentionPriority-ExtIEs} } OPTIONAL,
...
}

AllocationAndRetentionPriority-ExtIEs S1AP-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,
    receiveStatusofULPDCPSDUs ReceiveStatusofULPDCPSDUs OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {Bearers-SubjectToStatusTransfer-ItemExtIEs} } OPTIONAL,
    ...}

Bearers-SubjectToStatusTransfer-ItemExtIEs S1AP-PROTOCOL-EXTENSION ::= [
    { ID id-ULCOUNTValueExtended CRITICALITY ignore EXTENSION COUNTValueExtended PRESENCE optional }|
    { ID id-DLCOUNTValueExtended CRITICALITY ignore EXTENSION COUNTValueExtended PRESENCE optional }|
    { ID id-ReceiveStatusOfULPDCPSDUsExtended CRITICALITY ignore EXTENSION ReceiveStatusOfULPDCPSDUsExtended PRESENCE optional },
    ...]

BitRate ::= INTEGER (0..10000000000)

BPLMNs ::= SEQUENCE (SIZE(1.. maxnoofBPLMNs)) OF PLMidentity
BroadcastCancelledAreaList ::= CHOICE {
  cellID-Cancelled              CellID-Cancelled,
  tAI-Cancelled                TAI-Cancelled,
  emergencyAreaID-Cancelled    EmergencyAreaID-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,
  om-intervention,
  unspecified,
  unknown-PLMN,
...
}

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-eutran-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-s1ap-id,
    unknown-enb-ue-s1ap-id,
    unknown-pair-ue-s1ap-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

}

CauseTransport ::= ENUMERATED {
  transport-resource-unavailable,
  unspecified,
  unspecified,
  unspecified

}
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...}

CauseNas ::= ENUMERATED {
    normal-release,
    authentication-failure,
    detach,
    unspecified,
    ...
    csg-subscription-expiry
}

CellAccessMode ::= ENUMERATED {
    hybrid,
    ...
}

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

Cdma2000PDU ::= OCTET STRING

Cdma2000RATType ::= ENUMERATED {
  hRPD,
  onexRTT,
  ...
}

Cdma2000SectorID ::= OCTET STRING

Cdma2000HOStatus ::= ENUMERATED {
  hOSuccess,
  hOFailure,
  ...
}
Cdma2000HORelatedIndication ::= 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,  
  lAC LAC,  
  cI CI,  
  rAC RAC OPTIONAL,  
  iE-Extensions ProtocolExtensionContainer { {CGI-ExtIEs} } OPTIONAL,  
  ...  
}  

CGI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {  
  ...  
}  

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...}

CI ::= OCTET STRING (SIZE (2))

CNDomain ::= ENUMERATED {
  ps,
  cs
}

ConcurrentWarningMessageIndicator ::= ENUMERATED {
  true
}

Correlation-ID ::= OCTET STRING (SIZE (4))

CSFallbackIndicator ::= ENUMERATED {
  cs-fallback-required,
  ...
  cs-fallback-high-priority
}

AdditionalCSFallbackIndicator ::= ENUMERATED {
  no-restriction,
restiction,
...
}

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 ::= {
  ...
}

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 : TypeError,
  iE-Extensions : ProtocolExtensionContainer { CriticalityDiagnostics-IE-Item-ExtIEs } OPTIONAL,
  ...

}

CriticalityDiagnostics-IE-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {

...

}
DataCodingScheme ::= BIT STRING (SIZE (8))

DL-Forwarding ::= ENUMERATED {
  dL-Forwarding-proposed,
  ...
}

Direct-Forwarding-Path-Availability ::= ENUMERATED {
  directPathAvailable,
  ...
}

Data-Forwarding-Not-Possible ::= ENUMERATED {
  data-Forwarding-not-Possible,
  ...
}

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EARFCN ::= INTEGER(0..maxEARFCN, ...)

ECGIList ::= SEQUENCE (SIZE(1..maxnoofCellID)) OF EUTRAN-CGI

EmergencyAreaIDList ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID

EmergencyAreaID ::= OCTET STRING (SIZE (3))

EmergencyAreaID-Broadcast ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID-Broadcast-Item

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)),
  ...
}

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 ::= {
  ...
}

GUMMEIList ::= SEQUENCE (SIZE (1..maxnoofMMECs)) OF GUMMEI

ENB-StatusTransfer-TransparentContainer ::= SEQUENCE {
  bearers-SubjectToStatusTransferList Berers-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..maxnooofENBX2TLAs)) OF TransportLayerAddress

ETSI
EncryptionAlgorithms ::= BIT STRING (SIZE (16,...))

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 } ... ::= { { ID id-E-RABInformationListItem CRITICALITY ignore TYPE E-RABInformationListItem PRESENCE mandatory }, ...

E-RABInformationListIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABInformationListItemItem CRITICALITY ignore TYPE E-RABInformationListItemItem PRESENCE mandatory }, ...
}

E-RABInformationListItem ::= SEQUENCE {
    e-RAB-ID E-RAB-ID,
    dL-Forwarding DL-Forwarding OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { {E-RABInformationListItem-ExtIEs} } OPTIONAL,
E-RAB Information List Item ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

E-RAB List ::= SEQUENCE (SIZE(1..maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABItemIEs} }

E-RAB Item IEs S1AP-PROTOCOL-IES ::= {
  { ID id-E-RABItem CRITICALITY ignore TYPE E-RABItem PRESENCE mandatory },
  ...
}

E-RAB Item ::= SEQUENCE {
  e-RAB-ID E-RAB-ID,
  cause Cause,
  iE-Extensions ProtocolExtensionContainer { {E-RABItem-ExtIEs} } OPTIONAL,
  ...
}

E-RAB Item ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}
E-RABLevelQoSParameters ::= SEQUENCE {
  qCI QCI,
  allocationRetentionPriority AllocationAndRetentionPriority,
  gbrQosInformation GBR-QosInformation
    OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {E-RABQoSParameters-ExtIEs} } OPTIONAL,
  ...
}

E-RABQoSParameters-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

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,
   ...
}

ExtendedRNC-ID ::= INTEGER (4096..65535)

ExtendedRepetitionPeriod ::= INTEGER (4096..131071)

-- F
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

-- G

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,

GUMMEI ::= SEQUENCE {
  pLMN-Identity  PLMNidentity,
  mME-Group-ID  MME-Group-ID,
  mME-Code  MME-Code,
  iE-Extensions  ProtocolExtensionContainer { {GUMMEI-ExtIEs} } OPTIONAL,
  ... }
native,
mapped,
...

GWContextReleaseIndication ::= ENumerated {
  true,
  ...
}

-- H

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 ::= {
  ...
}
HandoverType ::= ENUMERATED {
  intralte,
  ltetoutran,
  ltetogeran,
  utrantolte,
  gerantolte,
  ...
}

HFN ::= INTEGER (0..1048575)

HFNModified ::= INTEGER (0..131071)

Masked-IMEISV ::= BIT STRING (SIZE (64))

ImmediateMDT ::= SEQUENCE {
  measurementsToActivate MeasurementsToActivate,
  m1reportingTrigger M1ReportingTrigger,
  m1thresholdeventA2 M1ThresholdEventA2 OPTIONAL,
-- Included in case of event-triggered, or event-triggered periodic reporting for measurement M1

m1periodicReporting M1PeriodicReporting OPTIONAL,

-- 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-M4Configuration CRITICALITY ignore EXTENSION M4Configuration PRESENCE conditional } |
{ ID id-M5Configuration CRITICALITY ignore EXTENSION M5Configuration PRESENCE conditional } |
{ ID id-MDT-Location-Info CRITICALITY ignore EXTENSION MDT-Location-Info PRESENCE optional },

... }

IMSI ::= OCTET STRING (SIZE (3..8))

IntegrityProtectionAlgorithms ::= BIT STRING (SIZE (16,...))

InterfacesToTrace ::= BIT STRING (SIZE (8))
KillAllWarningMessages ::= ENUMERATED {true}

-- L

LAC ::= OCTET STRING (SIZE (2))

LAI ::= SEQUENCE {
    pLMNidentity PLMNidentity,
    iE-Extensions ProtocolExtensionContainer { {LAI-ExtIEs} } OPTIONAL,
    ...
}

LAI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

LastVisitedCell-Item ::= CHOICE {
    e-UTRAN-Cell LastVisitedEUTRANCellInformation,
    uTRAN-Cell LastVisitedUTRANCellInformation,
    gERAN-Cell LastVisitedGERANCellInformation,
    ...
LastVisitedEUTRANCellInformation ::= SEQUENCE {
    global-Cell-ID                EUTRAN-CGI,
    cellType                     CellType,
    time-UE-StayedInCell         Time-UE-StayedInCell,
    iE-Extensions                ProtocolExtensionContainer { { LastvisitedEUTRANCellInformation-ExtIEs} } OPTIONAL,

    ...}

LastVisitedEUTRANCellInformation-ExtIEs SIAP-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]|
    { ID id-HO-Cause            CRITICALITY ignore EXTENSION Cause PRESENCE optional],

    ...}

LastVisitedEUTRANCellInformation ::= OCTET STRING

LastVisitedGERANCellInformation ::= CHOICE {
    undefined              NULL,

    ...}

L3-Information ::= OCTET STRING

-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
LPPa-PDU ::= OCTET STRING

LHN-ID ::= OCTET STRING(SIZE (32..256))

Links-to-log ::= ENumerated { uplink, downlink, both-uplink-and-downlink, ...}

ListeningSubframePattern ::= SEQUENCE {
  pattern-period ENUMERATED {ms1280, ms2560, ms5120, ms10240, ...},
  pattern-offset INTEGER (0..10239, ...),
  iE-Extensions ProtocolExtensionContainer { { ListeningSubframePattern-ExtIEs} } OPTIONAL,
  ...
}

ListeningSubframePattern-ExtIEs SIAP-PROTOCOL-EXTENSION ::= {
  ...
}

LoggedMDT ::= SEQUENCE {
  loggingInterval LoggingInterval,
  loggingDuration LoggingDuration,
  iE-Extensions ProtocolExtensionContainer { {LoggedMDT-ExtIEs} } OPTIONAL,
  ...
}

ETSI
LoggedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... }

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 ::= {
  ... }

M3Configuration ::= SEQUENCE {
  ... }

-- M
m3period             M3period,
iE-Extensions          ProtocolExtensionContainer { { M3Configuration-ExtIEs} } OPTIONAL,
                         ...

M3Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
                         ...
}

M3period ::= ENUMERATED {ms100, ms1000, ms10000, ... }

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, ... }

ETS
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, ... } 

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 {
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mdt-Activation MDT-Activation,
areaScopeOfMDT AreaScopeOfMDT,
mDTMode MDTMode,
iE-Extensions ProtocolExtensionContainer { { MDT-Configuration-ExtIEs} } 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 ::= {
    ...,
}

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..maxnoofMDTPLMN)) OF PLMNidentity

PrivacyIndicator ::= ENUMERATED {
    immediate-MDT,
    logged-MDT,
    ...
}

MDTMode ::= CHOICE {
    immediateMDT    ImmediateMDT,
    loggedMDT      LoggedMDT,
    ...
    mDTMode-Extension   MDTMode-Extension
}

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, ...))

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

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
}

OverloadResponse ::= CHOICE {
  overloadAction OverloadAction,
  ...
}

ETS1
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)

M1PeriodicReporting ::= SEQUENCE {
    reportInterval REPORTIntervalMDT,
    reportAmount REPORTAmountMDT,
    iE-Extensions ProtocolExtensionContainer { { M1PeriodicReporting-ExtIEs} } OPTIONAL,
    ...
}

M1PeriodicReporting-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

PLMNidentity ::= TBCD-STRING

Port-Number ::= OCTET STRING (SIZE (2))

Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
}

ETSI
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 ::= {
    ...
}

ProSeDirectDiscovery ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}
ProSeDirectCommunication ::= ENUMERATED {
    authorized,
    not-authorized,
    ...
}

PS-ServiceNotAvailable ::= ENUMERATED {
    ps-service-not-available,
    ...
}

-- Q

QCI ::= INTEGER (0..255)

-- R

ReceiveStatusOfULPDCPSDUs ::= BIT STRING (SIZE(4096))

ReceiveStatusOfULPDCPSDUsExtended ::= BIT STRING (SIZE(1..16384))

RelativeMMECapacity ::= INTEGER (0..255)

RelayNode-Indicator ::= ENUMERATED {

true,
...
}

RAC ::= OCTET STRING (SIZE (1))

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 S1AP-PROTOCOL-EXTENSION ::= 
   {  
      ... 
   }

RIMTransfer ::= SEQUENCE {
   rIMInformation RIMInformation, 
   rIMRoutingAddress RIMRoutingAddress OPTIONAL, 
   iE-Extensions ProtocolExtensionContainer { { RIMTransfer-ExtIEs} } OPTIONAL, 
   ... 
}

RIMTransfer-ExtIEs S1AP-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,
  uE-RLF-Report-Container-for-extended-bands
  UE-RLF-Report-Container-for-extended-bands
  OPTIONAL,
  iE-Extensions
  ProtocolExtensionContainer {{ RLFReportInformation-ExtIEs}}
  OPTIONAL,
  ...
}

RLFReportInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

RNC-ID ::= INTEGER (0..4095)

RRC-Container ::= OCTET STRING

RRC-Establishment-Cause ::= ENUMERATED {
  ...
etemergency,
highPriorityAccess,
mt-Access,
mo-Signalling,
mo-Data,
...
delay-TolerantAccess
}

ECGIListForRestart ::= SEQUENCE (SIZE(1..maxnoofCellsforRestart)) OF EUTRAN-CGI

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 ::= {
  ...
}

SerialNumber ::= BIT STRING (SIZE (16))

SONInformation ::= CHOICE{
  sONInformationRequest SONInformationRequest,
  sONInformationReply SONInformationReply,
  ...
  sONInformation-Extension SONInformation-Extension
}

SONInformation-Extension ::= ProtocolIE-SingleContainer {{ SONInformation-ExtensionIE }}

SONInformation-ExtensionIE S1AP-PROTOCOL-IES ::= [
  { ID id-SON-Information-Report CRITICALITY ignore TYPE SONInformationReport PRESENCE mandatory }
]

SONInformationRequest ::= ENUMERATED {
  ...
x2TNL-Configuration-Info,
...

activate-Muting,
decide-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{

rLFRReportInformation   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 S1AP-PROTOCOL-EXTENSION ::= {

...}
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 S1AP-PROTOCOL-EXTENSION ::= {


SourceRNC-ToTargetRNC-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 {
  servedPLMNs            ServedPLMNs,
  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

ServedPLMNs ::= SEQUENCE (SIZE(1.. maxnoofPLMNsPerMME)) OF PLMNidentity

SubscriberProfileIDforRFP ::= INTEGER (1..256)

SupportedTAs ::= SEQUENCE (SIZE(1.. maxnoofTACs)) OF SupportedTAs-Item

SupportedTAs-Item ::= SEQUENCE {
    tAC                      TAC,
    broadcastPLMNs           BPLMN,
    iE-Extensions            ProtocolExtensionContainer { {SupportedTAs-Item-ExtIEs} } OPTIONAL,
    ...
}

SupportedTAs-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

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 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 ::= {
    ...
}
TAC ::= OCTET STRING (SIZE (2))

TAIBasedMDT ::= SEQUENCE {
    tAIlIstforMDT TAIListforMDT,
    iE-Extensions ProtocolExtensionContainer { {TAIBasedMDT-ExtIEs} } OPTIONAL,
    ...
}

TAIBasedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...  
}

TAIListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAlIstforMDT)) OF TAI

TAIListforWarning ::= SEQUENCE (SIZE(1..maxnoofTAlIstforWarning)) OF TAI

TAI ::= SEQUENCE {
    pLMNidentity PLMNidentity, 
    tAC TAC, 
    iE-Extensions ProtocolExtensionContainer { {TAI-ExtIEs} } OPTIONAL, 
    ...
}

ETSI
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 ::= {

  ...
}

TAListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAC

CompletedCellinTAI ::= SEQUENCE (SIZE(1..maxnoofCellinTAI)) 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,
  ...  
}

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 ::= {

  

ETSI
TargetRNC-ID ::= SEQUENCE {
  lAI                LAI,
  rAC                RAC OPTIONAL,
  rNC-ID             RNC-ID,
  extendedRNC-ID     ExtendedRNC-ID OPTIONAL,
  iE-Extensions      ProtocolExtensionContainer { {TargetRNC-ID-ExtIEs} } OPTIONAL,
  ...
}

TargetRNC-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ...
}

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.

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 S1AP-PROTOCOL-EXTENSION ::= {
  -- Extension for Rel-10 to support MDT --
  { ID id-MDTConfiguration CRITICALITY ignore EXTENSION MDT-Configuration 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
uDP-Port-Number
iE-Extensions

Tunnel-Information-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {

...}

TypeOfError ::= ENumerated {

   not-understood,
   missing,
   ...

...}

TAIListForRestart ::= SEQUENCE (SIZE(1..maxnoofRestartTAlS)) OF TAI

-- U

UEAggregateMaximumBitrate ::= SEQUENCE {

   uEaggregateMaximumBitRateDL           BitRate,
   uEaggregateMaximumBitRateUL           BitRate,
   iE-Extensions ProtocolExtensionContainer { {UEAggregate-MaximumBitrates-ExtIEs} } OPTIONAL,
... 

UEAggregate-MaximumBitrates-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... 
}

UE-S1AP-IDs ::= CHOICE{
  uE-S1AP-ID-pair       UE-S1AP-ID-pair,
  mME-UE-S1AP-ID       MME-UE-S1AP-ID,
  ... 
}

UE-S1AP-ID-pair ::= SEQUENCE{
  mME-UE-S1AP-ID       MME-UE-S1AP-ID,
  eNB-UE-S1AP-ID       ENB-UE-S1AP-ID,
  iE-Extensions        ProtocolExtensionContainer {{UE-S1AP-ID-pair-ExtIEs}} OPTIONAL,
  ... 
}

UE-S1AP-ID-pair-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ... 
}
UE-associatedLogicalS1-ConnectionItem ::= SEQUENCE {
    mME-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..maxnoofCells)) 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 ::= {
    ...
}
UserLocationInformation ::= SEQUENCE {
    eutran-cgi           EUTRAN-CGI,
    tai                 TAI,
    iE-Extensions       ProtocolExtensionContainer { { UserLocationInformation-ExtIEs} } OPTIONAL,
    ...
}

UserLocationInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- V

VoiceSupportMatchIndicator ::= ENUMERATED {
    supported,
    not-supported,
    ...
}

-- W

WarningAreaList ::= CHOICE {
    cellIDList           ECGIList,
    trackingAreaListforWarning TAIListforWarning.
}
WarningType ::= OCTET STRING (SIZE (2))

WarningSecurityInfo ::= OCTET STRING (SIZE (50))

WarningMessageContents ::= OCTET STRING (SIZE(1..9600))

-- 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 --
}
-- 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 {
    iPsecTLA                  TransportLayerAddress OPTIONAL,
    gTPTLAa                   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
```

-- Y
9.3.5 Common Definitions

S1AP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) s1ap (1) version1 (1) s1ap-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
}

ETSII
ProcedureCode ::= INTEGER (0..255)

ProtocolExtensionID ::= INTEGER (0..65535)

ProtocolIE-ID ::= INTEGER (0..65535)

TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessfull-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) s1ap (1) version1 (1) s1ap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=
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-DownlinkS1cdma2000tunnelling ProcedureCode ::= 19
id-UplinkS1cdma2000tunnelling ProcedureCode ::= 20
id-UEContextModification 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
maxPrivateIEs INTEGER ::= 65535
maxProtocolExtensions INTEGER ::= 65535
maxProtocolIEs INTEGER ::= 65535
maxnoofCSGs INTEGER ::= 256
maxnoofE-RABs INTEGER ::= 256
maxnoofTAIs INTEGER ::= 256
maxnoofTACs INTEGER ::= 256
maxnoofErrors INTEGER ::= 256
maxnoofBPLMNs INTEGER ::= 6
maxnoofPLMNsPerMME INTEGER ::= 32
maxnoofEPLMNs INTEGER ::= 15
maxnoofEPLMNsPlusOne

maxnoofForbLACs

maxnoofForbTACs

maxnoofIndividualS1ConnectionsToReset

maxnoofCells

maxnoofCellsineNB

maxnoofTAIforWarning

maxnoofCellID

maxnoofEmergencyAreaID

maxnoofCellinTAI

maxnoofCellinEAI

maxnoofeNBX2TLAs

maxnoofeNBX2ExtTLAs

maxnoofeNBX2GTPTLAs

maxnoofRATs

maxnoofGroupIDs

maxnoofMMECs

maxnoofCellIDforMDT

maxnoofTAforMDT

maxnoofMDTPLMNs

maxnoofCellsforRestart

maxnoofRestartTAIs

INTEGER ::= 16

INTEGER ::= 4096

INTEGER ::= 4096

INTEGER ::= 256

INTEGER ::= 16

INTEGER ::= 256

INTEGER ::= 65535

INTEGER ::= 65535

INTEGER ::= 65535

INTEGER ::= 65535

INTEGER ::= 65535

INTEGER ::= 2

INTEGER ::= 16

INTEGER ::= 16

INTEGER ::= 8

INTEGER ::= 65535

INTEGER ::= 256

INTEGER ::= 32

INTEGER ::= 8

INTEGER ::= 16

INTEGER ::= 256

INTEGER ::= 2048
maxnoofRestartEmergencyAreaIDs

maxEARFCN

maxnoofMBSFNAreaMDT

-- *****************************************************************
-- IEs
-- -- *****************************************************************

id-MME-UE-S1AP-ID

id-HandoverType

id-Cause

id-SourceID

id-TargetID

id-eNB-UE-S1AP-ID

id-E-RABSubjecttoDataForwardingList

id-E-RABtoReleaseListHOCmd

id-E-RABDataForwardingItem

id-E-RABReleaseItemBearerRelComp

id-E-RABToBeSetupListBearerSUReq

id-E-RABToBeSetupItemBearerSUReq

id-E-RABAdmittedList

id-E-RABFailedToSetupListHOReqAck
id-E-RABAdmittedItem ProtocolIE-ID ::= 20
id-E-RABFailedtoSetupItemHOReqAck ProtocolIE-ID ::= 21
id-E-RABToBeSwitchedDLList ProtocolIE-ID ::= 22
id-E-RABToBeSwitchedDLLItem ProtocolIE-ID ::= 23
id-E-RABToBeSetupListCtxtSUReq ProtocolIE-ID ::= 24
id-TraceActivation ProtocolIE-ID ::= 25
id-NAS-PDU ProtocolIE-ID ::= 26
id-E-RABToBeSetupItemHOReq 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-RABToBeReleasedList ProtocolIE-ID ::= 33
id-E-RABFailedToReleaseList ProtocolIE-ID ::= 34
id-E-RABItem ProtocolIE-ID ::= 35
id-E-RABToBeModifiedItemBearerModReq ProtocolIE-ID ::= 36
id-E-RABModifyItemBearerModRes ProtocolIE-ID ::= 37
id-E-RABReleaseItem ProtocolIE-ID ::= 38
id-E-RABSetupItemBearerSURes ProtocolIE-ID ::= 39
id-SecurityContext ProtocolIE-ID ::= 40
id-HandoverRestrictionList ProtocolIE-ID ::= 41
id-UEPagingID ProtocolIE-ID ::= 43
id-pagingDRX ProtocolIE-ID ::= 44
id-TAIList

id-TAILitem

id-E-RABFailedToSetupListCtxtSRes

id-E-RABReleaseItemHOCmd

id-E-RABSetupItemCtxtSRes

id-E-RABSetupListCtxtSRes

id-E-RABToBeSetupItemCtxtSReq

id-E-RABToBeSetupListHOReq

id-GERANtoLTEHOInformationRes

id-UTRANtoLTEHOInformationRes

id-CriticalityDiagnostics

id-Global-ENB-ID

id-ENBname

id-MMName

id-ServedPLMNs

id-SupportedTAs

id-TimeToWait

id-uEaggregateMaximumBitrate

id-TAI

id-E-RABReleaseListBearerRelComp

id-cdma2000PDU

id-cdma2000RATType

id-cdma2000SectorID

id-SecurityKey
id-UERadioCapability ProtocolIE-ID ::= 74
id-GUMMEI-ID ProtocolIE-ID ::= 75
id-E-RABInformationList Item ProtocolIE-ID ::= 78
id-Direct-Forwarding-Path-Availability ProtocolIE-ID ::= 79
id-UEIdentityIndexValue ProtocolIE-ID ::= 80
id-cdma2000HOstatus ProtocolIE-ID ::= 83
id-cdma2000HOREquiredIndication ProtocolIE-ID ::= 84
id-E-UTRAN-Trace-ID ProtocolIE-ID ::= 86
id-RelativeMMECapacity ProtocolIE-ID ::= 87
id-SourceMME-UE-S1AP-ID ProtocolIE-ID ::= 88
id-Bearers-SubjectToStatusTransfer-Item ProtocolIE-ID ::= 89
id-eNB-StatusTransfer-TransparentContainer ProtocolIE-ID ::= 90
id-UE-associatedLogicalS1-ConnectionItem ProtocolIE-ID ::= 91
id-ResetType ProtocolIE-ID ::= 92
id-UE-associatedLogicalS1-ConnectionListRes Ack ProtocolIE-ID ::= 93
id-E-RABToBeSwitchedULItem ProtocolIE-ID ::= 94
id-E-RABToBeSwitchedULList ProtocolIE-ID ::= 95
id-S-TMSI ProtocolIE-ID ::= 96
id-cdma2000OneXRAND ProtocolIE-ID ::= 97
id-RequestType ProtocolIE-ID ::= 98
id-UE-S1AP-IDs ProtocolIE-ID ::= 99
id-EUTRAN-CGI ProtocolIE-ID ::= 100
id-OverloadResponse ProtocolIE-ID ::= 101
id-cdma2000OneXSRVCCInfo ProtocolIE-ID ::= 102
id-E-RABFailedToBeReleasedList  ProtocolIE-ID ::= 103
id-Source-ToTarget-TransparentContainer  ProtocolIE-ID ::= 104
id-ServedGUMMEIs  ProtocolIE-ID ::= 105
id-SubscriberProfileIDforRFP  ProtocolIE-ID ::= 106
id-UESecurityCapabilities  ProtocolIE-ID ::= 107
id-CSFallbackIndicator  ProtocolIE-ID ::= 108
id-CNDomain  ProtocolIE-ID ::= 109
id-E-RABReleasedList  ProtocolIE-ID ::= 110
id-MessageIdentifier  ProtocolIE-ID ::= 111
id-SerialNumber  ProtocolIE-ID ::= 112
id-WarningAreaList  ProtocolIE-ID ::= 113
id-RepetitionPeriod  ProtocolIE-ID ::= 114
id-NumberofBroadcastRequest  ProtocolIE-ID ::= 115
id-WarningType  ProtocolIE-ID ::= 116
id-WarningSecurityInfo  ProtocolIE-ID ::= 117
id-DataCodingScheme  ProtocolIE-ID ::= 118
id-WarningMessageContents  ProtocolIE-ID ::= 119
id-BroadcastCompletedAreaList  ProtocolIE-ID ::= 120
id-Inter-SystemInformationTransferTypeEDT  ProtocolIE-ID ::= 121
id-Inter-SystemInformationTransferTypeMDT  ProtocolIE-ID ::= 122
id-Target-ToSource-TransparentContainer  ProtocolIE-ID ::= 123
id-SRVCCOperationPossible  ProtocolIE-ID ::= 124
id-SRVCCCHOIndication  ProtocolIE-ID ::= 125
id-NAS-DownlinkCount  ProtocolIE-ID ::= 126
id-CSG-Id ProtocolIE-ID ::= 127
id-CSG-IdList ProtocolIE-ID ::= 128
id-SONConfigurationTransferECT ProtocolIE-ID ::= 129
id-SONConfigurationTransferMCT ProtocolIE-ID ::= 130
id-TraceCollectionEntityIPAddress ProtocolIE-ID ::= 131
id-MSCClassmark2 ProtocolIE-ID ::= 132
id-MSCClassmark3 ProtocolIE-ID ::= 133
id-RRC-Establishment-Cause ProtocolIE-ID ::= 134
id-NASSecurityParametersfromE-UTRAN ProtocolIE-ID ::= 135
id-NASSecurityParameterstoE-UTRAN ProtocolIE-ID ::= 136
id-DefaultPagingDRX ProtocolIE-ID ::= 137
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-PS-ServiceNotAvailable ProtocolIE-ID ::= 150
id-PagingPriority  ProtocolIE-ID ::= 151
id-x2TNLConfigurationInfo  ProtocolIE-ID ::= 152
id-eNBX2ExtendedTransportLayerAddresses  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-2  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-ULCOUNTValueExtended  ProtocolIE-ID ::= 179
id-DLCOUNTValueExtended  ProtocolIE-ID ::= 180
id-ReceiveStatusOfULPDCPSDUsExtended  ProtocolIE-ID ::= 181
id-ECGIListForRestart  ProtocolIE-ID ::= 182
id-SIPTO-Correlation-ID  ProtocolIE-ID ::= 183
id-SIPTO-L-GW-TransportLayerAddress  ProtocolIE-ID ::= 184
id-TransportInformation  ProtocolIE-ID ::= 185
id-LHN-ID  ProtocolIE-ID ::= 186
id-AdditionalCSFallbackIndicator  ProtocolIE-ID ::= 187
id-TAILlistForRestart  ProtocolIE-ID ::= 188
id-UserLocationInformation  ProtocolIE-ID ::= 189
id-EmergencyAreaIDLListForRestart  ProtocolIE-ID ::= 190
id-KillAllWarningMessages  ProtocolIE-ID ::= 191
id-Masked-IMEISV  ProtocolIE-ID ::= 192
id-eNBIndirectX2TransportLayerAddresses  ProtocolIE-ID ::= 193
id-uE-HistoryInformationFromTheUE  ProtocolIE-ID ::= 194
id-ProSeAuthorized  ProtocolIE-ID ::= 195
id-ExpectedUEBehaviour  ProtocolIE-ID ::= 196
id-LoggedMBSFNMDT  ProtocolIE-ID ::= 197
id-UERadioCapabilityForPaging  ProtocolIE-ID ::= 198
id-E-RABToBeModifiedListBearerModInd 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

END

9.3.7 Container Definitions

S1AP-Containers {
  itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
  eps-Access (21) modules (3) s1ap (1) version1 (1) s1ap-Containers (5) }

END

ETSI
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;
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
}

-- ************************************************************************
-- -- Class Definition for Protocol Extensions
-- --
S1AP-PROTOCOL-EXTENSION ::= CLASS {
    &id ProtocolExtensionID UNIQUE,
    &criticality Criticality,  
    &Extension,  
    &presence Presence
}

WITH SYNTAX {
    ID &id
    CRITICALITY &criticality
    EXTENSION &Extension
    PRESENCE &presence
}

-- *****************************************************
-- Class Definition for Private IEs
--
-- *****************************************************

S1AP-PRIVATE-IES ::= CLASS {
    &id := PrivateIE-ID,  
    &criticality Criticality,  
    &Value,  
    &presence Presence
WITH SYNTAX {

    ID &id
    CRITICALITY &criticality
    TYPE &Value
    PRESENCE &presence

    }
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
ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, S1AP-PROTOCOL-IES : IEsSetParam} ::=  
  SEQUENCE (SIZE (lowerBound..upperBound)) OF  
  ProtocolIE-SingleContainer {{IEsSetParam}}

ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, S1AP-PROTOCOL-IES-PAIR : IEsSetParam} ::=  
  SEQUENCE (SIZE (lowerBound..upperBound)) OF  
  ProtocolIE-ContainerPair {{IEsSetParam}}

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}),
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} [ @id ] ),
  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

\textbf{TS}_{1\text{RELOC}}{}^\text{prep}

- Specifies the maximum time for the Handover Preparation procedure in the source eNB.

\textbf{TS}_{1\text{RELOC}}{}^\text{overall}

- Specifies the maximum time for the protection of the overall handover procedure in the source eNB.

\textbf{TX}_{2\text{RELOCO}}{}^\text{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:

![Fig 10.1-1: Protocol Errors in S1AP.](Image)

The information stated in subclauses 10.2, 10.3 and 10.4, to be included in the message used when reporting an error, is what at minimum shall be included. Other optional information elements within the message may also be included, if available. This is also valid for the case when the reporting is done with a response message. The latter is an exception to what is stated in subclause 4.1.

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;
2. Conditional;
3. Mandatory.

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 (except for the reporting) 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 'Reject IE', 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 unsuccessfully 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 unsuccessfully 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 unsuccessfully 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 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: HANOVER REQUIRED message</th>
<th>Target to Source Transparent Container IE in S1AP: HANOVER COMMAND message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra E-UTRAN handover</td>
<td>Source eNB to Target eNB Transparent Container 36.413</td>
<td>Target eNB to Source eNB Transparent Container 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 25.413</td>
<td>Target RNC to Source RNC Transparent Container 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 48.018</td>
<td>Target BSS to Source BSS Transparent Container Contents of the Target BSS to Source BSS Transparent Container 48.018</td>
</tr>
<tr>
<td>SRVCC operation to GERAN without DTM support or SRVCC operation to GERAN with DTM HO support</td>
<td>Old BSS to New BSS information elements field of the Old BSS to New BSS information 48.008</td>
<td>Layer 3 Information field of the Layer 3 Information 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) 48.018</td>
<td>Layer 3 Information field of the Layer 3 Information (in the Target to Source Transparent Container IE); Target BSS to Source BSS Transparent Container Contents of the Target BSS to Source BSS Transparent Container (in the Target to Source Transparent Container Secondary IE) 48.018</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>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SON Transfer Application Identity</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td>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', &quot;Multi-Cell Load Reporting', 'HO Reporting', 'E-UTRAN Cell Activation', 'Energy Savings Indication', or &quot;Failure Event Reporting&quot;. 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 &quot;Failure Event Reporting&quot;.</td>
</tr>
</tbody>
</table>

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].
<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>NULL</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;Multi-Cell Load Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Multi-Cell Load Reporting Request</td>
<td>M</td>
<td></td>
<td>B.1.7</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;Event-Triggered Cell Load Reporting Request</td>
<td>M</td>
<td></td>
<td>B.1.11</td>
<td></td>
</tr>
<tr>
<td>&gt;HO Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;HO Report</td>
<td>M</td>
<td></td>
<td>B.1.13</td>
<td></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 Request</td>
<td>M</td>
<td></td>
<td>B.1.14</td>
<td></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</td>
<td>M</td>
<td></td>
<td>B.1.16</td>
<td></td>
</tr>
<tr>
<td>&gt;Failure Event Reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Failure Event Report</td>
<td>M</td>
<td></td>
<td>B.1.17</td>
<td></td>
</tr>
</tbody>
</table>

### 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></td>
</tr>
<tr>
<td>&gt;&gt;E-UTRAN Cell Activation Response</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></td>
</tr>
<tr>
<td>&gt;&gt;Failure Event Reporting</td>
<td>NULL</td>
<td></td>
<td></td>
<td></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>Presence</th>
<th>Range</th>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Cell Load Reporting</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>
</tr>
<tr>
<td>&gt;Multi-Cell Load Reporting</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>
</tr>
<tr>
<td>&gt;Event-Triggered Cell Load Reporting</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>
</tr>
<tr>
<td>&gt;HO Reporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;HO Reporting Cause</td>
<td>M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IE type and reference</th>
<th>Semantics description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOICE</td>
<td></td>
</tr>
<tr>
<td>SON</td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td></td>
</tr>
</tbody>
</table>

<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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<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>
<tr>
<td>Inconsistent Reporting Cell Identifier</td>
<td>- 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 case of a RAN-INFORMATION-REQUEST PDU) or with the Source Cell Identifier IE value (in the case of a RAN-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 RAN-INFORMATION-REQUEST PDU.</td>
</tr>
<tr>
<td>Unspecified</td>
<td>Sent when none of the above cause values applies.</td>
</tr>
</tbody>
</table>

<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 PDU.</td>
</tr>
<tr>
<td>Unspecified</td>
<td>Sent when none of the above cause values applies.</td>
</tr>
</tbody>
</table>
### 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</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;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 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;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</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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>B.1.8</td>
<td></td>
<td></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>M</td>
<td>OCTET STRING</td>
<td>Contains the E-UTRAN CGI IE as defined in 9.2.1.38.</td>
</tr>
<tr>
<td>&gt;&gt;Cell Identifier</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;UTRAN</td>
<td></td>
<td>M</td>
<td>OCTET STRING</td>
<td>Contains the Source Cell Identifier IE as defined in TS 25.413.</td>
</tr>
<tr>
<td>&gt;&gt;Cell Identifier</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;GERAN</td>
<td></td>
<td>M</td>
<td>OCTET STRING</td>
<td>Contains the Cell Identifier IE as defined in TS 48.018.</td>
</tr>
<tr>
<td>&gt;&gt;Cell Identifier</td>
<td>M</td>
<td>OCTET STRING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;eHRPD</td>
<td></td>
<td>M</td>
<td>B.1.18</td>
<td></td>
</tr>
</tbody>
</table>

> >>eHRPD Sector ID

B.1.9 Multi-Cell Load Reporting Response

This IE contains response information for inter-RAT multi-cell load reporting.
### Reporting Cell 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>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;CHOICE Reporting RAT</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;E-UTRAN</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;E-UTRAN Response</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>
<tr>
<td>&gt;&gt;&gt;&gt;&gt;Cell Identifier</td>
<td>M</td>
<td></td>
<td>B.1.6</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;E-UTRAN Cell Load Reporting Response</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;UTRAN</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the Cell Load Information Group IE as defined in TS 25.413.</td>
</tr>
<tr>
<td>&gt;&gt;&gt;UTRAN Response</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;GERAN</td>
<td>M</td>
<td></td>
<td>OCTET STRING</td>
<td>Contains the Cell Load Information Group IE as defined in TS 48.008.</td>
</tr>
<tr>
<td>&gt;&gt;&gt;eHRPD</td>
<td>M</td>
<td></td>
<td>B.1.18</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;&gt;eHRPD Sector ID</td>
<td>M</td>
<td></td>
<td>B.1.19</td>
<td></td>
</tr>
</tbody>
</table>

### B.1.10 Cell Load Reporting Cause

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>Cell Load Reporting Cause</td>
<td>M</td>
<td></td>
<td>ENUMERATED</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Application Container Syntax Error, Inconsistent Reporting Cell Identifier, Unspecified, ...)</td>
<td></td>
</tr>
</tbody>
</table>

The meaning of the different cause values is described in the following table.

<table>
<thead>
<tr>
<th>Cell Load 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 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 RAN-INFORMATION-REQUEST PDU) or with the Source Cell Identifier IE value (in the case of a RAN-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 RAN-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></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>
</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></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>
</tr>
<tr>
<td>Overload Flag</td>
<td>O</td>
<td></td>
<td>ENUMERATED (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.
### IE/Group Name, Presence, Range, IE Type and Reference, Semantics Description

<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>ENUMERATED (LTE to UTRAN, LTE to GERAN, …)</td>
<td></td>
<td>The &quot;Early IRAT Handover&quot; code-point shall be used by the RNC according to TS 25.413 [19].</td>
</tr>
<tr>
<td>HO Report Type</td>
<td>M</td>
<td>ENUMERATED (Unnecessary HO to another RAT, …, Early IRAT Handover)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HO Source ID</td>
<td>M</td>
<td>IRAT Cell ID B.1.8</td>
<td></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>
</tr>
<tr>
<td>HO Target ID</td>
<td>M</td>
<td>IRAT Cell ID B.1.8</td>
<td></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>
</tr>
<tr>
<td>Candidate Cell List</td>
<td>1 .. &lt;maxnoofCandidateCells&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Candidate Cell ID</td>
<td>M</td>
<td>IRAT Cell ID B.1.8</td>
<td></td>
<td>This IE contains an E-UTRAN CGI.</td>
</tr>
<tr>
<td>Candidate PCI List</td>
<td>0 .. 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;Candidate PCIs</td>
<td>1 .. &lt;maxnoofCandidateCells&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt;Candidate PCI</td>
<td>M</td>
<td>B.1.23</td>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

### Range Bound

| maxnoofCandidateCells | Maximum no. of candidate cells. |

### 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>1 .. &lt;maxnoofCellineNB&gt;</td>
<td></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 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>

### Range Bound

| maxnoofCellineNB | Maximum no. of cells that can be served by an eNB. Value is 256. |
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></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>OCTET</td>
<td>Contains the E-UTRAN CGI IE as defined in 9.2.1.38.</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.1.16 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></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></td>
<td></td>
<td>M</td>
<td>OCTET</td>
<td>Contains the E-UTRAN CGI IE as defined in 9.2.1.38.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>ENUMERATE D (Activated, Deactivated, ...)</td>
<td></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.1.17 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>OCTET STRING (SIZE(16))</td>
<td>Defined in 3GPP2 C.S0024-B [27] sub-section 13.9</td>
<td></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>eHRPD Composite Available Capacity B.1.20</td>
<td>For the downlink</td>
<td></td>
</tr>
<tr>
<td>eHRPD Composite Available Capacity Uplink</td>
<td>M</td>
<td>eHRPD Composite Available Capacity B.1.20</td>
<td>For the uplink</td>
<td></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>B.1.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>eHRPD Capacity Value</td>
<td>M</td>
<td>B.1.22</td>
<td>&quot;0&quot; indicates no resource is available, Measured on a linear scale.</td>
<td></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></td>
<td>INTEGER (1..100,...)</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></td>
<td>INTEGER (0..100)</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 SIAP-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

}  

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, 
  gERAN OCTET STRING, 
  ..., 
  eHRPD EHRPDSectorLoadReportingResponse
}

CompositeAvailableCapacityGroup ::= OCTET STRING

EUTRANcellLoadReportingResponse ::= SEQUENCE { 
  compositeAvailableCapacityGroup CompositeAvailableCapacityGroup, 
  ...
}

--
-- IEs for Multi-Cell Load Reporting application
--

**EUTRANResponse ::= SEQUENCE {**
  cell-ID OCTET STRING,
  eUTRANcellLoadReportingResponse EUTRANcellLoadReportingResponse,
  ...**

  }**

**EHRPD-Sector-ID ::= OCTET STRING (SIZE (16))**

**IRAT-Cell-ID ::= CHOICE{**
  eUTRAN OCTET STRING,
  uTRAN OCTET STRING,
  gERAN OCTET STRING,
  ..., eHRPD EHRPD-Sector-ID**

  }**

**RequestedCellList ::= SEQUENCE (SIZE(1.. maxnoofIRATReportingCells)) OF IRAT-Cell-ID**

**MultiCellLoadReportingRequest ::= SEQUENCE {**
  requestedCellList RequestedCellList,
  ...**

  }**

**ReportingCellList-Item ::= SEQUENCE {**
  cell-ID IRAT-Cell-ID,
  ...**

  }**

**ReportingCellList ::= SEQUENCE (SIZE(1.. maxnoofIRATReportingCells)) OF ReportingCellList-Item**

**MultiCellLoadReportingResponse ::= SEQUENCE (SIZE(1.. maxnoofIRATReportingCells)) OF**

**MultiCellLoadReportingResponse-Item**
MultiCellLoadReportingResponse-Item ::= CHOICE{
    eUTRANResponse EUTRANResponse,
    uTRANResponse OCTET STRING,
    gERANResponse OCTET STRING,
    ..., 
    eHRPD EHRPDMultiSectorLoadReportingResponseItem
}

--
-- IEs for Event-triggered Cell Load Reporting application
--

NumberOfMeasurementReportingLevels ::= ENUMERATED {  
    rl2, 
    rl3, 
    rl4, 
    rl5, 
    rl10, 
    ... 
}

EventTriggeredCellLoadReportingRequest ::= SEQUENCE {  
    numberOfMeasurementReportingLevels NumberOfMeasurementReportingLevels, 
    ... 
}

OverloadFlag ::= ENUMERATED {  
    overload, 
    ... 
}

EventTriggeredCellLoadReportingResponse ::= SEQUENCE {  

cellLoadReportingResponse   CellLoadReportingResponse,
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 {
    lteoutran,
    lteogeran,
    ...
}

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 {
  tooEarlyInterRATHOReportFromEUTRAN TooEarlyInterRATHOReportReportFromEUTRAN,

  ...}

TooEarlyInterRATHOReportReportFromEUTRAN ::= SEQUENCE {
  uERLFRReportContainer OCTET STRING, -- as defined in TS 36.331 [16] --
  mobilityInformation MobilityInformation OPTIONAL,
MobilityInformation ::= BIT STRING (SIZE(32))

--
-- IEs for reporting of eHRPD load
--

EHRPDCapacityValue ::= INTEGER (0..100)

EHRPDSectorCapacityClassValue ::= INTEGER (1..100, ...)

EHRPDSectorLoadReportingResponse ::= SEQUENCE {
    dL-EHRPD-CompositeAvailableCapacity   EHRPDCompositeAvailableCapacity,
    uL-EHRPD-CompositeAvailableCapacity   EHRPDCompositeAvailableCapacity,
    ...}

EHRPDCompositeAvailableCapacity ::= SEQUENCE {
    eHRPDSectorCapacityClassValue    EHRPDSectorCapacityClassValue,
    eHRPDCapacityValue       EHRPDCapacityValue,
    ...
}

EHRPDMultiSectorLoadReportingResponseItem ::= SEQUENCE {
    eHRPD-Sector-ID        EHRPD-Sector-ID,
    eHRPDSectorLoadReportingResponse  EHRPDSectorLoadReportingResponse,
    ...
}
-- 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

<table>
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<th>TSG #</th>
<th>TSG Doc.</th>
<th>CR</th>
<th>Rev</th>
<th>Subject/Comment</th>
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</table>

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March 2009:

- Minor corrections before freezing of ASN.1
- Editorial Updates
- Correction of RAN#43 CR implementation
Explicitly allow TRACE START to be the first UE-associated message received at the eNB.

Clarification of UE Capability Info Indication.

Mandatory UE History Information IE in HANDOVER REQUIRED for Inter-RAT HO from E-UTRAN to UMTS.

Clarify eNB may send Release msg rather than RRC Reject msg on receiving OVERLOAD Start msg.

Clarification of UE Capability Info Indication.

Mandatory UE History Information IE in HANDOVER REQUIRED For Inter-RAT HO from E-UTRAN to UMTS.

Clarify eNB may send Release msg rather than RRC Reject msg on receiving OVERLOAD Start msg.

Correction of security parameters.

Emergency call Indicator during CS Fallback.

Correction on Path Switch Request procedure.

Removing "outcome" element from the Triggering Message IE.

Clarification of Security Context to be used in HANDOVER REQUEST message.

Correction the text about the Handover Resource Allocation procedure.

Clarification for RAT list in S1 Setup Response and MME configuration Update.

Add that a non-GBR must be received and admitted on S1-HO.

Clarification of E-UTRAN Trace ID in Cell Traffic Trace message.

Removal of duplication description of MME UE S1AP ID and eNB UE S1AP ID.

Handling of not supported QCI values.

Specify how report dup E-RAB ID in Tabular and replace MME with EPC in 8.3.1.2.

Indirect path use by the MME.

CR on Repetition Period IE.

Miscellaneous correction to 36.413v8.6.1.

ASN1 object identified correction.

Interaction between Initial Context Setup/UE Context Modification and Handover Preparation/Redirection procedures during CS Fallback.

Adding the RTD information in UPLINK CDMA2000 TUNNELING.

Handling of Emergency Calls in Limited Service Mode.

Emergency Calls Mobility Handling.

S1AP Kill procedure for cancellation of PWS warning messages.

S1AP Write-Replace Warning procedure for PWS/CMAS.

Support for paging optimization with CSG membership changes.

Inclusion of Access Mode and Subscription Status for UE prioritisation in LTE hybrid cells.

Handling of Multiple concurrent CMAS Warning Notifications.

CR for Transportation support for LPPa.
46  RP-091183  0589  2  Rejection Criteria for Overload  9.1.0
46  RP-091369  0592  2  Introduction of inbound LTE mobility  9.1.0
46  RP-091194  0605  1  Repetition Period for CMAS  9.1.0
46  RP-091183  0607  1  Correction of E-RAB Modify  9.1.0
46  RP-091183  0616  1  Clarification on handover restriction  9.1.0
46  RP-091183  0618  2  Correction of Transport Layer Address  9.1.0
46  RP-091183  0621  1  Missing reference and unclear handling of the CDMA2000 Sector ID  9.1.0
46  RP-100214  0623  1  Correction of RTD range  9.2.0
46  RP-100214  0625  1  Correction of path switch failure  9.2.0
46  RP-100213  0626  1  Correction of CSG Cell and Hybrid Cell Definition  9.2.0
46  RP-100228  0631  1  Correction of CSG expiry Handling  9.2.0
46  RP-100229  0641  1  CMAS and ETWS action if Number of Broadcasts Requested IE set to 0  9.2.0
46  RP-100229  0645  1  Description of Transparent Container Encoding  9.2.0
46  RP-100230  0647  2  Rapporteur’s update for S1AP protocol  9.2.0
46  RP-100214  0651  1  CDMA2000 1xRTT RAND format  9.2.0
46  RP-100213  0659  1  Handling of the CDMA2000 RAT and Sector ID  9.2.0
46  RP-100214  0661  2  Handling of CSG ID check failure in LTE hybrid cells  9.2.0
46  RP-100225  0664  1  Transfer Encoding of LPPa PDUs over S1  9.2.0
46  RP-100222  0666  1  Correction of connection establishment  9.2.0
46  RP-100222  0667  1  Correction of connection establishment  9.2.0
46  RP-100222  0678  3  Creation of annex for SON Transfer and Cell Load Reporting RIM application  9.2.0
46  RP-100230  0679  2  Support of time and frequency synchronization using network listening  9.2.0
46  RP-100230  0682  1  E-UTRAN Trace ID Abnormal Conditions  9.3.0
46  RP-100599  0683  2  Clarification on DTM and PS Handover  9.3.0
46  RP-100599  0687  1  Correction on UE Security Capability handling in UE Context Modification procedure  9.3.0
46  RP-100599  0693  1  Clarification on processing Extended Repetition Period IE  9.3.0
46  RP-100599  0694  1  List more apt cause in Interactions with E-RAB Management procedures section  9.3.0
46  RP-100599  0695  1  Missing ETWS action if Repetition period set to 0  9.3.0
46  RP-100599  0701  2  Correction of shall to shall if supported  9.3.0
46  RP-100599  0710  1  Correction of no DTM support  9.3.0
46  RP-100599  0711  2  Correction of forbidden inter-RAT  9.3.0
47  RP-100599  0712  1  Rapporteur’s update for S1AP protocol  9.3.0
46  RP-100599  0717  1  S1AP Transparent containers compatible maximum message size  9.3.0
46  RP-100908  0726  1  Explicit PLMN coding in Trace IEs  9.4.0
46  RP-100908  0731  3  Cause value for UE context release during CSFB  9.4.0
46  RP-100906  0738  1  CS Fallback Indication and Handover Restriction List  9.4.0
46  RP-100908  0741  1  Correction of Repetition Period  9.4.0
46  RP-100908  0742  1  Notification of Location Reporting Failure  9.4.0
46  RP-100908  0743  1  Correction of UE AMBR  9.4.0
46  RP-100908  0745  1  Simultaneous Rekeying and CSFB  9.4.0
46  RP-100908  0751  1  Delete references to 23.041 in Tabular  9.4.0
48  RP-101271  0753  1  Handling of CDMA2000 HO Required Indication  9.5.0
48  RP-101270  0755  1  Correction of E-RAB Data Forwarding in HANDOVER COMMAND and DOWNLINK S1 CDMA2000 TUNNELING  9.5.0
48  RP-101271  0756  1  Clarification on Handover Restriction List  9.5.0
48  RP-101271  0758  4  Multiple PLMNs Selection in eNodeB for CS fallback  9.5.0
48  RP-101271  0780  2  Clarification on SRVCC procedure in case of PS handover failure  9.5.0
48  RP-101271  0783  1  Correction of GBR and MBR  9.5.0
50  RP-101271  0783  1  Correction of GBR and MBR  9.5.0
50  RP-101271  0799  1  Clarification on the overload action only accepting emergency and MT sessions  9.5.0

12/2010  Rel-10 version created based on v 9.5.0  10.0.0
50  RP-101272  0752  2  Prioritised handling of MPS session in S1-AP PAGING message  10.0.0
50  RP-101272  0754  2  Alignment of tabular with ASN.1 for S1 Setup message  10.0.0
50  RP-101272  0764  2  Enhancement of the IP address exchange mechanism for ANR purposes  10.0.0
50  RP-101304  0768  1  Inter-RAT cell load reporting for multiple cells  10.0.0
50  RP-101304  0769  2  Event-triggered inter-RAT cell load reporting  10.0.0
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