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Technical Specification

Universal Mobile Telecommunications System (UMTS); UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling (3GPP TS 25.413 version 4.9.0 Release 4)



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Foreword

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1 Scope

The present document specifies the radio network layer signalling protocol called Radio Access Network Application Part (RANAP) for the Iu interface. RANAP supports the functions of Iu interface by signalling procedures defined in this document. RANAP is developed in accordance to the general principles stated in [1], [2] and [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".

- [1] 3GPP TR 23.930: "Iu Principles".
- [2] 3GPP TS 25.410: "UTRAN Iu Interface: General Aspects and Principles".
- [3] 3GPP TS 25.401: "UTRAN Overall Description".
- [4] 3GPP TR 25.931: "UTRAN Functions, Examples on Signalling Procedures".
- [5] 3GPP TS 25.412: "UTRAN Iu interface signalling transport".
- [6] 3GPP TS 25.415: "UTRAN Iu interface user plane protocols".
- [7] 3GPP TS 23.107: "Quality of Service (QoS) concept and architecture".
- [8] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".
- [9] 3GPP TS 25.414: "UTRAN Iu interface data transport and transport signalling".
- [10] 3GPP TS 25.331: Radio Resource Control (RRC) protocol specification".
- [11] 3GPP TS 08.08: "Mobile services Switching Centre - Base Station System (MSC-BSS) interface; Layer 3 specification".
- [12] 3GPP TS 12.08: "Subscriber and equipment trace".
- [13] ITU-T Recommendation X.691 (1997): "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".
- [14] ITU-T Recommendation X.680 (1997): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [15] ITU-T Recommendation X.681 (1997): "Information technology - Abstract Syntax Notation One (ASN.1): Information object specification".
- [16] 3GPP TS 23.110: "UMTS Access Stratum, Services and Functions".
- [17] 3GPP TS 25.323: "Packet Data Convergence Protocol (PDCP) specification".
- [18] 3GPP TR 25.921: "Guidelines and principles for protocol description and error handling".
- [19] 3GPP TS 23.003: "Numbering, addressing and identification".
- [20] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".
- [21] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

- [22] 3GPP TS 24.080: "Mobile radio Layer 3 supplementary services specification; Formats and coding".
- [23] 3GPP TS 29.108: "Application of the Radio Access Network Application Part (RANAP) on the E-interface".
- [24] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [25] 3GPP TS 12.20: "Base Station System (BSS) management information".
- [26] 3GPP TS 22.071: "Location Services (LCS); Service description - Stage 1".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Integrity Protection Alternative: defines both the Integrity Protection Status (started/not started) together with the Integrity Protection Algorithm considered altogether.

Ciphering Alternative: defines both the Ciphering Status (started/not started) together with the Ciphering Algorithm considered altogether.

Default CN node: An RNC has one single permanent default CN node per CN domain. It always initiates the Initial UE Message procedure towards its default CN node.

Relocation of SRNS: relocation of SRNS is a UMTS functionality used to relocate the serving RNS role from one RNS to another RNS. This UMTS functionality is realised by several elementary procedures executed in several interfaces and by several protocols and it may involve a change in the radio resources used between UTRAN and UE

It is also possible to relocate the serving RNS role from:

- one RNS within UMTS to another relocation target external to UMTS;
- functionality equivalent to the serving RNS role from another relocation source external to UMTS to another RNS.

Serving RNS (SRNS): role an RNS can take with respect to a specific connection between an UE and UTRAN. There is one serving RNS for each UE that has a connection to UTRAN. The serving RNS is in charge of the radio connection between a UE and the UTRAN. The serving RNS terminates the Iu for this UE

Serving RNC (SRNC): SRNC is the RNC belonging to SRNS

SRNC-ID: see [3] for definition

S-RNTI: see [3] for definition

Source RNS: role, with respect to a specific connection between UTRAN and CN, that RNS takes when it decides to initiate a relocation of SRNS

Source RNC: source RNC is the RNC belonging to source RNS

Target RNS: role an RNS gets with respect to a specific connection between UTRAN and CN when it is being a subject of a relocation of SRNS which is being made towards that RNS

Target RNC: target RNC is the RNC belonging to target RNS

Directed retry: Directed retry is the process of assigning a User Equipment to a radio resource that does not belong to the serving RNC e.g. in situations of congestion. It is triggered by the RAB Assignment procedure and employs relocation procedures.

Elementary Procedure: RANAP protocol consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the RNS and the CN. 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 stand alone procedures, which can be active in parallel. Examples on using several RANAP EPs together with each other and EPs from other interfaces can be found in reference [4].

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

- **Class 1:** Elementary Procedures with response (success and/or failure).
- **Class 2:** Elementary Procedures without response.
- **Class 3:** Elementary Procedures with possibility of multiple responses.

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.

Class 3 EPs have one or several response messages reporting both successful, unsuccessful outcome of the requests and temporary status information about the requests. This type of EP only terminates through response(s) or EP timer expiry.

3.2 Symbols

Void.

3.3 Abbreviations

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

| | |
|-------|---|
| AAL2 | ATM Adaptation Layer type 2 |
| AS | Access Stratum |
| ASN.1 | Abstract Syntax Notation One |
| ATM | Asynchronous Transfer Mode |
| CC | Call Control |
| CN | Core Network |
| CRNC | Controlling RNC |
| CS | Circuit Switched |
| DCH | Dedicated Channel |
| DL | Downlink |
| DRNC | Drift RNC |
| DRNS | Drift RNS |
| DSCH | Downlink Shared Channel |
| EP | Elementary Procedure |
| GPRS | General Packet Radio System |
| GSM | Global System for Mobile communications |

| | |
|-----------|---|
| GTP | GPRS Tunnelling Protocol |
| IE | Information Element |
| IMEI | International Mobile Equipment Identity |
| IMSI | International Mobile Subscriber Identity |
| IPv4 | Internet Protocol (version 4) |
| IPv6 | Internet Protocol (version 6) |
| MM | Mobility Management |
| MSC | Mobile services Switching Center |
| NAS | Non Access Stratum |
| N-PDU | Network – Protocol Data Unit |
| OSP:IHOSS | Octet Stream Protocol: Internet-Hosted Octet Stream Service |
| P-TMSI | Packet TMSI |
| PDCP | Packet Data Convergence Protocol |
| PDP | Packet Data Protocol |
| PDU | Protocol Data Unit |
| PPP | Point-to-Point Protocol |
| PS | Packet Switched |
| QoS | Quality of Service |
| RAB | Radio Access Bearer |
| RANAP | Radio Access Network Application Part |
| RNC | Radio Network Controller |
| RNS | Radio Network Subsystem |
| RRC | Radio Resource Control |
| SAI | Service Area Identifier |
| SAP | Service Access Point |
| SCCP | Signalling Connection Control Part |
| SDU | Service Data Unit |
| SGSN | Serving GPRS Support Node |
| SRNC | Serving RNC |
| SRNS | Serving RNS |
| TEID | Tunnel Endpoint Identifier |
| TMSI | Temporary Mobile Subscriber Identity |
| UE | User Equipment |
| UEA | UMTS Encryption Algorithm |
| UIA | UMTS Integrity Algorithm |
| UL | Uplink |
| UMTS | Universal Mobile Telecommunications System |
| USCH | Uplink Shared Channel |
| UTRAN | UMTS Terrestrial Radio Access Network |

4 General

4.1 Procedure Specification Principles

The principle for specifying the procedure logic is to specify the functional behaviour of the RNC exactly and completely. The CN functional behaviour is left unspecified. The EPs Relocation Preparation, Reset, Reset Resource and Overload Control are exceptions from this principle.

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 of Class 3 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.

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. RAB Assignment 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. RAB ASSIGNMENT REQUEST message. |
| IE | When referring to an information element (IE) in the specification the <i>Information Element Name</i> 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. <i>User Plane Mode IE</i> . |
| 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. "Abstract Syntax Error (Reject)" or "Geographical Coordinates". |

5 RANAP Services

RANAP provides the signalling service between UTRAN and CN that is required to fulfil the RANAP functions described in clause 7. RANAP services are divided into three groups based on Service Access Points (SAP) defined in [16]:

1. General control services: They are related to the whole Iu interface instance between RNC and logical CN domain, and are accessed in CN through the General Control SAP. They utilise connectionless signalling transport provided by the Iu signalling bearer.
2. Notification services: They are related to specified UEs or all UEs in specified area, and are accessed in CN through the Notification SAP. They utilise connectionless signalling transport provided by the Iu signalling bearer.
3. Dedicated control services: They are related to one UE, and are accessed in CN through the Dedicated Control SAP. RANAP functions that provide these services are associated with Iu signalling connection that is maintained for the UE in question. The Iu signalling connection is realised with connection oriented signalling transport provided by the Iu signalling bearer.

6 Services Expected from Signalling Transport

Signalling transport (See [5]) shall provide two different service modes for the RANAP.

1. Connection oriented data transfer service. This service is supported by a signalling connection between RNC and CN domain. It shall be possible to dynamically establish and release signalling connections based on the need. Each active UE shall have its own signalling connection. The signalling connection shall provide in sequence delivery of RANAP messages. RANAP shall be notified if the signalling connection breaks.
2. Connectionless data transfer service. RANAP shall be notified in case a RANAP message did not reach the intended peer RANAP entity.

7 Functions of RANAP

RANAP protocol has the following functions:

- Relocating serving RNC. This function enables to change the serving RNC functionality as well as the related Iu resources (RAB(s) and Signalling connection) from one RNC to another.
- Overall RAB management. This function is responsible for setting up, modifying and releasing RABs.
- Queuing the setup of RAB. The purpose of this function is to allow placing some requested RABs into a queue, and indicate the peer entity about the queuing.
- Requesting RAB release. While the overall RAB management is a function of the CN, the RNC has the capability to request the release of RAB.
- Release of all Iu connection resources. This function is used to explicitly release all resources related to one Iu connection.
- Requesting the release of all Iu connection resources. While the Iu release is managed from the CN, the RNC has the capability to request the release of all Iu connection resources from the corresponding Iu connection.
- SRNS context forwarding function. This function is responsible for transferring SRNS context from the RNC to the CN for intersystem change in case of packet forwarding.
- Controlling overload in the Iu interface. This function allows adjusting the load in the Iu interface.
- Resetting the Iu. This function is used for resetting an Iu interface.
- Sending the UE Common ID (permanent NAS UE identity) to the RNC. This function makes the RNC aware of the UE's Common ID.
- Paging the user. This function provides the CN for capability to page the UE.
- Controlling the tracing of the UE activity. This function allows setting the trace mode for a given UE. This function also allows the deactivation of a previously established trace.
- Transport of NAS information between UE and CN (see [8]). This function has two sub-classes:
 1. Transport of the initial NAS signalling message from the UE to CN. This function transfers transparently the NAS information. As a consequence also the Iu signalling connection is set up.
 2. Transport of NAS signalling messages between UE and CN, This function transfers transparently the NAS signalling messages on the existing Iu signalling connection. It also includes a specific service to handle signalling messages differently.
- Controlling the security mode in the UTRAN. This function is used to send the security keys (ciphering and integrity protection) to the UTRAN, and setting the operation mode for security functions.
- Controlling location reporting. This function allows the CN to operate the mode in which the UTRAN reports the location of the UE.
- Location reporting. This function is used for transferring the actual location information from RNC to the CN.
- Data volume reporting function. This function is responsible for reporting unsuccessfully transmitted DL data volume over UTRAN for specific RABs.

- Reporting general error situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.
- Location related data. This function allows the CN to either retrieve from the RNC deciphering keys (to be forwarded to the UE) for the broadcasted assistance data, or request the RNC to deliver dedicated assistance data to the UE.

These functions are implemented by one or several RANAP elementary procedures described in the following clause.

8 RANAP Procedures

8.1 Elementary Procedures

In the following tables, all EPs are divided into Class 1, Class 2 and Class 3 EPs (see subclause 3.1 for explanation of the different classes):

Table 1: Class 1

| Elementary Procedure | Initiating Message | Successful Outcome | Unsuccessful Outcome |
|--------------------------------|-------------------------------|--------------------------------|--------------------------------|
| | | Response message | Response message |
| Iu Release | IU RELEASE COMMAND | IU RELEASE COMPLETE | |
| Relocation Preparation | RELOCATION REQUIRED | RELOCATION COMMAND | RELOCATION PREPARATION FAILURE |
| Relocation Resource Allocation | RELOCATION REQUEST | RELOCATION REQUEST ACKNOWLEDGE | RELOCATION FAILURE |
| Relocation Cancel | RELOCATION CANCEL | RELOCATION CANCEL ACKNOWLEDGE | |
| SRNS Context Transfer | SRNS CONTEXT REQUEST | SRNS CONTEXT RESPONSE | |
| Security Mode Control | SECURITY MODE COMMAND | SECURITY MODE COMPLETE | SECURITY MODE REJECT |
| Data Volume Report | DATA VOLUME REPORT REQUEST | DATA VOLUME REPORT | |
| Reset | RESET | RESET ACKNOWLEDGE | |
| Reset Resource | RESET RESOURCE | RESET RESOURCE ACKNOWLEDGE | |
| Location related Data | LOCATION RELATED DATA REQUEST | LOCATION RELATED DATA RESPONSE | LOCATION RELATED DATA FAILURE |

Table 2: Class 2

| Elementary Procedure | Message |
|---|----------------------------|
| RAB Modification Request | RAB MODIFY REQUEST |
| RAB Release Request | RAB RELEASE REQUEST |
| Iu Release Request | IU RELEASE REQUEST |
| Relocation Detect | RELOCATION DETECT |
| Relocation Complete | RELOCATION COMPLETE |
| SRNS Data Forwarding Initiation | SRNS DATA FORWARD COMMAND |
| SRNS Context Forwarding from Source RNC to CN | FORWARD SRNS CONTEXT |
| SRNS Context Forwarding to Target RNC from CN | FORWARD SRNS CONTEXT |
| Paging | PAGING |
| Common ID | COMMON ID |
| CN Invoke Trace | CN INVOKE TRACE |
| CN Deactivate Trace | CN DEACTIVATE TRACE |
| Location Reporting Control | LOCATION REPORTING CONTROL |
| Location Report | LOCATION REPORT |
| Initial UE Message | INITIAL UE MESSAGE |
| Direct Transfer | DIRECT TRANSFER |
| Overload Control | OVERLOAD |
| Error Indication | ERROR INDICATION |

Table 3: Class 3

| Elementary Procedure | Initiating Message | Response Message |
|-----------------------------|---------------------------|------------------------------------|
| RAB Assignment | RAB ASSIGNMENT REQUEST | RAB ASSIGNMENT RESPONSE x N (N>=1) |

The following applies concerning interference between Elementary Procedures:

- The Reset procedure takes precedence over all other EPs.
- The Reset Resource procedure takes precedence over all other EPs except the Reset procedure.
- The Iu Release procedure takes precedence over all other EPs except the Reset procedure and the Reset Resource procedure.

8.2 RAB Assignment

8.2.1 General

The purpose of the RAB Assignment procedure is to establish new RABs and/or to enable modifications and/or releases of already established RABs for a given UE. The procedure uses connection oriented signalling.

8.2.2 Successful Operation

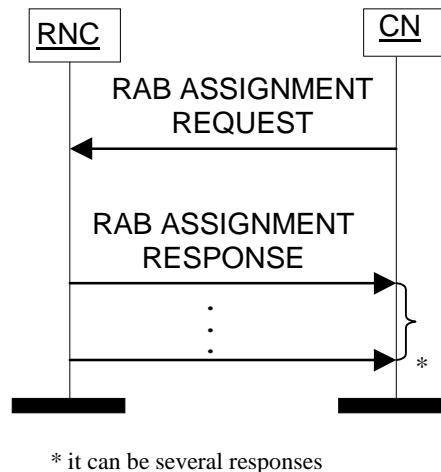


Figure 1: RAB Assignment procedure. Successful operation.

The CN shall initiate the procedure by sending a RAB ASSIGNMENT REQUEST message. When sending the RAB ASSIGNMENT REQUEST message, the CN shall start the T_{RABAssgt} timer.

The CN may request UTRAN to:

- establish,
- modify,
- release

one or several RABs with one RAB ASSIGNMENT REQUEST message.

The CN shall include in the RAB ASSIGNMENT REQUEST message at least one request to either establish/modify or release a RAB.

The message shall contain the information required by the UTRAN to build the new RAB configuration, such as:

- list of RABs to establish or modify with their bearer characteristics;
- list of RABs to release.

For each RAB requested to establish, the message shall contain:

- RAB ID.
- NAS Synchronisation Indicator (only when available).
- RAB parameters (including e.g. Allocation/Retention Priority).
- User Plane Information (i.e required User Plane Mode and required UP Mode Versions).
- Transport Layer Information.
- PDP Type Information (only for PS)
- Data Volume Reporting Indication (only for PS).
- DL GTP-PDU sequence number (only when GTP-PDU sequence number is available in cases of intersystem change from GPRS to UMTS or when establishing a RAB for an existing PDP context or in some further cases described in [21]).
- UL GTP-PDU sequence number (only when GTP-PDU sequence number is available in cases of intersystem change from GPRS to UMTS or when establishing a RAB for an existing PDP context or in some further cases described in [21]).

- DL N-PDU sequence number (only when N-PDU sequence number is available in case of intersystem change from GPRS to UMTS or in some further cases described in [21]).
- UL N-PDU sequence number (only when N-PDU sequence number is available in case of intersystem change from GPRS to UMTS or in some further cases described in [21]).

For each RAB requested to modify, the message may contain:

- RAB ID (mandatory).
- NAS Synchronisation Indicator.
- RAB parameters.
- Transport Layer Information.
- User Plane Information.

The *Transport Layer Information* IE may be present at a RAB modification except in the case when the only other present IE, besides the *RAB ID* IE, is the *NAS Synchronisation Indicator* IE.

At a RAB modification that does not include transfer of *NAS Synchronisation Indicator* IE, the *RAB Parameters* IE shall be present in RAB ASSIGNMENT REQUEST message only when any previously set value for this IE is requested to be modified.

At a RAB modification, the *User Plane Information* IE shall be present in RAB ASSIGNMENT REQUEST message only when any previously set value for this IE is requested to be modified.

For a RAB setup, the *SDU Format Information Parameter* IE in the *RAB Parameters* IE shall be present only if the *User Plane Mode* IE is set to 'support mode for pre-defined SDU sizes' and the *Traffic Class* IE is set to either 'Conversational' or 'Streaming'.

If the *RAB Parameters* IE is present for a RAB modification, the *SDU Format Information Parameter* IE in the *RAB Parameters* IE shall be present only if the *Traffic Class* IE is set to either 'Conversational' or 'Streaming' and if

- either the User Plane mode is currently 'support mode for pre-defined SDU sizes' and the *User Plane Mode* IE is not contained in the RAB ASSIGNMENT REQUEST message
- or if the *User Plane Mode* IE optionally contained within the RAB ASSIGNMENT REQUEST message is set to 'support mode for pre-defined SDU sizes'.

If, for a RAB requested to be modified, one (or more) of these IEs except *RAB ID* IE are not present in RAB ASSIGNMENT REQUEST message the RNC shall continue to use the value(s) currently in use for the not present IEs.

For each RAB request to release, the message shall contain:

- RAB ID.
- Cause.

Upon reception of the RAB ASSIGNMENT REQUEST message UTRAN shall execute the requested RAB configuration. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The same RAB ID shall only be present once in the whole RAB ASSIGNMENT REQUEST message.

The RAB ID shall identify uniquely the RAB for the specific CN domain for the particular UE, which makes the RAB ID unique over the Iu connection on which the RAB ASSIGNMENT REQUEST message is received. When a RAB ID already in use over that particular Iu instance is used, the procedure is considered as modification of that RAB.

The RNC shall pass the contents of *RAB ID* IE to the radio interface protocol for each RAB requested to establish or modify.

The RNC shall establish or modify the resources according to the values of the *Allocation/Retention Priority* IE (priority level, pre-emption indicators, queuing) and the resource situation as follows:

- The RNC shall consider the priority level of the requested RAB, when deciding on the resource allocation.

- If the requested RAB is allowed for queuing and the resource situation so requires, RNC may place the RAB in the establishment queue.
- The priority levels and the pre-emption indicators may (singularly or in combination) be used to determine whether the RAB assignment has to be performed unconditionally and immediately. If the requested RAB is marked as "may trigger pre-emption" and the resource situation so requires, RNC may trigger the pre-emption procedure which may then cause the forced release of a lower priority RAB which is marked as "pre-emptable". Whilst the process and the extent of the pre-emption procedure is operator dependent, the pre-emption indicators, if given in the RAB ASSIGNMENT REQUEST message, 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 connection shall be included in the pre-emption process.
 5. If the *Pre-emption Vulnerability* IE is set to "not pre-emptable", then this connection 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.
- If the *Allocation/Retention Priority* IE is not given in the RAB ASSIGNMENT REQUEST message, the allocation request shall not trigger the pre-emption process and the connection may be pre-empted and considered to have the value "lowest" as priority level. Moreover, queuing shall not be allowed.
- The UTRAN pre-emption process shall keep the following rules:
 1. UTRAN shall only pre-empt RABs with lower priority, in ascending order of priority.
 2. The pre-emption may be done for RABs belonging to the same UE or to other UEs.

If the *NAS Synchronisation Indicator* IE is contained in the RAB ASSIGNMENT REQUEST message, the RNC shall pass it to the radio interface protocol for the transfer to the UE.

If the RAB ASSIGNMENT REQUEST message includes the *PDP Type Information* IE, the UTRAN may use this to configure any compression algorithms.

If the *Service Handover* IE is included, this tells if the RAB

- should be handed over to GSM, i.e. from NAS point of view, the RAB should be handed over to GSM as soon as possible although the final decision whether to perform a handover to GSM is still made in UTRAN.
- should not be handed over to GSM, i.e. from NAS point of view, the RAB should remain in UMTS as long as possible although the final decision whether to perform a handover to GSM is still made in UTRAN.
- shall not be handed over to GSM, i.e. the RAB shall never be handed over to GSM. This means that UTRAN shall not initiate handover to GSM for the UE unless the RABs with this indication have first been released with the normal release procedures.

The value of the *Service Handover* IE is valid throughout the lifetime of the RAB or until changed by a RAB modification.

The *Service Handover* IE shall only influence decisions made regarding UTRAN initiated inter-system handovers.

If the *Service Handover* IE is not included, the decision whether to perform an inter-system handover to GSM is only an internal UTRAN matter.

UTRAN shall report to CN, in the first RAB ASSIGNMENT RESPONSE message, the result for all the requested RABs, such as:

- List of RABs successfully established or modified.
- List of RABs released.
- List of RABs queued.
- List of RABs failed to establish or modify.
- List of RABs failed to release.

The same RAB ID shall only be present once in the whole RAB ASSIGNMENT RESPONSE message.

For each RAB successfully established towards the PS domain, the RNC shall include the *Transport Layer Address IE* and the *Iu Transport Association IE* in the RAB ASSIGNMENT RESPONSE message.

For each RAB successfully modified or released towards the PS domain, for which data volume reporting has been requested, the RNC shall include the *DL Data Volumes IE* in the RAB ASSIGNMENT RESPONSE message.

For each RAB successfully released towards the PS domain, the RNC shall include in the RAB ASSIGNMENT RESPONSE message, if available, the *DL GTP-PDU Sequence Number IE* and the *UL GTP-PDU Sequence Number IE*, if the release was initiated by UTRAN.

The RNC shall report in the RAB ASSIGNMENT RESPONSE message at least one RAB:

- setup/modified or
- released or
- queued or
- failed to setup/modify or
- failed to release.

If any alternative RAB parameter values have been used when establishing or modifying a RAB, these RAB parameter values shall be included in the RAB ASSIGNMENT RESPONSE message within the *Assigned RAB Parameter Values IE*.

For the CS domain, UTRAN shall report the successful outcome of a specific RAB to establish or modify only after the Iu user plane at RNL level is ready to be used in UL and DL. At a RAB establishment, the transport network control plane signalling required to set up the transport bearer shall use the *Transport Layer Address IE* and *Iu Transport Association IE*. At a RAB modification when *Transport Layer Address IE* and *Iu Transport Association IE* is included, the RNC shall establish a new transport bearer. The transport network control plane signalling shall then use the included *Transport Layer Address IE* and *Iu Transport Association IE*. Then the switch over to this new transport bearer shall be done immediately after transport bearer establishment and initialisation of the user plane mode. If *Transport Layer Address IE* and *Iu Transport Association IE* is not included, then the RNC may modify the already existing transport bearer.

For each RAB successfully modified towards the PS domain, if the RNC has changed the *Transport Layer Address IE* and/or the *Iu Transport Association IE*, it shall include the new value(s) in the RAB ASSIGNMENT RESPONSE message.

Before reporting the successful outcome of a specific RAB to establish or modify, the RNC shall have executed the initialisation of the user plane, if necessary.

Re-initialisation of the user plane shall not be performed if:

- the *RAB Parameters IE* is not included, for example during transfer of *NAS Synchronisation Indicator IE*;
- the *RAB Parameters IE* is included but *SDU Format Information Parameter IE* is not changed for the existing RAB and *NAS Synchronisation Indicator IE* is not included.

Re-initialisation of the user plane shall be performed if the *RAB Parameters IE* and *NAS Synchronisation Indicator IE* are included.

If the RNC can not initialise the requested user plane mode for any of the user plane mode versions in the *UP Mode Versions* IE according to the rules for initialisation of the respective user plane mode versions, as described in [6], the RAB Assignment shall fail with the cause value "RNC unable to establish all RFCs".

In case of establishment of a RAB for the PS domain, the CN must be prepared to receive user data before the RAB ASSIGNMENT RESPONSE message has been received.

If none of the RABs have been queued, the CN shall stop timer $T_{RABAssgt}$. And the RAB Assignment procedure terminates. In that case, the procedure shall also be terminated in UTRAN.

When the request to establish or modify one or several RABs is put in the queue, UTRAN shall start the timer $T_{QUEUING}$. This timer specifies the maximum time for queuing of the request of establishment or modification. The same timer $T_{QUEUING}$ is supervising all RABs being queued.

For each RAB that is queued the following outcomes shall be possible:

- successfully established or modified;
- failed to establish or modify;
- failed due to expiry of the timer $T_{QUEUING}$.

For the queued RABs, indicated in the first RAB ASSIGNMENT RESPONSE message, UTRAN shall report the outcome of the queuing for every RAB individually or for several RABs in subsequent RAB ASSIGNMENT RESPONSE message(s). This is left to implementation. UTRAN shall stop $T_{QUEUING}$ when all RABs have been either successfully established or modified or failed to establish or modify. The RAB Assignment procedure is then terminated both in CN and UTRAN when all RABs have been responded to.

When CN receives the response that one or several RABs are queued, CN shall expect UTRAN to provide the outcome of the queuing function for each RAB before expiry of the $T_{RABAssgt}$ timer. In case the timer $T_{RABAssgt}$ expires, the CN shall consider the RAB Assignment procedure terminated and the RABs not reported shall be considered as failed.

In the case the timer $T_{QUEUING}$ expires, the RAB Assignment procedure terminates in UTRAN for all queued RABs, and UTRAN shall respond for all of them in one RAB ASSIGNMENT RESPONSE message. The RAB Assignment procedure shall also be terminated in CN.

In case a request to modify or release a RAB contains the RAB ID of a RAB being queued, the RAB shall be taken out of the queue and treated according to the second request. The first request shall be responded to as a RAB failed to setup or modify with the cause value "Request superseded".

If the UTRAN failed to modify a RAB it shall keep the RAB as it was configured prior to the modification request.

When UTRAN reports unsuccessful establishment/modification of a RAB, the cause value should be precise enough to enable the core network to know the reason for unsuccessful establishment/modification. Typical cause values are: "Requested Traffic Class not Available", "Invalid RAB Parameters Value", "Requested Maximum Bit Rate not Available", "Requested Maximum Bit Rate for DL not Available", "Requested Maximum Bit Rate for UL not Available", "Requested Guaranteed Bit Rate not Available", "Requested Guaranteed Bit Rate for DL not Available", "Requested Guaranteed Bit Rate for UL not Available", "Requested Transfer Delay not Achievable", "Invalid RAB Parameters Combination", "Condition Violation for SDU Parameters", "Condition Violation for Traffic Handling Priority", "Condition Violation for Guaranteed Bit Rate", "User Plane Versions not Supported", "Iu UP Failure", "Iu Transport Connection Failed to Establish".

If the RAB ID of a RAB requested to be released is unknown in the RNC, this shall be reported as a RAB failed to release with the cause value "Invalid RAB ID".

The RNC may indicate an impending directed retry attempt to GSM by sending RAB ASSIGNMENT RESPONSE message with a RAB ID included in the list of RABs failed to setup and a cause value of 'Directed Retry'.

The RNC shall be prepared to receive a RAB ASSIGNMENT REQUEST message containing a *RABs To Be Released* IE at any time and shall always reply to it. If there is an ongoing RAB Assignment procedure for a RAB indicated within the *RABs To Be Released* IE, the RNC shall discard the preceding RAB Assignment procedure for that specific RAB, release any related resources and report the released RAB within the RAB ASSIGNMENT RESPONSE message.

After sending RAB ASSIGNMENT RESPONSE message containing RAB ID within the *RABs Released* IE, the RNC shall be prepared to receive new establishment request of a RAB identified by the same RAB ID.

8.2.3 Unsuccessful Operation

The unsuccessful operation for this Class 3 Elementary procedure is described under the Successful Operation chapter.

8.2.4 Abnormal Conditions

For a RAB requested to be modified, if only the *RAB ID IE*, the *NAS Synchronisation Indicator IE* and the *Transport Layer Information IE* are included in the *First Setup or Modify Item IE* this RAB shall not be modified, and the corresponding *RAB ID IE* with *Cause IE* shall be included in the "RABs Failed To Setup Or Modify List" in the RAB ASSIGNMENT RESPONSE message.

If, for a RAB requested to be setup towards the PS domain, any of these following IEs:

- *PDP Type Information*.
- *Data Volume Reporting Indication*.

is not present, the RNC shall continue with the procedure.

Interactions with Relocation Preparation procedure:

If the relocation becomes necessary during the RAB Assignment procedure, the RNC may interrupt the ongoing RAB Assignment procedure and initiate the Relocation Preparation procedure as follows:

1. The RNC shall terminate the RAB Assignment procedure indicating unsuccessful RAB configuration modification:
 - for all queued RABs;
 - for RABs not already established or modified, and
 - for RABs not already released;with the cause "Relocation triggered".
2. The RNC shall terminate the RAB Assignment procedure indicating successful RAB configuration modification:
 - for RABs already established or modified but not yet reported to the CN, and
 - for RABs already released but not yet reported to the CN.
3. The RNC shall report this outcome of the procedure in one RAB ASSIGNMENT RESPONSE message.
4. The RNC shall invoke relocation by sending the RELOCATION REQUIRED message to the active CN node(s).
5. The CN shall terminate the RAB Assignment procedure at reception of the RAB ASSIGNMENT RESPONSE message.

Directed retry from UMTS to GSM (CS domain only):

In the case where the RNC has no RAB configuration for a particular UE in the CS domain, and the RNC receives a RAB ASSIGNMENT REQUEST message for that UE requesting the establishment of one RAB only, a directed retry to perform inter-system handover to GSM may be initiated. In this case the RNC may interrupt the ongoing RAB Assignment procedure and initiate the Relocation Preparation procedure as follows:

1. The RNC shall terminate the RAB Assignment procedure indicating unsuccessful RAB configuration modification of that RAB with the cause "Directed retry".
2. The RNC shall report this outcome of the procedure in one RAB ASSIGNMENT RESPONSE message.
3. The RNC shall invoke relocation by sending the RELOCATION REQUIRED message to the active CN node, with the cause "Directed Retry".
4. The CN shall terminate the RAB Assignment procedure at reception of the RAB ASSIGNMENT RESPONSE message.

8.3 RAB Release Request

8.3.1 General

The purpose of the RAB Release Request procedure is to enable UTRAN to request the release of one or several radio access bearers. The procedure uses connection oriented signalling.

8.3.2 Successful Operation

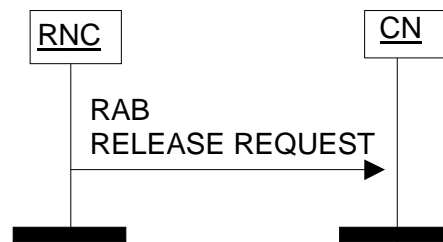


Figure 2: RAB Release Request procedure. Successful operation.

The RNC shall initiate the procedure by generating a RAB RELEASE REQUEST message towards the CN. The *RABs To Be Released* IE shall indicate the list of RABs requested to release and the *Cause* IE associated to each RAB shall indicate the reason for the release, e.g. "RAB pre-empted", "Release due to UTRAN Generated Reason", "Radio Connection With UE Lost".

Upon reception of the RAB RELEASE REQUEST message, the CN should initiate the appropriate release procedure for the identified RABs in the RAB RELEASE REQUEST message. It is up to the CN to decide how to react to the request.

Interaction with Iu Release Command:

If no RABs will remain according to the RAB RELEASE REQUEST message, the CN may decide to initiate the Iu Release procedure if it does not want to keep the Iu signalling connection. The cause value to use is "No Remaining RAB".

Interaction with RAB Assignment (release RAB):

If the CN decides to release some or all indicated RABs, the CN may decide to invoke the RAB Assignment procedure (release RAB) to this effect.

8.3.3 Abnormal Conditions

Not applicable.

8.4 Iu Release Request

8.4.1 General

The purpose of the Iu Release Request procedure is to enable UTRAN to request the CN to release the Iu connection for a particular UE due to some UTRAN generated reason (e.g. "O&M Intervention", "Unspecified Failure", "User Inactivity", "Repeated Integrity Checking Failure", "Release due to UE generated signalling connection release", "Radio Connection With UE Lost"). The procedure uses connection oriented signalling.

8.4.2 Successful Operation



Figure 3: Iu Release Request procedure. Successful operation.

The RNS controlling the Iu connection(s) of that particular UE shall initiate the procedure by generating an IU RELEASE REQUEST message towards the affected CN domain(s). The procedure may be initiated for instance when the contact with a particular UE is lost or due to user inactivity.

The IU RELEASE REQUEST message shall indicate the cause value for the requested Iu connection release. It is up to the CN to decide how to react to the request.

Interactions with Iu Release procedure:

If the CN decides to release the Iu connection, the CN shall initiate the Iu Release procedure.

8.4.3 Abnormal Conditions

Not applicable.

8.5 Iu Release

8.5.1 General

The purpose of the Iu Release procedure is to enable the CN to release the Iu connection and all UTRAN resources related only to that Iu connection to be released. The procedure uses connection oriented signalling.

The Iu Release procedure can be initiated for at least the following reasons:

- Completion of transaction between UE and CN.
- UTRAN generated reasons, e.g. reception of IU RELEASE REQUEST message.
- Completion of successful relocation of SRNS.
- Cancellation of relocation after successful completion of the Relocation Resource Allocation procedure.

The Iu release procedure should also be initiated when there is a period of Iu signalling inactivity with no existing RAB.

8.5.2 Successful Operation

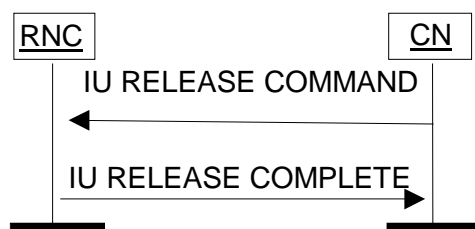


Figure 4: Iu Release procedure. Successful operation.

The procedure is initiated by the CN by sending an IU RELEASE COMMAND message to the UTRAN.

After the IU RELEASE COMMAND message has been sent, the CN shall not send further RANAP connection oriented messages on this particular connection.

The IU RELEASE COMMAND message shall include a *Cause* IE, indicating the reason for the release (e.g. "Successful Relocation", "Normal Release", "Release due to UTRAN Generated Reason", "Relocation Cancelled", "No Remaining RAB").

When the RNC receives the IU RELEASE COMMAND message:

1. Clearing of the related UTRAN resources is initiated. However, the UTRAN shall not clear resources related to other Iu signalling connections the UE might have. The Iu transport bearers for RABs subject to data forwarding and other UTRAN resources used for the GTP-PDU forwarding process, are released by the RNC only when the timer $T_{DATAfwd}$ expires.
2. The RNC returns any assigned Iu user plane resources to idle i.e. neither uplink user data nor downlink user data can be transferred over the Iu interface anymore. Then the RNC sends an IU RELEASE COMPLETE message to the CN. (The RNC does not need to wait for the release of UTRAN radio resources or for the transport network layer signalling to be completed before returning the IU RELEASE COMPLETE message.) When an IU RELEASE COMPLETE message is sent, the procedure is terminated in the UTRAN.

The IU RELEASE COMPLETE message shall include a *RABs Data Volume Report* IE for RABs towards the PS domain for which data volume reporting was requested during RAB establishment.

If the release was initiated by UTRAN, for each RAB towards the PS domain, for which the *DL GTP-PDU Sequence Number* IE and/or the *UL GTP-PDU Sequence Number* IE are (is) available, the RNC shall include the available sequence number(s) in the *RABs Released Item* IE (within the *RAB Released List* IE) in the IU RELEASE COMPLETE message.

The *RAB Release Item* IE shall not be present if there is no sequence number to be reported for that RAB.

Reception of an IU RELEASE COMPLETE message terminates the procedure in the CN.

8.5.3 Abnormal Conditions

If the Iu Release procedure is not initiated towards the source RNC from the CN before the expiry of timer $T_{RELOCoverall}$, the source RNC should initiate the Iu Release Request procedure towards the CN with a cause value " $T_{RELOCoverall}$ expiry".

8.6 Relocation Preparation

8.6.1 General

The purpose of the Relocation Preparation procedure is to prepare relocation of SRNS either with involving UE or without involving UE. The relocation procedure shall be co-ordinated in all Iu signalling connections existing for the UE in order to allow Relocation co-ordination in the target RNC. The procedure uses connection oriented signalling.

The source RNC shall not initiate the Relocation Preparation procedure for an Iu signalling connection if a Prepared Relocation exists in the RNC for that Iu signalling connection or if a Relocation Preparation procedure is ongoing for that Iu signalling connection.

8.6.2 Successful Operation

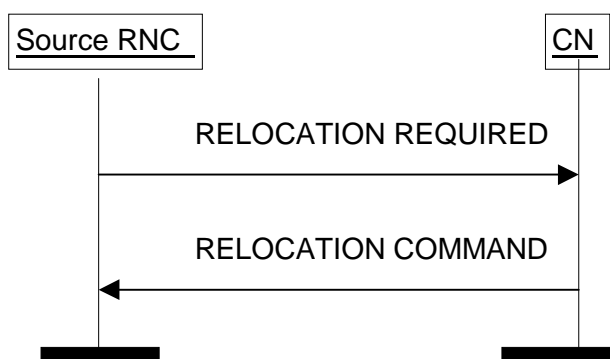


Figure 5: Relocation Preparation procedure. Successful operation.

The source RNC shall initiate the procedure by generating RELOCATION REQUIRED message. The source RNC shall decide whether to initiate the intra-system Relocation or the inter-system handover. In case of intra-system Relocation the source RNC shall indicate in the *Source ID* IE the RNC-ID of the source RNC and in the *Target ID* IE the RNC-ID of the target RNC. In case of inter-system handover the source RNC shall indicate in the *Source ID* IE the Service Area Identifier and in the *Target ID* IE the cell global identity of the cell in the target system. The source RNC shall indicate the appropriate cause value for the Relocation in the *Cause* IE. Typical cause values are "Time critical Relocation", "Resource optimisation relocation", "Relocation desirable for radio reasons", "Directed Retry".

The source RNC shall determine whether the relocation of SRNS shall be executed with or without involvement of UE. The source RNC shall set the *Relocation Type* IE accordingly to "UE involved in relocation of SRNS" or "UE not involved in relocation of SRNS".

In case of intra-system Relocation, the source RNC shall include in the RELOCATION REQUIRED message the *Source RNC to Target RNC Transparent Container* IE. This container shall include the *Relocation Type* IE and the number of Iu signalling connections existing for the UE by setting correctly the *Number of Iu Instances* IE.

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Integrity Protection Key* IE from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Integrity Protection Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Ciphering Key* IE for the signalling data from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Encryption Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, for each domain where the security mode control procedure has been successfully performed in the source RNC, the *Source RNC-to-Target RNC transparent container* IE shall include the *Chosen Encryption Algorithm* IE of CS (PS respectively) user data corresponding to the ciphering alternative that has been selected for this domain. If the security mode control procedure had not been successful or performed for one domain or had proposed no ciphering alternative, the *Chosen Encryption Algorithm* IE for the user data of this domain shall not be included. When both the CS and the PS user data *Chosen Encryption Algorithm* IEs are provided, they shall be the same.

This *Source RNC-to-Target RNC transparent container* IE shall include the *RRC Container* IE. If the *Relocation Type* IE is set to "UE not involved in relocation of SRNS" and the UE is using DCH(s), DSCH(s) or USCH(s), the *Source RNC to Target RNC Transparent Container* IE shall:

- for each RAB include the RAB ID, the *CN Domain Indicator* IE and the mapping between each RAB subflow and transport channel identifier(s) over Iur, i.e. if the RAB is carried on a DCH(s), the DCH ID(s) shall be included, and when it is carried on DSCH(s) or USCH(s), the DSCH ID(s) or USCH ID(s) respectively shall be included,
- only in the case the active SRBs in SRNC are not all mapped onto the same DCH, include the SRB TrCH Mapping IE containing for each SRB the SRB ID and the associated transport channel identifier over Iur, i.e. if the SRB is carried on a DCH, the DCH ID shall be included, and when it is carried on DSCH or USCH, the DSCH ID or USCH ID respectively shall be included.

If the *Relocation Type* IE is set to "UE not involved in relocation of SRNS", the *d-RNTI* IE shall be included in the *Source RNC to Target RNC Transparent Container* IE. If the *Relocation Type* IE is set to "UE involved in relocation of SRNS", the *Target Cell ID* IE shall be included in the *Source RNC to Target RNC Transparent Container* IE.

In case of inter-system handover to GSM the RNC:

- shall include *MS Classmark 2* and *MS Classmark 3* IEs received from the UE in the RELOCATION REQUIRED message to the CN.
- shall include the *Old BSS to New BSS* IE within the RELOCATION REQUIRED message only if the information is available.

The source RNC shall send the RELOCATION REQUIRED message to the CN and the source RNC shall start the timer $T_{\text{RELOCprep}}$.

When the preparation including resource allocation in the target system is ready and the CN has decided to continue the relocation of SRNS, the CN shall send RELOCATION COMMAND message to the source RNC and the CN shall start the timer $T_{\text{RELOCcomplete}}$.

If the *Target RNC To Source RNC Transparent Container* IE or the *L3 information* IE is received by the CN from the relocation target, it shall be included in the RELOCATION COMMAND message.

For each RAB successfully established in the target system and originating from the PS domain, the RELOCATION COMMAND message shall contain Iu transport address and Iu transport association to be used for the forwarding of the DL N-PDU duplicates towards the relocation target. Upon reception of the RELOCATION COMMAND message from the PS domain, the source RNC shall start the timer T_{DATAfwd} .

The Relocation Preparation procedure is terminated in the CN by transmission of RELOCATION COMMAND message.

If the target system (including target CN) does not support all existing RABs, the RELOCATION COMMAND message shall contain a list of RABs indicating all the RABs that are not supported by the target system. This list is contained in the *RABs to Be Released* IE. The source RNC shall use this information to avoid transferring associated contexts where applicable and may use this information e.g. to decide if to cancel the relocation or not. The resources associated with these not supported RABs shall not be released until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

Upon reception of RELOCATION COMMAND message the source RNC shall stop the timer $T_{\text{RELOCprep}}$. RNC shall start the timer $T_{\text{RELOCoverall}}$ and RNC shall terminate the Relocation Preparation procedure. The source RNC is then defined to have a Prepared Relocation for that Iu signalling connection.

When Relocation Preparation procedure is terminated successfully and when the source RNC is ready, the source RNC should trigger the execution of relocation of SRNS.

Interactions with other procedures:

If, after RELOCATION REQUIRED message is sent and before the Relocation Preparation procedure is terminated, the source RNC receives a RANAP message initiating an other connection oriented RANAP class 1 or class 3 procedure (except IU RELEASE COMMAND message, which shall be handled normally) via the same Iu signalling connection, the source RNC shall either:

1. cancel the Relocation Preparation procedure i.e. execute Relocation Cancel procedure with an appropriate value for the *Cause* IE, e.g. "Interaction with other procedure", and after successful completion of Relocation Cancel procedure, the source RNC shall continue the initiated RANAP procedure;

or

2. terminate the initiated RANAP procedure without any changes in UTRAN by sending appropriate response message with the cause value 'Relocation Triggered' to the CN. The source RNC shall then continue the relocation of SRNS.

If during the Relocation Preparation procedure the source RNC receives a DIRECT TRANSFER message it shall be handled normally.

If during the Relocation Preparation procedure the source RNC receives connection oriented RANAP class 2 messages (with the exception of DIRECT TRANSFER message) it shall decide to either execute the procedure immediately or suspend it. In the case the relocation is cancelled the RNC shall resume any suspended procedures (if any).

After Relocation Preparation procedure is terminated successfully, all RANAP messages (except IU RELEASE COMMAND message, which shall be handled normally) received via the same Iu signalling bearer shall be ignored by the source RNC.

8.6.3 Unsuccessful Operation

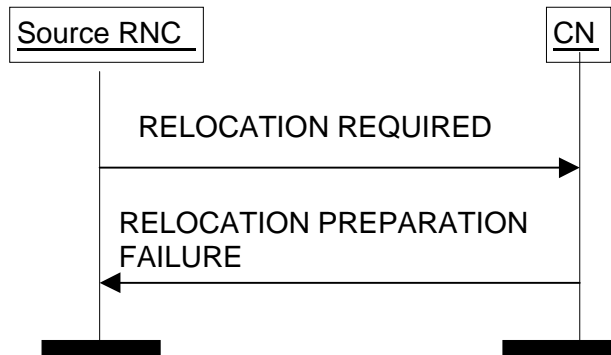


Figure 6: Relocation Preparation procedure. Unsuccessful operation.

If the CN or target system is not able to even partially accept the relocation of SRNS or a failure occurs during the Relocation Preparation procedure in the CN or the CN decides not to continue the relocation of SRNS, the CN shall send RELOCATION PREPARATION FAILURE message to the source RNC.

RELOCATION PREPARATION FAILURE message shall contain appropriate value for the *Cause IE* e.g. "T_{RELOCalloc} expiry", "Relocation Failure in Target CN/RNC or Target System", "Relocation not supported in Target RNC or Target System", "Relocation Target not allowed".

Transmission of RELOCATION PREPARATION FAILURE message terminates the procedure in the CN. Reception of RELOCATION PREPARATION FAILURE message terminates the procedure in UTRAN.

When the Relocation Preparation procedure is unsuccessfully terminated, the existing Iu signalling connection can be used normally.

If the Relocation Preparation procedure is terminated unsuccessfully, the CN shall release the possibly existing Iu signalling connection for the same UE and related to the same relocation of SRNS towards the target RNC by initiating Iu Release procedure towards the target RNC with an appropriate value for the *Cause IE*, e.g. "Relocation Cancelled".

Interactions with Relocation Cancel procedure:

If there is no response from the CN to the RELOCATION REQUIRED message before timer T_{RELOCprep} expires in the source RNC, the source RNC shall cancel the Relocation Preparation procedure by initiating the Relocation Cancel procedure with appropriate value for the *Cause IE*, e.g. "T_{RELOCprep} expiry".

8.6.4 Abnormal Conditions

If the target RNC, which was indicated in the RELOCATION REQUIRED message, is not known to the CN:

1. The CN shall reject the relocation of SRNS by sending a RELOCATION PREPARATION FAILURE message to the source RNC with *Cause IE* set to "Unknown target RNC".
2. The CN shall continue to use the existing Iu connection towards the source RNC.

NOTE: In case two CN domains are involved in the SRNS Relocation Preparation procedure and the Source RNC receives the *Target RNC to Source RNC Transparent Container IE* via two CN domains, it may check whether the content of the two *Target RNC to Source RNC Transparent Container IE* is the same. In case the Source RNC receives two different *Target RNC to Source RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

8.6.5 Co-ordination of Two Iu Signalling Connections

If the RNC has decided to initiate Relocation Preparation procedure for a UTRAN to UTRAN relocation, the RNC shall initiate simultaneously Relocation Preparation procedure on all Iu signalling connections existing for the UE. The source RNC shall also include the same *Source RNC to Target RNC Transparent Container IE*, *Relocation Type IE*, *Source ID IE* and *Cause IE* in the RELOCATION REQUIRED message towards the two domains.

For intersystem handover to GSM, Relocation Preparation procedure shall be initiated only towards the circuit switched CN.

The source RNC shall not trigger the execution of relocation of SRNS unless it has received RELOCATION COMMAND message from all Iu signalling connections for which the Relocation Preparation procedure has been initiated.

If the source RNC receives RELOCATION PREPARATION FAILURE message from the CN, the RNC shall initiate Relocation Cancel procedure on the other Iu signalling connection for the UE if the other Iu signalling connection exists and if the Relocation Preparation procedure is still ongoing or the procedure has terminated successfully in that Iu signalling connection.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

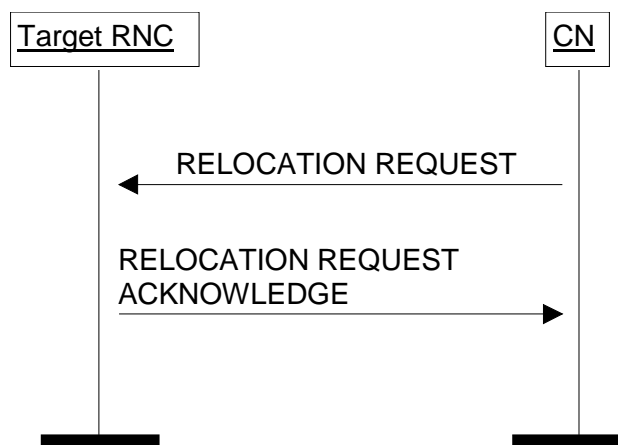


Figure 7: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same set of RABs as existing for the UE before the relocation. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

When a RELOCATION REQUEST message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID IE* shall be included.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources.

The RELOCATION REQUEST message shall contain following IEs

- *Permanent NAS UE Identity* IE (if available)
- *Cause*
- *CN Domain Indicator*
- *Source RNC To Target RNC Transparent Container*
- *Iu Signalling Connection Identifier*
- *Integrity Protection Information* IE (if available)

For each RAB requested to relocate (or to be created e.g. in the case of inter-system handover), the message shall contain following IEs:

- *RAB-ID*
- *NAS Synchronisation Indicator* IE (if the relevant NAS information is provided by the CN)
- *RAB parameters*
- *User Plane Information*
- *Transport Layer Address*
- *Iu Transport Association*
- *Data Volume Reporting Indication* (only for PS)
- *PDP Type Information* (only for PS)

The RELOCATION REQUEST message may include following IEs:

- *Encryption Information* (shall not be included if the *Integrity Protection Information* IE is not included)

For each RAB requested to relocate the message may include following IEs:

- *Service Handover*.
- *Alternative RAB Parameter Values*.

The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- *RAB-ID*
- *User plane Information*(i.e. required User Plane Mode and required User Plane Versions)
- *Priority level, queuing and pre-emption indication*
- *Service Handover*

The *SDU Format Information Parameter* IE in the *RAB Parameters* IE shall be present only if the *User Plane Mode* IE is set to 'support mode for pre-defined SDU sizes' and the *Traffic Class* IE is set to either 'Conversational' or 'Streaming'.

If the RELOCATION REQUEST message includes the *PDP Type Information* IE, the UTRAN may use this IE to configure any compression algorithms.

The *Cause* IE shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier* IE contains an Iu signalling connection identifier which is allocated by the CN. The value for the *Iu Signalling Connection Identifier* IE shall be allocated so as to uniquely identify an Iu signalling connection for the CN node involved. The RNC shall store and remember this identifier for the duration of the Iu connection.

The algorithms within the *Integrity Protection Information IE* and the *Encryption Information IE* shall be ordered in preferred order with the most preferred first in the list.

The *Permitted Encryption Algorithms IE* within the *Encryption Information IE* may contain 'no encryption' within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information IE*, the RNC shall not start ciphering.

In case of intra-system relocation, if no *Integrity Protection Key IE* (*Ciphering Key IE* respectively) is provided within the *Source RNC-to-Target RNC transparent container IE*, the target RNC shall not start integrity protection (ciphering respectively).

In case of intra-system relocation, when an *Ciphering Key IE* is provided within the *Source RNC-to-Target RNC transparent container IE*, the target RNC may select to use a ciphering alternative where an algorithm is used. It shall in this case make use of this key to cipher its signalling data whatever the selected algorithm. The *Encryption Key IE* that is contained within the *Encryption Information IE* of the RELOCATION REQUEST message shall never be considered for ciphering of signalling data.

In case of intra-system relocation, when an *Integrity Protection Key IE* is provided within the *Source RNC-to-Target RNC transparent container IE*, the target RNC shall select one integrity algorithm to start integrity and shall in this case make use of this key whatever the selected algorithm. The integrity protection key that is contained within the *Integrity Protection Information IE* of the RELOCATION REQUEST message shall never be considered.

In case of inter-system relocation, the integrity protection and ciphering information to be considered shall be the ones received in the *Integrity Protection Information IE* and *Encryption Information IE* from the RELOCATION REQUEST messages over the Iu interface.

The *Global CN-ID IE* contains the identity of the CN node that sent the RELOCATION REQUEST message, and it shall, if included, be stored together with the Iu signalling connection identifier. If the *Global CN-ID IE* is not included, the RELOCATION REQUEST message shall be considered as coming from the default CN node for the indicated CN domain.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the *Relocation Type IE* is set to "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause IE*, e.g. "Unable to Establish During Relocation".
- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values IE*.

If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values IE*. It should be noted that the usage of alternative RAB parameter values is not applicable to the UTRAN initiated relocation of type "UE not involved in relocation of SRNS".

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN.

For each RAB successfully setup the RNC shall include following IEs:

- RAB ID
- Transport Layer Address (only for PS)
- Iu Transport Association (only for PS)

For each RAB the RNC is not able to setup during Relocation Resource Allocation the RNC shall include the RAB ID IE and the Cause IE within the RABs Failed To Setup IE. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message sent to the CN shall, if applicable and if not sent via the other CN domain, include the Target RNC To Source RNC Transparent Container IE. This container shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

The RNC shall include the Chosen Integrity Protection Algorithm IE (Chosen Encryption Algorithm IE respectively) within the RELOCATION REQUEST ACKNOWLEDGE message, if, and only if the Integrity Protection Information IE (Encryption Information IE respectively) was included in the RELOCATION REQUEST message.

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the NAS Synchronisation Indicator IE is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the UE.

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

Before reporting the successful outcome of the Relocation Resource allocation procedure, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the User Plane Mode IE. If the RNC can not initialise the requested user plane mode for any of the user plane mode versions in the UP Mode Versions IE according to the rules for initialisation of the respective user plane mode versions, as described in [6], the RAB Relocation shall fail with the cause value "RNC unable to establish all RFCs".

8.7.3 Unsuccessful Operation

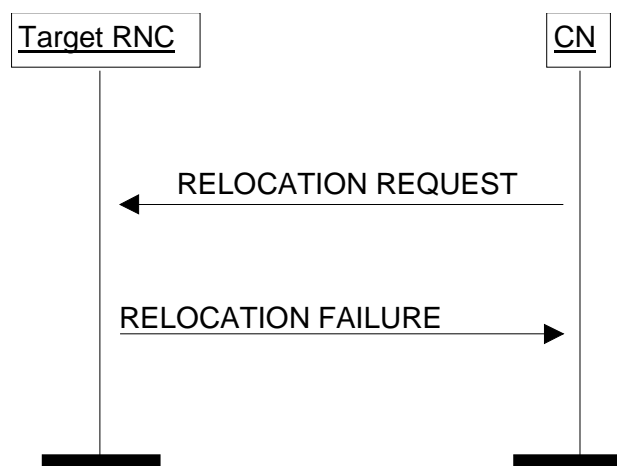


Figure 8: Relocation Resource Allocation procedure: Unsuccessful operation.

If the target RNC can not even partially accept the relocation of SRNS or a failure occurs during the Relocation Resource Allocation procedure in the target RNC, the target RNC shall send RELOCATION FAILURE message to the CN.

If the target RNC cannot support any of the integrity protection (ciphering respectively) alternatives provided in the *Integrity Protection Information IE* (*Encryption Information IE* respectively), it shall return a RELOCATION FAILURE message with the cause 'Requested Ciphering and/or Integrity Protection algorithms not supported'.

Transmission and reception of RELOCATION FAILURE message terminates the procedure in the UTRAN and the CN respectively.

When CN has received RELOCATION FAILURE message from target RNC, CN shall stop timer $T_{\text{RELOCalloc}}$ and shall assume possibly allocated resources within target RNC completely released.

8.7.4 Abnormal Conditions

If after reception of the RELOCATION REQUEST message, the target RNC receives another RELOCATION REQUEST message on the same Iu connection, then the target RNC shall discard the latter message and the original Relocation Resource Allocation procedure shall continue normally.

If the target RNC receives a *Source RNC -to-Target RNC Transparent Container IE* containing *Chosen Integrity Protection* (*Encryption* respectively) *Algorithm IE* without *Integrity Protection* (*Ciphering* respectively) *Key IE*, it shall return RELOCATION FAILURE message with the cause 'Conflict with already existing Integrity protection and/or Ciphering information'.

NOTE: In case two CN domains are involved in the SRNS Relocation Resource Allocation procedure, the Target RNC may check whether the content of the two *Source RNC to Target RNC Transparent Container IE* is the same. In case the Target RNC receives two different *Source RNC to Target RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

Interactions with Iu Release procedure:

If the CN decides to not continue the Relocation Resource Allocation procedure (e.g. due to $T_{\text{RELOCalloc}}$ expiry) before the Relocation Resource Allocation procedure is completed, the CN shall stop timer $T_{\text{RELOCalloc}}$ (if timer $T_{\text{RELOCalloc}}$ has not already expired) and the CN shall, if the Iu signalling connection has been established or later becomes established, initiate the Iu Release procedure towards the target RNC with an appropriate value for the *Cause IE*, e.g. "Relocation Cancelled".

8.7.5 Co-ordination of Two Iu Signalling Connections

Co-ordination of two Iu signalling connections during Relocation Resource Allocation procedure shall be executed by the target RNC when the *Number of Iu Instances IE* received in the *Source RNC to Target RNC Transparent Container IE* in the RELOCATION REQUEST message indicates that two CN domains are involved in relocation of SRNS.

When both the CS and PS user data *Chosen Encryption Algorithm IE* are received within the *Source RNC-to-Target RNC transparent container IE* and if these two received *Chosen Encryption Algorithm IE* are not the same, the target RNC shall fail the Relocation Resource Allocation procedure by sending back the RELOCATION FAILURE message.

The integrity protection (ciphering respectively) alternatives provided in the *Integrity Protection Information IE* (*Encryption Information IE* respectively) of the RELOCATION REQUEST messages received from both CN domains shall have at least one common alternative, otherwise the Relocation Resource Allocation shall be failed by sending back the RELOCATION FAILURE message.

If two CN domains are involved, the following actions shall be taken by the target RNC:

- The target RNC shall utilise the *Permanent NAS UE Identity IE*, received explicitly by each CN domain within RELOCATION REQUEST message, to co-ordinate both Iu signalling connections.
- The target RNC shall generate and send RELOCATION REQUEST ACKNOWLEDGE message only after all expected RELOCATION REQUEST messages are received and analysed.
- If the target RNC decides to send the *Target RNC to Source RNC Transparent Container IE* via the two CN domains, the target RNC shall ensure that the same *Target RNC to Source RNC Transparent Container IE* is included in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via the two CN domains and related to the same relocation of SRNS.

8.8 Relocation Detect

8.8.1 General

The purpose of Relocation Detect procedure is to indicate by the RNC the detection of SRNS relocation execution to the CN. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.8.2 Successful Operation

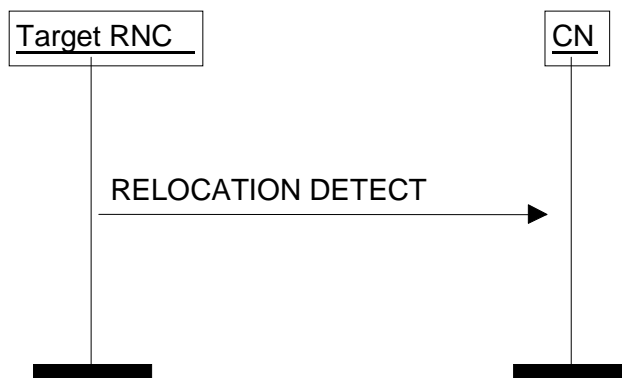


Figure 9: Relocation Detect procedure: Successful operation.

The target RNC shall send RELOCATION DETECT message to the CN when relocation execution trigger is received.

If the type of relocation of SRNS is "UE involved in relocation of SRNS", the relocation execution trigger may be received either from the Uu interface or as an implementation option from the Iur interface. If the type of relocation of SRNS is "UE not involved in relocation of SRNS", the relocation execution trigger is received from the Iur interface.

When RELOCATION DETECT message is sent, the target RNC shall start SRNC operation.

Upon reception of RELOCATION DETECT message, the CN may switch the user plane from the source RNC to the target RNC.

8.8.3 Abnormal Conditions

Interactions with Relocation Complete procedure:

If the RELOCATION COMPLETE message is received by CN before the reception of RELOCATION DETECT message, the CN shall handle the RELOCATION COMPLETE message normally.

8.8.4 Co-ordination of Two Iu Signalling Connections

When Relocation Detect procedure is to be initiated by the target RNC, the target RNC shall initiate the Relocation Detect procedure on all Iu signalling connections existing for the UE between the target RNC and the CN.

8.9 Relocation Complete

8.9.1 General

The purpose of Relocation Complete procedure is to indicate by the target RNC the completion of relocation of SRNS to the CN. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.9.2 Successful Operation



Figure 10: Relocation Complete procedure. Successful operation.

When the new SRNC-ID and serving RNC Radio Network Temporary Identity are successfully exchanged with the UE by the radio protocols, target RNC shall initiate Relocation Complete procedure by sending RELOCATION COMPLETE message to CN. Upon reception of the RELOCATION COMPLETE message by the CN, the CN should then stop the $T_{RELOCcomplete}$ timer.

8.9.3 Abnormal Conditions

If the timer $T_{RELOCcomplete}$ expires:

- The CN should initiate release of Iu connections towards the source and the target RNC by initiating the Iu Release procedure with an appropriate value for the *Cause* IE, e.g. " $T_{RELOCcomplete}$ expiry".

Interactions with the Relocation Detect procedure:

If the RELOCATION DETECT message is not received by CN before reception of RELOCATION COMPLETE message, CN shall handle the RELOCATION COMPLETE message normally.

8.9.4 Co-ordination of Two Iu Signalling Connections

When Relocation Complete procedure is to be initiated by target RNC, target RNC shall initiate the Relocation Complete procedure on all Iu signalling connections existing for the UE between target RNC and CN.

8.10 Relocation Cancel

8.10.1 General

The purpose of the Relocation Cancel procedure is to enable source RNC to cancel an ongoing relocation of SRNS. The Relocation Cancel procedure may be initiated by the source RNC during and after the Relocation Preparation procedure if either of the following conditions is fulfilled:

1. Source RNC has not yet initiated the execution of relocation of SRNS, neither via the Iur interface nor via the Uu interface.
2. After having initiated the execution of relocation of SRNS the UE has returned to source RNC by transmitting an RRC message which indicates that the UE considers the source RNC as its serving RNC.

The procedure shall be co-ordinated in all Iu signalling connections for which the Relocation Preparation procedure has been initiated. The procedure uses connection oriented signalling.

8.10.2 Successful Operation

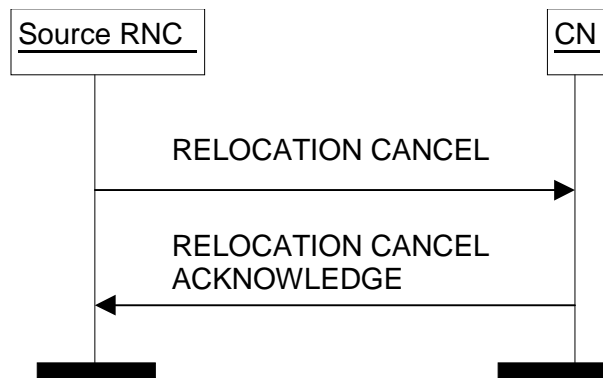


Figure 11: Relocation Cancel procedure. Successful operation.

RNC shall initiate the procedure by sending RELOCATION CANCEL message to CN. This message shall indicate the reason for cancelling the relocation of SRNS by appropriate value of the *Cause* IE. Upon reception of RELOCATION CANCEL message, CN shall send RELOCATION CANCEL ACKNOWLEDGE message to source RNC.

Transmission and reception of RELOCATION CANCEL ACKNOWLEDGE message terminates the procedure in CN and source RNC respectively. After this, the source RNC does not have a prepared relocation for that Iu signalling connection.

Interactions with Relocation Preparation procedure:

Upon reception of RELOCATION CANCEL message from source RNC, CN shall locally terminate the possibly ongoing Relocation Preparation procedure towards that RNC and abandon the relocation of SRNS.

If source RNC receives RELOCATION COMMAND message from CN after Relocation Cancel procedure is initiated, source RNC shall ignore the received RELOCATION COMMAND message.

8.10.3 Unsuccessful Operation

Not applicable.

8.10.4 Abnormal Conditions

Not applicable.

8.10.5 Co-ordination of Two Iu Signalling Connections

If Relocation Cancel procedure is to be initiated due to other reasons than reception of RELOCATION PREPARATION FAILURE message, Relocation Cancel procedure shall be initiated on all Iu signalling connections existing for the UE in which the Relocation Preparation procedure has not terminated unsuccessfully.

8.11 SRNS Context Transfer

8.11.1 General

The purpose of the SRNS Context Transfer procedure is to trigger the transfer of SRNS contexts from the source RNC to the CN (PS domain) in case of intersystem change or in some further cases described in [21]. The procedure uses connection oriented signalling.

8.11.2 Successful Operation

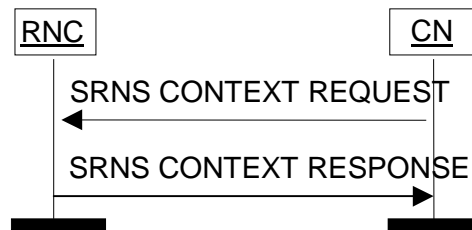


Figure 12: SRNS Context Transfer procedure. Successful operation.

The CN shall initiate the procedure by sending a SRNS CONTEXT REQUEST message to the source RNC. The SRNS CONTEXT REQUEST message shall include the list of RABs whose contexts should be transferred.

The source RNC shall respond to the CN with a SRNS CONTEXT RESPONSE message containing all the referenced RABs including both, successful and unsuccessful RABs transfers. For each RAB whose transfer is successful, the following context information elements shall be included:

- RAB ID;
- always when available, the sequence number for the next downlink GTP-PDU to be sent to the UE i.e. DL GTP-PDU Sequence Number;
- always when available, the sequence number for the next uplink GTP-PDU to be tunnelled to the GGSN i.e. UL GTP-PDU Sequence Number;
- always when available, the radio interface sequence number (PDCP) [17] of the next downlink N-PDU (PDCP SDU) that would have been sent to the UE by a source system i.e. *DL N-PDU Sequence Number IE*;
- always when available, the radio interface sequence number (PDCP) [17] of the next uplink N-PDU (PDCP SDU) that would have been expected from the UE by a source system i.e. *UL N-PDU Sequence Number IE*.

Transmission and reception of the SRNS CONTEXT RESPONSE message shall terminate the procedure in the UTRAN and the CN respectively.

8.11.3 Unsuccessful Operation

For each RAB for which UTRAN is not able to transfer the RAB context, e.g. if the RAB ID is unknown to the RNC, this RAB ID is included in the SRNS CONTEXT RESPONSE message together with a *Cause IE*, e.g. "Invalid RAB ID".

8.11.4 Abnormal Conditions

Not applicable.

8.12 SRNS Data Forwarding Initiation

8.12.1 General

The purpose of the SRNS Data Forwarding procedure is to trigger the transfer of N-PDUs from the RNC to the CN (PS domain) in case of intersystem change or in some further cases described in [21]. The procedure uses connection oriented signalling.

8.12.2 Successful Operation



Figure 13: SRNS Data Forwarding Initiation procedure. Successful operation.

CN initiates the procedure by sending SRNS DATA FORWARD COMMAND message to UTRAN. SRNS DATA FORWARD COMMAND message includes the list of RABs towards the PS domain whose data should be forwarded and the necessary information for establishing a GTP tunnel to be used for data forwarding. For each RAB indicated the list shall include the *RAB ID IE*, the *Transport Layer Address IE* and the *Iu Transport Association IE*.

Upon reception of SRNS DATA FORWARD COMMAND message RNC starts the timer $T_{DATAfwd}$.

8.12.3 Abnormal Conditions

Not applicable.

8.13 SRNS Context Forwarding from Source RNC to CN

8.13.1 General

The purpose of this procedure is to transfer SRNS contexts from the source RNC to the CN (PS domain) in case of handover via the CN. The procedure uses connection oriented signalling. SRNS contexts are sent for each concerned RAB among those that are supported by the target system, and for which at least either GTP-PDU or PDCP sequence numbering is available. The contexts contain the sequence numbers of the GTP-PDUs next to be transmitted in the uplink and downlink directions, if available, and the next PDCP sequence numbers that would have been used to send and receive data from the UE, if available.

8.13.2 Successful Operation

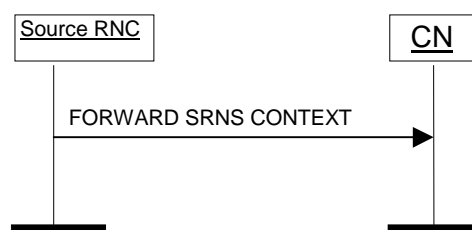


Figure 14: SRNS Context forwarding from source RNC to CN. Successful operation.

The source RNC initialises the procedure by sending FORWARD SRNS CONTEXT message to the CN. The FORWARD SRNS CONTEXT message contains the RAB Context information for each referenced RAB. For each RAB the following information shall be included:

- RAB ID
- always when available, the sequence number for the next downlink GTP-PDU to be sent to the UE, and
- always when available, the sequence number for the next uplink GTP-PDU to be tunnelled to the GGSN;

- always when available, the radio interface sequence number (PDCP) [17] of the next uplink N-PDU (PDCP SDU) that would have been expected from the UE by a source system i.e. *UL N-PDU Sequence Number IE*;
- always when available, the radio interface sequence number (PDCP) [17] of the next downlink N-PDU (PDCP SDU) that would have been sent to the UE by a source system i.e. *DL N-PDU Sequence Number IE*.

8.13.3 Abnormal Conditions

Not applicable.

8.14 SRNS Context Forwarding to Target RNC from CN

8.14.1 General

The purpose of this procedure is to transfer SRNS contexts from the CN (PS domain) to the target RNC in case of handover via the CN. The procedure uses connection oriented signalling. SRNS contexts are sent for each referenced RAB, for which at least either GTP-PDU or PDCP sequence numbering is available. The contexts contain the sequence numbers of the GTP-PDUs next to be transmitted in the uplink and downlink directions, if available, and the next PDCP sequence numbers that would have been used to send and receive data from the UE, if available.

8.14.2 Successful Operation

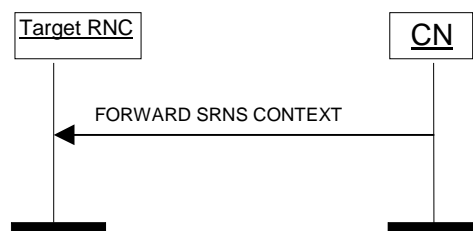


Figure 15: SRNS Context forwarding to target RNC from CN. Successful operation.

The CN initialises the procedure by sending FORWARD SRNS CONTEXT message to the target RNC. The FORWARD SRNS CONTEXT message contains the RAB Context information for each referenced RAB. For each RAB the following information shall be included:

- RAB ID
- always when available, the sequence number for the next downlink GTP-PDU to be sent to the UE, and
- always when available, the sequence number for the next uplink GTP-PDU to be tunnelled to the GGSN;
- always when available, the radio interface sequence number (PDCP) [17] of the next uplink N-PDU (PDCP SDU) that would have been expected from the UE by a source system i.e. *UL N-PDU Sequence Number IE*;
- always when available, the radio interface sequence number (PDCP) [17] of the next downlink N-PDU (PDCP SDU) that would have been sent to the UE by a source system i.e. *DL N-PDU Sequence Number IE*.

8.14.3 Abnormal Conditions

Not applicable.

8.15 Paging

8.15.1 General

The purpose of the Paging procedure is to enable the CN to request the UTRAN to contact that UE. The procedure uses connectionless signalling.

8.15.2 Successful Operation



Figure 16: Paging procedure. Successful operation.

The CN shall initiate the procedure by sending a PAGING message. The PAGING message shall contain following IEs:

- *CN Domain Indicator*.
- *Permanent NAS UE Identity*.
- *DRX Cycle Length Coefficient* (if available).

The PAGING message may contain following IEs:

- *Temporary UE Identity*.
- *Paging Area*.
- *Paging Cause*.
- *Non Searching Indicator*.

The *CN Domain Indicator* IE shall be used by the RNC to identify from which CN domain the paging request originates.

The *Permanent NAS UE Identity* IE (i.e. IMSI) shall be used by the UTRAN paging co-ordination function to check if a signalling connection towards the other CN domain already exists for this UE. In that case, the radio interface paging message shall be sent via that connection instead of using the paging broadcast channel.

The *Temporary UE Identity* IE (e.g. TMSI) is the temporary identity of the user (allocated by that CN Domain) which can be used in a radio interface paging message. If the *Temporary UE Identity* IE is not included in the PAGING message, the RNC shall use the *Permanent NAS UE Identity* instead – if no signalling connection exists.

The *Paging Area* IE shall be used by the RNC to identify the area in which the radio interface paging message shall be broadcast in case no signalling connection, as described above, already exists for the UE. If the *Paging Area* IE is not included in the PAGING message, the whole RNC area shall be used as Paging Area – if no signalling connection exists for that UE.

The *Paging Cause* IE shall indicate to the RNC the reason for sending the PAGING message. The paging cause is transferred transparently to the UE.

The *Non Searching Indication* IE shall, if present, be used by the RNC to decide whether the UTRAN paging co-ordination function needs to be activated or not. In the absence of this IE, UTRAN paging co-ordination shall be performed.

The *DRX Cycle Length Coefficient* IE may be included in the PAGING message, and if present, the UTRAN shall, when applicable, use it for calculating the paging occasions for the UE.

It should be noted that each PAGING message on the Iu interface relates to only one UE and therefore the RNC has to pack the pages into the relevant radio interface paging message.

The core network is responsible for the paging repetition over the Iu interface.

8.15.3 Abnormal Conditions

Not applicable.

8.16 Common ID

8.16.1 General

The purpose of the Common ID procedure is to inform the RNC about the permanent NAS UE Identity (i.e. IMSI) of a user. This is used by the RNC e.g. to create a reference between the permanent NAS UE identity of the user and the RRC connection of that user for UTRAN paging co-ordination. The procedure uses connection oriented signalling.

8.16.2 Successful Operation



Figure 17: Common ID procedure. Successful operation.

After having established an Iu signalling connection, and if the Permanent NAS UE identity (i.e. IMSI) is available, the CN shall send a COMMON ID message, containing the *Permanent NAS UE Identity* IE to the RNC. The RNC shall associate the permanent identity to the RRC Connection of that user and shall save it for the duration of the RRC connection.

8.16.3 Abnormal Conditions

Not applicable.

8.17 CN Invoke Trace

8.17.1 General

The purpose of the CN Invoke Trace procedure is to inform the RNC that it should begin producing a trace record of a type indicated by the CN and related to the UE. The procedure uses connection oriented signalling.

8.17.2 Successful Operation

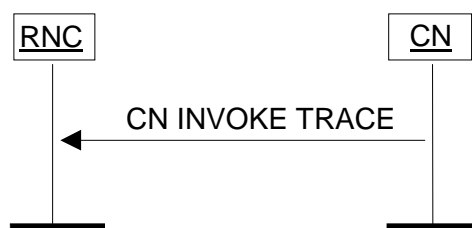


Figure 18: CN Invoke Trace procedure. Successful operation.

The CN Invoke Trace procedure is invoked by the CN by sending a CN INVOKE TRACE message to the RNC.

The CN INVOKE TRACE message shall include the *Trace Type* IE to indicate the events and parameters to be recorded.

The message shall include a *Trace Reference* IE which is allocated by the entity which triggered the trace.

The message may include the *OMC ID* IE, which if present, indicates the OMC to which the record is destined.

The message may include the *UE Identity* IE, which if present, indicates the UE to which this record pertains to.

The message may include the *Trigger ID* IE, which if present, indicates the entity which triggered the trace.

The *Trace Reference* and *Trigger ID* IEs are used to tag the trace record to allow simpler construction of the total record by the entity which combines trace records.

Interaction with Relocation:

The order to perform tracing is lost in UTRAN at successful Relocation of SRNS. If the tracing shall continue also after the relocation has been performed, the CN Invoke Trace procedure shall thus be re-initiated from the CN towards the future SRNC after the Relocation Resource Allocation procedure has been executed successfully.

8.17.3 Abnormal Conditions

Not applicable.

8.18 Security Mode Control

8.18.1 General

The purpose of the Security Mode Control procedure is to allow the CN to pass cipher and integrity mode information to the UTRAN. UTRAN uses this information to select and load the encryption device for user and signalling data with the appropriate parameters, and also to store the appropriate parameters for the integrity algorithm. The procedure uses connection oriented signalling.

8.18.2 Successful Operation

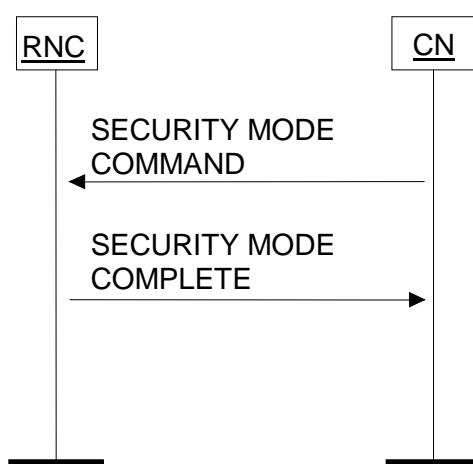


Figure 19: Security Mode Control procedure. Successful operation.

The CN shall start the procedure by sending to the UTRAN a SECURITY MODE COMMAND message. This message may contain the *Encryption Information* IE and shall contain the *Integrity Protection Information* IE, specifying, in preferred order with the most preferred first in the list, which ciphering, if any, and integrity protection algorithms may be used by the UTRAN.

The *Permitted Encryption Algorithms* IE within the *Encryption Information IE* may contain 'no encryption' within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information* group IE in SECURITY MODE COMMAND message, the RNC shall not start ciphering.

Upon reception of the SECURITY MODE COMMAND message, the UTRAN shall internally select appropriate algorithms, taking into account the UE/UTRAN capabilities. If a signalling connection already exists towards the other core network domain, and integrity protection and ciphering information has been received from that core network domain, the same algorithm(s) as being used for that core network domain shall be selected. This also means for encryption that if 'no encryption' or no *Encryption Information IE* has been received from the first core network domain and ciphering has not been started, ciphering shall also not be started for the second core network domain. The UTRAN shall then trigger the execution of the corresponding radio interface procedure and, if applicable, start/restart the encryption device and also start/restart the integrity protection.

The CN may send a SECURITY MODE COMMAND message towards the RNC also when integrity protection and possibly ciphering has already been started for an existing signalling connection towards that core network domain. This may be used to activate new integrity protection and ciphering keys. The included integrity protection and ciphering information shall then support (at least) the integrity protection alternative and the ciphering alternative presently being used and the *Key Status IE* shall have the value 'New'.

When the execution of the radio interface procedure is successfully finished, UTRAN shall return a SECURITY MODE COMPLETE message to the CN. This message shall include the *Chosen Integrity Protection Algorithm IE* and may include the *Chosen Encryption Algorithm IE*.

The *Chosen Encryption Algorithm IE* shall be included in the SECURITY MODE COMPLETE message if, and only if the *Encryption Information IE* was included in the SECURITY MODE COMMAND message.

The set of permitted algorithms specified in the SECURITY MODE COMMAND message shall remain applicable for subsequent RAB Assignments and Intra-UTRAN Relocations.

In case of a UE with Radio Access Bearers towards both core networks, the user data towards CS shall always be ciphered with the ciphering key received from CS and the user data towards PS with the ciphering key received from PS. The signalling data shall always be ciphered with the last received ciphering key and integrity protected with the last received integrity protection key from any of the two CNs.

8.18.3 Unsuccessful Operation

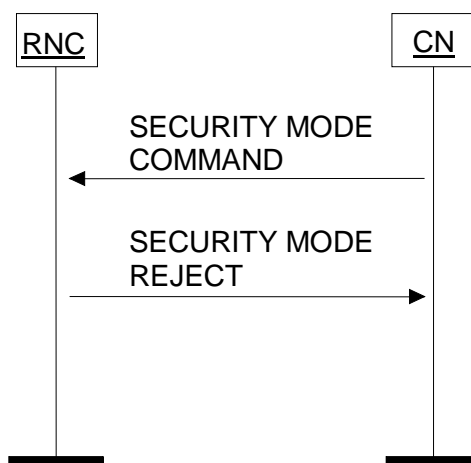


Figure 20: Security Mode Control procedure. Unsuccessful operation.

If the UTRAN or the UE is unable to support the ciphering and/or integrity protection algorithms specified in the SECURITY MODE COMMAND message, then the UTRAN shall return to CN a SECURITY MODE REJECT message with cause value "Requested Ciphering and/or Integrity Protection Algorithms not Supported". If the radio interface Security Control procedure fails, a SECURITY MODE REJECT message shall be sent to CN with cause value "Failure in the Radio Interface Procedure".

8.18.4 Abnormal Conditions

If, when establishing a signalling connection towards a second core network domain, the integrity protection and ciphering information specified in the SECURITY MODE COMMAND message does not support the integrity protection alternative and the ciphering alternative presently being used, a SECURITY MODE REJECT message shall be sent to the second core network domain with cause value "Conflict with already existing Integrity protection and/or Ciphering information".

If, upon reception of a SECURITY MODE COMMAND message from a core network domain with an already existing signalling connection from that core network domain and for which integrity protection and possibly ciphering has already been started, the *Key Status* IE has the value 'Old', a SECURITY MODE REJECT message shall be returned with cause value "Conflict with already existing Integrity protection and/or Ciphering information".

If, upon reception of a SECURITY MODE COMMAND message from a core network domain with an already existing signalling connection and for which integrity protection and possibly ciphering has already been started, the included integrity protection and ciphering information does not support the integrity protection alternative and the ciphering alternative presently being used, a SECURITY MODE REJECT message shall be returned with cause value "Conflict with already existing Integrity protection and/or Ciphering information".

8.19 Location Reporting Control

8.19.1 General

The purpose of the Location Reporting Control procedure is to allow the CN to request information on the location of a given UE. The procedure uses connection oriented signalling.

8.19.2 Successful Operation



Figure 21: Location Reporting Control procedure. Successful operation.

The CN shall initiate the procedure by generating a LOCATION REPORTING CONTROL message.

The *Request Type* IE shall indicate to the serving RNC whether:

- to report directly;
- to stop a direct report;
- to report upon change of Service area, or
- to stop reporting at change of Service Area.

If reporting upon change of Service Area is requested, the Serving RNC shall report whenever the UE moves between Service Areas. For this procedure, only Service Areas that are defined for the PS and CS domains shall be considered.

The *Request Type* IE shall also indicate what type of location information the serving RNC shall report. The location information is either of the following types:

- Service Area Identifier, or
- Geographical area, including geographical coordinates with or without requested accuracy. If the *Vertical Accuracy Code* IE is included, the *Accuracy Code* IE in the *Request Type* IE shall be present. The *Accuracy Code* IE shall be understood as the horizontal accuracy code.

A request for a direct report can be done in parallel with having an active request to report upon change of Service Area for the same UE. The request to report upon change of Service Area shall not be affected by this.

Any of the *Vertical Accuracy Code IE*, *Response Time IE*, *Positioning Priority IE* or *Client Type IE* shall be included according to the following rules:

- Vertical Accuracy Code shall be included, if available, in connection with Geographical Area,
- Response time shall be included, if available, in connection with request for start of direct reporting of Geographical Area,
- Client type shall be included in connection with request for start of direct reporting of Geographical Area and, if available, in request for direct reporting of SAI,
- Positioning Priority shall be included, if available, in connection with request for start of direct reporting or in connection with request for start of reporting upon change of Service Area.

When no *Positioning Priority IE* is included, the RNC shall consider the request as if 'Normal Priority' value had been received.

When no *Response Time IE* is included, the RNC shall consider the request as if 'Delay Tolerant' value had been received.

Interaction with Relocation:

The order to perform location reporting at change of Service Area is lost in UTRAN at successful Relocation of SRNS. If the location reporting at change of Service Area shall continue also after the relocation has been performed, the Location Reporting Control procedure shall thus be re-initiated from the CN towards the future SRNC after the Relocation Resource Allocation procedure has been executed successfully.

8.19.3 Abnormal Conditions

Not applicable.

8.20 Location Report

8.20.1 General

The purpose of the Location Report procedure is to provide the UE's location information to the CN. The procedure uses connection oriented signalling.

8.20.2 Successful Operation

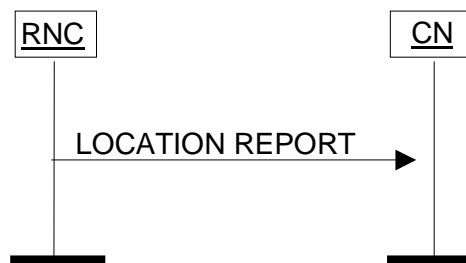


Figure 22: Location Report procedure. Successful operation.

The serving RNC shall initiate the procedure by generating a LOCATION REPORT message. The LOCATION REPORT message may be used as a response for the LOCATION REPORTING CONTROL message. Also, when a user enters or leaves a classified zone set by O&M, e.g. zone where a disaster occurred, a LOCATION REPORT message shall be sent to the CN including the Service Area of the UE in the *Area Identity IE*. The *Cause IE* shall indicate the appropriate cause value to CN, e.g. "User Restriction Start Indication" and "User Restriction End Indication". The CN shall react to the LOCATION REPORT message with CN vendor specific actions.

For this procedure, only Service Areas that are defined for the PS and CS domains shall be considered.

In case reporting at change of Service Area is requested by the CN, then the RNC shall issue a LOCATION REPORT message.

- whenever the information given in the previous LOCATION REPORT message or INITIAL UE MESSAGE message is not anymore valid.
- upon receipt of the first LOCATION REPORTING CONTROL message following a Relocation Resource Allocation procedure, with the *Event* IE included in the *Request Type* IE set to "Change of Service Area", as soon as SAI becomes available in the new SRNC and the relocation procedure has been successfully completed.

In the case when Service Area is reported, the RNC shall include to the LOCATION REPORT message in the *Area Identity* IE the Service Area, which includes at least one of the cells from which the UE is consuming radio resources.

In the case when the LOCATION REPORT message is sent as an answer to a request for a direct report or at a change of Service Area, the *Request Type* IE from the LOCATION REPORTING CONTROL message shall be included.

If the LOCATION REPORT message is sent as an answer to a request for a direct report of Service Area and the current Service Area can not be determined by the RNC, then the *Area Identity* IE shall be omitted and a cause value shall be included to indicate that the request could not be fulfilled, e.g. "Requested Information Not Available" or "Location Reporting Congestion". The RNC may also include the *Last Known Service Area* IE.

If the RNC can not deliver the location information as requested by the CN, due to either the non-support of the requested event or the non-support of the requested report area or if RNC is currently not able to reach the UE, the RNC shall indicate the UE location to be "Undetermined" by omitting the *Area Identity* IE. A cause value shall instead be added to indicate the reason for the undetermined location, e.g. "Requested Request Type not supported" or "Location Reporting Congestion" or "No Resource Available".

If the Location Report procedure was triggered by a LOCATION REPORTING CONTROL message, which included a request to report a geographical area with a specific accuracy, the LOCATION REPORT message shall include the *Geographical Area* IE within the *Area Identity* IE containing either a point with indicated uncertainty or a polygon or an other type, which fulfils the requested accuracy as accurately as possible. If, on the other hand, no specific accuracy level was requested in the LOCATION REPORTING CONTROL message, the LOCATION REPORT message shall include the *Geographical Area* IE within the *Area Identity* IE, the reported *Geographical Area* IE may include an accuracy.

8.20.3 Abnormal Conditions

Not applicable.

8.21 Data Volume Report

8.21.1 General

The Data Volume Report procedure is used by CN to request the unsuccessfully transmitted DL data volume for specific RABs. This procedure only applies to PS domain. The procedure uses connection oriented signalling.

8.21.2 Successful Operation

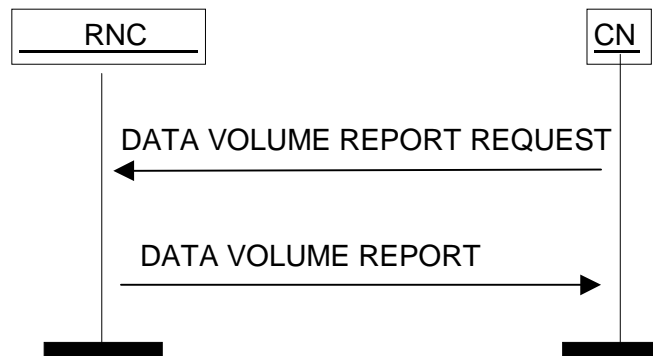


Figure 23: Data Volume Report procedure. Successful operation.

The procedure is initiated by CN by sending DATA VOLUME REPORT REQUEST message to UTRAN. This message shall contain the list of *RAB ID* IEs to identify the RABs for which the unsuccessfully transmitted DL data volume shall be reported.

At reception of DATA VOLUME REPORT REQUEST message UTRAN shall produce the DATA VOLUME REPORT message. This message shall include for each RAB successfully addressed within the *RAB Data Volume Report List* IE the amount of unsuccessfully transmitted DL data in the *Unsuccessfully Transmitted DL Data Volume* IE since the last data volume indication to CN and may contain the *Data Volume Reference* IE.

The message may contain for each RAB successfully addressed a maximum of two *RAB Data Volume Report Item* IEs within the *RAB Data Volume Report List* IE for the case when there is a need to report two different data volumes since the last data volume indication to CN. UTRAN shall also reset the data volume counter for the reported RABs. UTRAN shall send the DATA VOLUME REPORT message to CN. Transmission and reception of DATA VOLUME REPORT message terminates the procedure in UTRAN and CN respectively.

The *Data Volume Reference* IE, if included, indicates the time when the data volume is counted.

8.21.3 Unsuccessful Operation

The *RAB ID* IE for each RAB for which UTRAN is not able to transfer a data volume report is included in the DATA VOLUME REPORT message together with a *Cause* IE, e.g. "Invalid RAB ID".

8.21.4 Abnormal Conditions

Not applicable.

8.22 Initial UE Message

8.22.1 General

The purpose of the Initial UE Message procedure is to establish an Iu signalling connection between a CN domain and the RNC and to transfer the initial NAS-PDU to the default CN node. The procedure uses connection oriented signalling.

8.22.2 Successful Operation

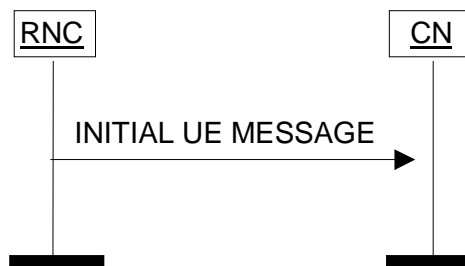


Figure 24: Initial UE Message procedure. Successful operation.

When RNC has received from radio interface a NAS message (see [8]) to be forwarded to CN domain to which the Iu signalling connection for the UE does not exist, RNC shall initiate the Initial UE Message procedure and send the INITIAL UE MESSAGE message to the CN.

In addition to the received NAS-PDU, RNC shall add following information to the INITIAL UE MESSAGE message:

- CN domain indicator, indicating the CN domain towards which this message is sent.
- For CS domain, the LAI which was the last LAI indicated to the UE by UTRAN via the current RRC connection, or if UTRAN had not yet indicated any LAI to the UE via the current RRC connection, then the LAI of the cell via which the current RRC connection was established.
- For PS domain, the LAI+RAC which were the last LAI+RAC indicated to the UE by UTRAN via the current RRC connection, or if UTRAN had not yet indicated any LAI+RAC to the UE via the current RRC connection, then the LAI+RAC of the cell via which the current RRC connection was established.
- Service Area corresponding to at least one of the cells from which the UE is consuming radio resources.
- Iu signalling connection identifier.
- Global RNC identifier.

The *Iu Signalling Connection Identifier* IE contains an Iu signalling connection identifier which is allocated by the RNC. The value for the *Iu Signalling Connection Identifier* IE shall be allocated so as to uniquely identify an Iu signalling connection for the RNC. The CN should store and remember this identifier for the duration of the Iu connection.

Whereas several processing entities within the CN (e.g. charging, interception, etc.) may make use of the location information given in the *SAI* IE and the *LAI* (and *RAC*) IE, the mobility management within the CN shall rely on the information given within the *LAI* IE (resp. *LAI* and *RAC* IEs) only.

8.23 Direct Transfer

8.23.1 General

The purpose of the Direct Transfer procedure is to carry UE – CN signalling messages over the Iu Interface. The UE - CN signalling messages are not interpreted by the UTRAN, and their content (e.g. MM or CC message) is outside the scope of this specification (see [8]). The UE – CN signalling messages are transported as a parameter in the DIRECT TRANSFER messages. The procedure uses connection oriented signalling.

8.23.2 Successful Operation

8.23.2.1 CN Originated Direct Transfer



Figure 25: Direct Transfer, CN originated. Successful operation.

If a UE - CN signalling message has to be sent from the CN to the UE, the CN shall send a DIRECT TRANSFER message to the RNC including the UE - CN signalling message as a *NAS-PDU* IE.

If the DIRECT TRANSFER message is sent in the downlink direction it shall include the *SAPI* IE and shall not include the *LAI + RAC* IE and the *SAI* IE. The use of the *SAPI* IE included in the DIRECT TRANSFER message enables the UTRAN to provide specific service for the transport of the messages.

8.23.2.2 UTRAN Originated Direct Transfer



Figure 26: Direct Transfer, RNC originated. Successful operation.

If a UE - CN signalling message has to be sent from the RNC to the CN without interpretation, the RNC shall send a DIRECT TRANSFER message to the CN including the UE - CN signalling message as a *NAS-PDU* IE.

If the DIRECT TRANSFER message shall be sent to the PS domain, RNC shall also add the *LAI* and the *RAC* IEs, which were the last *LAI + RAC* indicated to the UE by UTRAN via the current RRC connection, or if UTRAN had not yet indicated any *LAI + RAC* to the UE via the current RRC connection, then the *LAI + RAC* of the cell via which the current RRC connection was established. If the DIRECT TRANSFER message is sent to the PS domain, the RNC shall also add Service Area corresponding to at least one of the cells from which the UE is consuming radio resources. If the DIRECT TRANSFER message is sent in uplink direction the RNC shall not include the *SAPI* IE.

8.23.3 Abnormal Conditions

If the DIRECT TRANSFER message is sent by the RNC to the PS domain, and is missing any of the *LAI* IE, *RAC* IE, *SAI* IE, the CN shall continue with the Direct Transfer procedure, ignoring the missing IE.

If the DIRECT TRANSFER message is sent by the CN to the RNC without the *SAPI* IE, the RNC shall continue with the Direct Transfer procedure.

8.24 Void

8.25 Overload Control

8.25.1 General

This procedure is defined to give some degree of signalling flow control. At the UTRAN "Processor Overload" and "Overload in the Capability to Send Signalling Messages to the UE" are catered for, and at the CN "Processor Overload" is catered for. The procedure uses connectionless signalling.

The philosophy used is to stem the traffic at source with known effect on the service. The algorithm used is:

At the CN side:

- If T_{igOC} is not running and an OVERLOAD message or "Signalling Point Congested" information is received, the traffic should be reduced by one step. It is also possible, optionally, to indicate the number of steps to reduce the traffic within the *Number of Steps* IE. At the same time, timers T_{igOC} and T_{inTC} should be started.
- During T_{igOC} all received OVERLOAD messages or "Signalling Point Congested" information should be ignored.
- This step by step reduction of traffic should be continued until maximum reduction is obtained by arriving at the last step.
- If T_{inTC} expires (i.e. no OVERLOAD message or "Signalling Point Congested" information is received during T_{inTC}) the traffic should be increased by one step and T_{inTC} should be started unless normal load has been resumed.

At the UTRAN side:

- If T_{igOR} is not running and an OVERLOAD message or "Signalling Point Congested" information is received, the traffic should be reduced by one step. It is also possible, optionally, to indicate the number of steps to reduce the traffic within the *Number of Steps* IE. At the same time, timers T_{igOR} and T_{inTR} should be started.
- During T_{igOR} all received OVERLOAD messages or "Signalling Point Congested" information should be ignored.
- This step-by-step reduction of traffic should be continued until maximum reduction is obtained by arriving at the last step.
- If T_{inTR} expires (i.e. no OVERLOAD message or "Signalling Point Congested" information is received during T_{inTR}) the traffic should be increased by one step and T_{inTR} should be started unless normal load has been resumed.

The number of steps and the method of reducing the load are considered to be an implementation specific function.

There may be other traffic control mechanisms from O&M activities occurring simultaneously.

8.25.2 Philosophy

Void.

8.25.3 Successful Operation

8.25.3.1 Overload at the CN



Figure 27: Overload at the CN. Successful operation.

The CN should indicate to the RNC that it is in a congested state by sending an OVERLOAD message. The *CN Domain Indicator* IE may be included, if the CN can determine the domain suffering the signalling traffic overload. A specific CN node shall send this message only towards those RNCs for which it is default CN node.

The UTRAN receipt of this message should cause the reduction of signalling traffic towards the CN. If *CN Domain Indicator* IE is indicated within the OVERLOAD message, the RNC should apply signalling traffic reduction mechanisms to the indicated domain.

8.25.3.2 Overload at the UTRAN



Figure 28: Overload at the UTRAN. Successful operation.

If the UTRAN is not capable to send signalling messages to the UE due to overloaded resources then the UTRAN should send an OVERLOAD message to the CN. The RNC shall include the *Global RNC-ID* IE in this message. A specific RNC shall send this message only towards its default CN node of the concerned domain(s).

8.25.4 Abnormal Conditions

Not applicable.

8.26 Reset

8.26.1 General

The purpose of the Reset procedure is to initialise the UTRAN in the event of a failure in the CN or vice versa. The procedure uses connectionless signalling.

8.26.2 Successful Operation

8.26.2.1 Reset Procedure Initiated from the CN

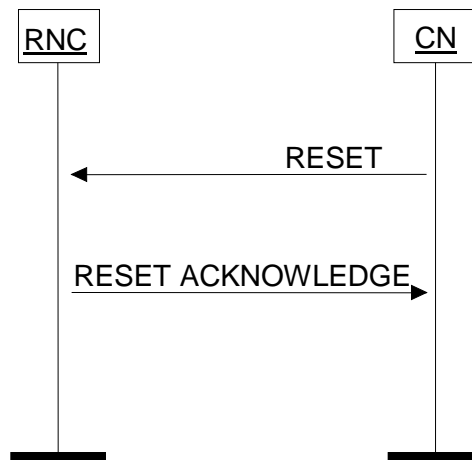


Figure 29: Reset procedure initiated from the CN. Successful operation.

In the event of a failure at the CN, which has resulted in the loss of transaction reference information, a RESET message shall be sent to the RNC. When a CN node sends this message towards an RNC for which it is not the default CN node, the *Global CN-ID* IE shall be included. This message is used by the UTRAN to release affected Radio Access Bearers and to erase all affected references for the specific CN node that sent the RESET message, i.e. the CN node indicated by the *Global CN-ID* IE or, if this IE is not included, the default CN node for the indicated CN domain.

After a guard period of T_{RatC} seconds a RESET ACKNOWLEDGE message shall be returned to the CN, indicating that all UEs which were involved in a call are no longer transmitting and that all references at the UTRAN have been cleared.

The RNC shall include the *Global RNC-ID* IE in the RESET ACKNOWLEDGE message. The *Global RNC-ID* IE shall not be included in the RESET message.

Interactions with other procedures:

In case of interactions with other procedures, the Reset procedure shall always override all other procedures.

8.26.2.2 Reset Procedure Initiated from the UTRAN

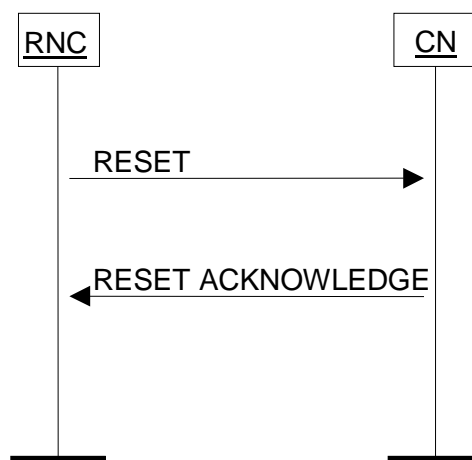


Figure 30: Reset procedure initiated from the UTRAN. Successful operation.

In the event of a failure at the UTRAN which has resulted in the loss of transaction reference information, a RESET message shall be sent to all CN nodes towards which the RNC has Iu signalling connections established. This message is used by the CN to release affected Radio Access Bearers and to erase all affected references for the sending RNC.

The RNC shall include the *Global RNC-ID* IE in the RESET message.

After a guard period of T_{RatR} seconds a RESET ACKNOWLEDGE message shall be returned to the UTRAN indicating that all references have been cleared.

When a RESET ACKNOWLEDGE message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Interactions with other procedures:

In case of interactions with other procedures, the Reset procedure shall always override all other procedures.

8.26.3 Abnormal Conditions

8.26.3.1 Abnormal Condition at the CN

If the CN sends a RESET message to the RNC and receives no RESET ACKNOWLEDGE message within a period T_{RatR} then it shall repeat the entire Reset procedure. The sending of the RESET message shall be repeated a maximum of "n" times where n is an operator matter. After the n-th unsuccessful repetition the procedure shall be stopped and e.g. the maintenance system be informed.

8.26.3.2 Abnormal Condition at the UTRAN

If the RNC sends a RESET message to the CN and receives no RESET ACKNOWLEDGE message within a period T_{RatC} then it shall repeat the entire Reset procedure. The sending of the RESET message shall be repeated a maximum of "n" times where n is an operator matter. After the n-th unsuccessful repetition the procedure shall be stopped and e.g. the maintenance system be informed.

8.26.3.3 Crossing of Reset Messages

When an entity that has sent a RESET message and is waiting for a RESET ACKNOWLEDGE message, instead receives a RESET message from the peer entity, it shall stop timer T_{RatC} or T_{RatR} and send a RESET ACKNOWLEDGE message to the peer entity.

8.27 Error Indication

8.27.1 General

The Error Indication procedure is initiated by a node 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 dedicated signalling, then the Error Indication procedure uses connection oriented signalling. Otherwise the procedure uses connectionless signalling.

8.27.2 Successful Operation



Figure 31: Error Indication procedure, CN originated. Successful operation.



Figure 32: Error Indication procedure, RNC originated. Successful operation.

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

The ERROR INDICATION message shall contain at least either the *Cause* IE or the *Criticality Diagnostics* IE.

If the ERROR INDICATION message is sent connectionless, the *CN Domain Indicator* IE shall be present.

If the ERROR INDICATION message is sent connectionless towards the CN, the *Global RNC-ID* IE shall be present.

Examples for possible cause values for protocol error indications are:

- "Transfer Syntax Error".
- "Semantic Error".
- "Message not compatible with receiver state".

When an ERROR INDICATION message is sent connectionless from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

8.27.3 Abnormal Conditions

Not applicable.

8.28 CN Deactivate Trace

8.28.1 General

The purpose of the CN Deactivate Trace procedure is to inform the RNC that it should stop producing a trace record for the indicated trace reference. The procedure uses the connection oriented signalling.

8.28.2 Successful Operation

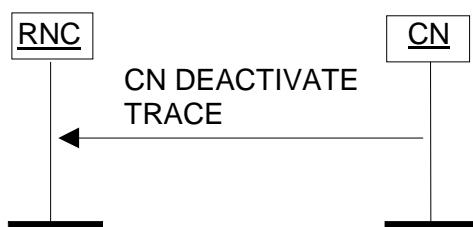


Figure 33: CN Deactivate Trace procedure. Successful operation.

The CN Deactivate Trace procedure is invoked by the CN sending a CN DEACTIVATE TRACE message to the UTRAN.

The CN DEACTIVATE TRACE message shall contain the *Trace Reference* IE and may contain the *Trigger ID* IE. The *Trace Reference* IE and, if present, the *Trigger ID* IE are used to indicate which trace shall be stopped.

8.28.3 Abnormal Conditions

If the RNC receives a CN DEACTIVATE TRACE message with an unknown trace reference, the RNC shall take no action.

8.29 Reset Resource

8.29.1 General

The purpose of the Reset Resource procedure is to initialise part of the UTRAN in the event of an abnormal failure in the CN or vice versa (e.g. Signalling Transport processor reset). The procedure uses connectionless signalling.

8.29.1.1 Reset Resource procedure initiated from the RNC

Void

8.29.1.2 Reset Resource procedure initiated from the CN

Void.

8.29.2 Successful Operation

8.29.2.1 Reset Resource procedure initiated from the RNC

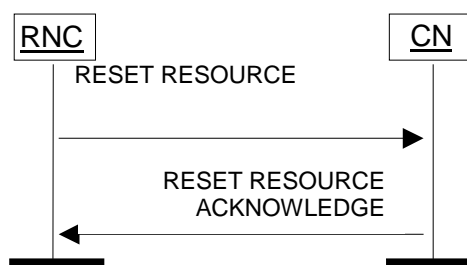


Figure 34: RNC initiated Reset Resource procedure. Successful operation.

The RNC initiates this procedure by sending a RESET RESOURCE message to the CN.

The RESET RESOURCE message shall include the *CN Domain Indicator IE*, the *Global RNC-ID IE*, the *Cause IE* with appropriate cause value (e.g. "Signalling Transport Resource Failure") and a list containing *Iu Signalling Connection Identifier IEs*.

On reception of this message the CN shall release locally the resources and references (i.e. resources and Iu signalling connection identifiers) associated to the Iu signalling connection identifiers indicated in the received message. The CN shall always return the RESET RESOURCE ACKNOWLEDGE message to the RNC when all Iu-related resources and references have been released and shall include the *CN Domain Indicator IE* and a list of *Iu Signalling Connection Identifier IEs*. The list of *Iu Signalling Connection Identifier IEs* within the RESET RESOURCE ACKNOWLEDGE message shall be in the same order as received in the RESET RESOURCE message. Unknown signalling connection identifiers shall be reported as released.

When a RESET RESOURCE ACKNOWLEDGE message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID IE* shall be included.

Both CN and RNC shall provide means to prevent the immediate re-assignment of released Iu signalling connection identifiers to minimise the risk that the Reset Resource procedure releases the same Iu signalling connection identifiers re-assigned to new Iu connections.

8.29.2.2 Reset Resource procedure initiated from the CN

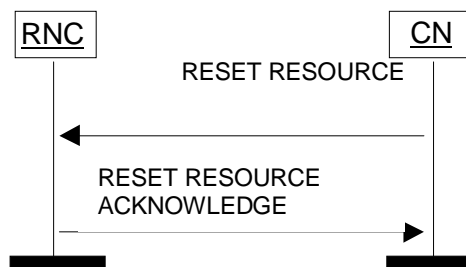


Figure 35: CN initiated Reset Resource procedure. Successful operation.

The CN initiates this procedure by sending a RESET RESOURCE message to the RNC.

The RESET RESOURCE message shall include the *CN Domain Indicator* IE, the *Cause* IE with appropriate cause value (e.g. "Signalling Transport Resource Failure") and a list containing *Iu Signalling Connection Identifier* IEs.

When a RESET RESOURCE message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

On reception of this message the RNC shall release locally the resources and references (i.e. radio resources and Iu signalling connection identifiers) associated to the specific CN node and Iu signalling connection identifiers indicated in the received message. The *Global RNC-ID* IE shall not be included in the RESET RESOURCE message. If no *Global CN-ID* IE is included in the RESET RESOURCE message to indicate the sending CN node, the default CN node for the indicated CN domain shall be considered as sender. The RNC shall always return the RESET RESOURCE ACKNOWLEDGE message to the CN when all Iu-related resources and references have been released and shall include the *CN Domain Indicator* IE, a list of *Iu Signalling Connection Identifier* IEs and the *Global RNC-ID* IE. The list of *Iu Signalling Connection Identifier* IEs within the RESET RESOURCE ACKNOWLEDGE message shall be in the same order as received in the RESET RESOURCE message. Unknown signalling connection identifiers shall be reported as released.

Both RNC and CN shall provide means to prevent the immediate re-assignment of released Iu signalling connection identifiers to minimise the risk that the Reset Resource procedure releases the same Iu signalling connection identifiers re-assigned to new Iu connections.

8.30 RAB Modification Request

8.30.1 General

The purpose of the RAB Modification procedure is to allow RNC to initiate renegotiation of RABs for a given UE after RAB establishment. The procedure uses connection oriented signalling.

8.30.2 Successful Operation

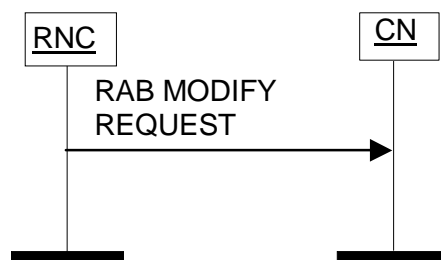


Figure 36: RAB Modification procedure.

The RNC shall initiate the procedure by generating a RAB MODIFY REQUEST message towards the CN and shall include a list of *RABs To Be Modified* IEs. For each RAB requested to be modified the *RABs To Be Modified Item* IE of the RAB MODIFY REQUEST message shall include the *RAB ID* IE, and the corresponding *Requested RAB Parameter Values* IE. The *Requested RAB Parameter Values* IE shall list those RAB parameters the RNC would like modified and the associated new RAB parameter values it is requesting. For any given RAB, RNC shall be able to propose modifications to any negotiable RAB parameters.

Upon reception of the RAB MODIFY REQUEST message, it is up to the CN to decide how to react to the request.

8.30.3 Abnormal Conditions

Not applicable.

8.31 Location Related Data

8.31.1 General

The purpose of the Location Related Data procedure is to provide the means to handle additional Location related requests over the Iu interface: it allows the CN to either retrieve from the RNC deciphering keys (to be forwarded to the UE) for the broadcasted assistance data, or request the RNC to deliver dedicated assistance data to the UE. The procedure uses connection oriented signalling.

8.31.2 Successful Operation

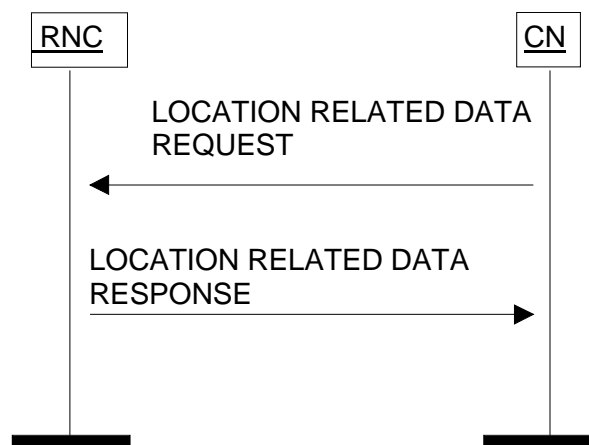


Figure 37: Location Related Data procedure. Successful operation.

The CN initiates the procedure by generating an LOCATION RELATED DATA REQUEST message to the RNC.

Upon the reception of the LOCATION RELATED DATA REQUEST message, the RNC shall initiate requested function as indicated in the *Location Related Data Request Type* IE.

The *Location Related Data Request Type* IE shall indicate to the RNC whether:

- to start dedicated assistance data delivery to the UE, or
- to send deciphering keys for broadcast assistance data to the CN.

If the LOCATION RELATED DATA REQUEST message included a request for dedicated assistance data delivery to the UE, and if the dedicated assistance data was successfully delivered to the UE, the RNC shall respond to CN with LOCATION RELATED DATA RESPONSE message containing no data.

If the LOCATION RELATED DATA REQUEST message included a request for broadcast assistance data deciphering keys, the RNC shall respond to CN with LOCATION RELATED DATA RESPONSE message containing the *Broadcast Assistance Data Deciphering Keys IE*.

8.31.3 Unsuccessful Operation

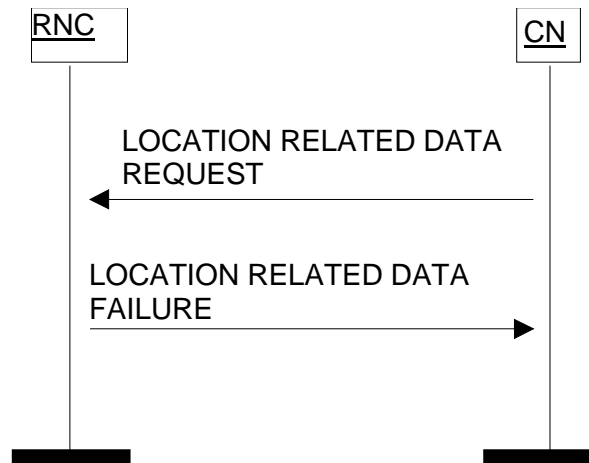


Figure 38: Location Related Data procedure. Unsuccessful operation.

If the RNC was not able to successfully deliver the requested dedicated assistance data to the UE, or if the RNC is not able to provide the requested deciphering keys, the RNC shall send LOCATION RELATED DATA FAILURE message including *Cause IE* to the CN. The *Cause IE* shall indicate the appropriate cause value to CN, e.g. "Dedicated Assistance data Not Available" or "Deciphering Keys Not Available".

8.31.4 Abnormal Conditions

Not applicable.

9 Elements for RANAP Communication

9.1 Message Functional Definition and Content

9.1.1 General

Subclause 9.1 presents the contents of RANAP messages 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 9.1 and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional IEs, where the tabular format shall take precedence.

NOTE: The messages have been defined in accordance to the guidelines specified in [18].

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 4: Meaning of abbreviations used in RANAP messages

| Abbreviation | Meaning |
|--------------|--|
| M | IEs marked as Mandatory (M) shall always be included in the message. |
| O | IEs marked as Optional (O) may or may not be included in the message. |
| C | IEs marked as Conditional (C) shall be included in a message only if the condition is satisfied. Otherwise the IE shall not be included. |

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 5: Meaning of content within 'Criticality' column

| Abbreviation | Meaning |
|---------------|---|
| – | No criticality information is applied explicitly. |
| YES | Criticality information is applied. This is usable only for non-repeatable IEs |
| GLOBAL | The IE and all its repetitions together have one common criticality information. This is usable only for repeatable IEs. |
| EACH | 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. |

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 RAB ASSIGNMENT REQUEST

This message is sent by the CN to request the establishment, modification or release of one or more RABs for the same UE.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|--------------------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RABs To Be Setup Or Modified List | O | | | | YES | ignore |
| >RABs To Be Setup Or Modified Item IEs | | 1 to <maxnoofRABs> | | | | |
| >>First Setup Or Modify Item | M | | | Grouping reason: same criticality | EACH | reject |
| >>>RAB ID | M | | 9.2.1.2 | The same RAB ID must only be present in one group. | - | |
| >>>NAS Synchronisation Indicator | O | | 9.2.3.18 | | - | |
| >>>RAB Parameters | O | | 9.2.1.3 | Includes all necessary parameters for RABs (both for MSC and SGSN) including QoS. | - | |
| >>>User Plane Information | O | | | | - | |
| >>>>User Plane Mode | M | | 9.2.1.18 | | - | |
| >>>>UP Mode Versions | M | | 9.2.1.19 | | - | |
| >>>Transport Layer Information | O | | | | - | |
| >>>>Transport Layer Address | M | | 9.2.2.1 | | - | |
| >>>>lu Transport Association | M | | 9.2.2.2 | | - | |
| >>>Service Handover | O | | 9.2.1.41 | | - | |
| >>Second Setup Or Modify Item | M | | | Grouping reason: same criticality | EACH | ignore |
| >>> PDP Type Information | O | | 9.2.1.40 | | - | |
| >>>Data Volume Reporting Indication | O | | 9.2.1.17 | | - | |
| >>>DL GTP-PDU Sequence Number | O | | 9.2.2.3 | | - | |
| >>>UL GTP-PDU Sequence Number | O | | 9.2.2.4 | | - | |
| >>>DL N-PDU Sequence Number | O | | 9.2.1.33 | | - | |
| >>>UL N-PDU Sequence Number | O | | 9.2.1.34 | | - | |
| >>>Alternative RAB Parameter Values | O | | 9.2.1.43 | | YES | ignore |
| RABs To Be Released List | O | | | | YES | ignore |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|--------------------|-----------------------|--|-------------|----------------------|
| >RABs To Be Released Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | The same RAB ID must only be present in one group. | - | |
| >>Cause | M | | 9.2.1.4 | | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.4 RAB ASSIGNMENT RESPONSE

This message is sent by the RNC to report the outcome of the request from the RAB ASSIGNMENT REQUEST message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|--------------------|-----------------------|--|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RABs Setup Or Modified List | O | | | | YES | ignore |
| >RABs Setup Or Modified Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | The same RAB ID must only be present in one group. | - | |
| >>Transport Layer Address | O | | 9.2.2.1 | | - | |
| >>lu Transport Association | O | | 9.2.2.2 | | - | |
| >>DL Data Volumes | O | | | | - | |
| >>>Data Volume List | | 1 to <maxnoofVol> | | | - | |
| >>>>Unsuccessfully Transmitted DL Data Volume | M | | 9.2.3.12 | | - | |
| >>>>Data Volume Reference | O | | 9.2.3.13 | | - | |
| >>Assigned RAB Parameter Values | O | | 9.2.1.44 | | YES | ignore |
| RABs Released List | O | | | | YES | ignore |
| >RABs Released Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | The same RAB ID must only be present in one group. | - | |
| >>DL Data Volumes | O | | | | - | |
| >>>Data Volume List | | 1 to <maxnoofVol> | | | - | |
| >>>>Unsuccessfully Transmitted DL Data Volume | M | | 9.2.3.12 | | - | |
| >>>>Data Volume Reference | O | | 9.2.3.13 | | - | |
| >>DL GTP-PDU Sequence Number | O | | 9.2.2.3 | | - | |
| >>UL GTP-PDU Sequence Number | O | | 9.2.2.4 | | - | |
| RABs Queued List | O | | | | YES | ignore |
| >RABs Queued Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | The same RAB ID must only be present in one group. | - | |
| RABs Failed To Setup Or Modify List | O | | | | YES | ignore |
| >RABs Failed To Setup Or Modify Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | The same RAB ID must only be present in | - | |

| | | | | | | |
|--|---|-----------------------|----------|--|------|--------|
| | | | | one group. | | |
| >>Cause | M | | 9.2.1.4 | | - | |
| RABs Failed To Release List | O | | | | YES | ignore |
| >RABs Failed To Release Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | The same RAB ID must only be present in one group. | - | |
| >>Cause | M | | 9.2.1.4. | | - | |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

| Range bound | Explanation |
|-------------|--|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |
| maxnoofVol | Maximum no. of reported data volume for one RAB. Value is 2. |

9.1.5 RAB RELEASE REQUEST

This message is sent by the RNC, to request the CN to release one or more RABs for the same UE.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|-----------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| RABs To Be Released List | M | | | | YES | ignore |
| >RABs To Be Released Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>Cause | M | | 9.2.1.4 | | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.6 IU RELEASE REQUEST

This message is sent by the RNC to request the CN to release the Iu connection.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Cause | M | | 9.2.1.4 | | YES | ignore |

9.1.7 IU RELEASE COMMAND

This message is sent by the CN to order RNC to release all resources related to the Iu connection.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |

9.1.8 IU RELEASE COMPLETE

This message is sent by the RNC as response to the IU RELEASE COMMAND message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|--------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RABs Data Volume Report List | O | | | | YES | ignore |
| >RABs Data Volume Report Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>RAB Data Volume Report List | M | | | | - | |
| >>>RAB Data Volume Report Item IEs | | 1 to <maxnoofVol> | | | - | |
| >>>>Unsuccessfully Transmitted DL Data Volume | M | | 9.2.3.12 | | - | |
| >>>>Data Volume Reference | O | | 9.2.3.13 | | - | |
| RABs Released List | O | | | | YES | ignore |
| >RABs Released Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>DL GTP-PDU Sequence Number | O | | 9.2.2.3 | | - | |
| >>UL GTP-PDU Sequence Number | O | | 9.2.2.4 | | - | |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

| Range bound | Explanation |
|-------------|--|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |
| maxnoofVol | Maximum no. of reported data volume for one RAB. Value is 2. |

9.1.9 RELOCATION REQUIRED

This message is sent by the source RNC to inform the CN that a relocation is to be performed.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|--------------------|-------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Relocation Type | M | | 9.2.1.23 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |
| Source ID | M | | 9.2.1.24 | | YES | ignore |
| Target ID | M | | 9.2.1.25 | | YES | reject |
| MS Classmark 2 | C – ifGSMtarget | | 9.2.1.26 | As defined in [10]. | YES | reject |
| MS Classmark 3 | C – ifGSMtarget | | 9.2.1.27 | As defined in [10]. | YES | ignore |
| Source RNC To Target RNC Transparent Container | C – ifUMStarget | | 9.2.1.28 | | YES | reject |
| Old BSS To New BSS Information | O | | 9.2.1.29 | Coded as the <i>Old BSS to New BSS information elements</i> field of the <i>Old BSS to New BSS Information IE</i> defined in [11]. Can optionally be used if GSM target but not used for UMTS target. | YES | ignore |

| Condition | Explanation |
|-------------|---|
| ifGSMtarget | This IE shall be present if the <i>Target ID</i> IE contains a <i>CGI</i> IE. |
| ifUMStarget | This IE shall be present if the <i>Target ID</i> IE contains a <i>Target RNC-ID</i> IE. |

9.1.10 RELOCATION REQUEST

This message is sent by the CN to request the target RNC to allocate necessary resources for a relocation.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|--------------------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Permanent NAS UE Identity | O | | 9.2.3.1 | | YES | ignore |
| Cause | M | | 9.2.1.4 | | YES | ignore |
| CN Domain Indicator | M | | 9.2.1.5 | | YES | reject |
| Source RNC To Target RNC Transparent Container | M | | 9.2.1.28 | | YES | reject |
| RABs To Be Setup List | O | | | | YES | reject |
| >RABs To Be Setup Item IEs | | 1 to <maxnoofRABs> | | | EACH | reject |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>NAS Synchronisation Indicator | O | | 9.2.3.18 | | - | |
| >>RAB Parameters | M | | 9.2.1.3 | | - | |
| >>Data Volume Reporting Indication | C – ifPS | | 9.2.1.17 | | - | |
| >> PDP Type Information | C – ifPS | | 9.2.1.40 | | - | |
| >>User Plane Information | M | | | | - | |
| >>>User Plane Mode | M | | 9.2.1.18 | | - | |
| >>>UP Mode Versions | M | | 9.2.1.19 | | - | |
| >>Transport Layer Address | M | | 9.2.2.1 | | - | |
| >>lu Transport Association | M | | 9.2.2.2 | | - | |
| >>Service Handover | O | | 9.2.1.41 | | - | |
| >> Alternative RAB Parameter Values | O | | 9.2.1.43 | | YES | Ignore |
| Integrity Protection Information | O | | 9.2.1.11 | Integrity Protection Information includes key and permitted algorithms. | YES | ignore |
| Encryption Information | O | | 9.2.1.12 | Encryption Information includes key and permitted algorithms. | YES | ignore |
| lu Signalling Connection Identifier | M | | 9.2.1.38 | | YES | ignore |
| Global CN-ID | O | | 9.2.1.46 | | YES | reject |

| Condition | Explanation |
|-----------|--|
| IfPS | This IE shall be present if the <i>CN domain indicator</i> IE is set to "PS domain". |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.11 RELOCATION REQUEST ACKNOWLEDGE

This message is sent by the target RNC to inform the CN about the result of the resource allocation for the requested relocation.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|--------------------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Target RNC To Source RNC Transparent Container | O | | 9.2.1.30 | | YES | ignore |
| RABs Setup List | O | | | | YES | ignore |
| >RABs Setup Item IEs | | 1 to <maxnoofRABs> | | | EACH | reject |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>Transport Layer Address | O | | 9.2.2.1 | | - | |
| >>lu Transport Association | O | | 9.2.2.2 | | - | |
| >>Assigned RAB Parameter Values | O | | 9.2.1.44 | | YES | ignore |
| RABs Failed To Setup List | O | | | | YES | ignore |
| >RABs Failed To Setup Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>Cause | M | | 9.2.1.4 | | - | |
| Chosen Integrity Protection Algorithm | O | | 9.2.1.13 | Indicates the Integrity Protection algorithm that will be used by the target RNC. | YES | ignore |
| Chosen Encryption Algorithm | O | | 9.2.1.14 | Indicates the Encryption algorithm that will be used by the target RNC. | YES | ignore |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.12 RELOCATION COMMAND

This message is sent by the CN to source RNC to inform that resources for the relocation are allocated in target RNC.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|--------------------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Target RNC To Source RNC Transparent Container | O | | 9.2.1.30 | | YES | reject |
| L3 Information | O | | 9.2.1.31 | Coded as the value part of the <i>Layer 3 Information</i> IE defined in [11] (i.e. excluding the <i>Element Identifier</i> and the <i>Length</i> fields). | YES | ignore |
| RABs To Be Released List | O | | | | YES | ignore |
| >RABs To Be Released Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| RABs Subject To Data Forwarding List | O | | | | YES | ignore |
| >RABs Subject To Data Forwarding Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>Transport Layer Address | M | | 9.2.2.1 | | - | |
| >>lu Transport Association | M | | 9.2.2.2 | | - | |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.13 RELOCATION DETECT

This message is sent by the target RNC to inform the CN that the relocation execution trigger has been received.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | Ignore |

9.1.14 RELOCATION COMPLETE

This message is sent by the target RNC to inform the CN that the relocation is completed.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |

9.1.15 RELOCATION PREPARATION FAILURE

This message is sent by the CN to the source RNC if the relocation preparation failed.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

9.1.16 RELOCATION FAILURE

This message is sent by the target RNC to inform the CN that the requested resource allocation failed.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

9.1.17 RELOCATION CANCEL

This message is sent by the source RNC to the CN to cancel an ongoing relocation.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |

9.1.18 RELOCATION CANCEL ACKNOWLEDGE

This message is sent by the CN to the source RNC when the relocation has been cancelled.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

9.1.19 SRNS CONTEXT REQUEST

This message is sent by the CN to source RNC to indicate the PS RABs for which context transfer shall be performed.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|--------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RABs Subject To Data Forwarding List | M | | | | YES | ignore |
| >RABs Subject To Data Forwarding Item IEs | | 1 to <maxnoofRABs> | | | EACH | reject |
| >>RAB ID | M | | 9.2.1.2 | | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.20 SRNS CONTEXT RESPONSE

This message is sent by the source RNC as a response to SRNS CONTEXT REQUEST message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|--------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RABs Contexts List | O | | | | YES | ignore |
| >RABs Contexts Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>DL GTP-PDU Sequence Number | O | | 9.2.2.3 | | - | |
| >>UL GTP-PDU Sequence Number | O | | 9.2.2.4 | | - | |
| >>DL N-PDU Sequence Number | O | | 9.2.1.33 | | - | |
| >>UL N-PDU Sequence Number | O | | 9.2.1.34 | | - | |
| RABs Contexts Failed To Transfer List | O | | | | YES | ignore |
| >RABs Contexts Failed To Transfer Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>Cause | M | | 9.2.1.4 | | - | |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.21 SRNS DATA FORWARD COMMAND

This message is sent by the CN to the RNC to trigger the transfer of N-PDUs from the RNC to the CN in intersystem change or in some further cases described in [21].

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|--------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| RABs Subject To Data Forwarding List | O | | | | YES | ignore |
| >RABs Subject To Data Forwarding Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>Transport Layer Address | M | | 9.2.2.1 | | - | |
| >>lu Transport Association | M | | 9.2.2.2 | | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.22 FORWARD SRNS CONTEXT

This message is sent either by source RNC to the CN or by the CN to target RNC.

Direction: CN → RNC and RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|----------------------------------|----------|--------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| RAB Contexts List | M | | | | YES | ignore |
| >RAB Contexts Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>DL GTP-PDU Sequence Number | O | | 9.2.2.3 | | - | |
| >>UL GTP-PDU Sequence Number | O | | 9.2.2.4 | | - | |
| >>DL N-PDU Sequence Number | O | | 9.2.1.33 | | - | |
| >>UL N-PDU Sequence Number | O | | 9.2.1.34 | | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.23 PAGING

This message is sent by the CN to request UTRAN to page a specific UE.

Direction: CN → RNC.

Signalling bearer mode: Connectionless.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|------------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| CN Domain Indicator | M | | 9.2.1.5 | | YES | ignore |
| Permanent NAS UE Identity | M | | 9.2.3.1 | | YES | ignore |
| Temporary UE Identity | O | | 9.2.3.2 | | YES | ignore |
| Paging Area ID | O | | 9.2.1.21 | | YES | ignore |
| Paging Cause | O | | 9.2.3.3 | | YES | ignore |
| Non Searching Indication | O | | 9.2.1.22 | | YES | ignore |
| DRX Cycle Length Coefficient | O | | 9.2.1.37 | | YES | ignore |

9.1.24 COMMON ID

This message is sent by the CN to inform RNC about the permanent NAS UE identity for a user.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Permanent NAS UE Identity | M | | 9.2.3.1 | | YES | ignore |

9.1.25 CN INVOKE TRACE

This message is sent by the CN to request the RNC to start to produce a trace record.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-----------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Trace Type | M | | 9.2.1.6 | | YES | ignore |
| Trace Reference | M | | 9.2.1.8 | | YES | ignore |
| Trigger ID | O | | 9.2.1.7 | | YES | ignore |
| UE Identity | O | | 9.2.1.9 | | YES | ignore |
| OMC ID | O | | 9.2.1.10 | | YES | ignore |

9.1.26 SECURITY MODE COMMAND

This message is sent by the CN to trigger the integrity and ciphering functions over the radio interface.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|----------------------------------|----------|-------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Integrity Protection Information | M | | 9.2.1.11 | Integrity information includes key and permitted algorithms. | YES | reject |
| Encryption Information | O | | 9.2.1.12 | Encryption information includes key and permitted algorithms. | YES | ignore |
| Key Status | M | | 9.2.1.36 | | YES | reject |

9.1.27 SECURITY MODE COMPLETE

This message is sent by the RNC as a successful response to SECURITY MODE COMMAND message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Chosen Integrity Protection Algorithm | M | | 9.2.1.13 | | YES | reject |
| Chosen Encryption Algorithm | O | | 9.2.1.14 | | YES | ignore |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

9.1.28 SECURITY MODE REJECT

This message is sent by the RNC as a unsuccessful response to SECURITY MODE COMMAND message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

9.1.29 LOCATION REPORTING CONTROL

This message is sent by the CN to initiate, modify or stop location reporting from the RNC to the CN.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Request Type | M | | 9.2.1.16 | | YES | ignore |
| Vertical Accuracy Code | O | | 9.2.1.46a | | YES | Ignore |
| Response Time | O | | 9.2.1.46b | | YES | Ignore |
| Positioning Priority | O | | 9.2.1.46c | | YES | Ignore |
| Client Type | O | | 9.2.1.46d | | YES | ignore |

9.1.30 LOCATION REPORT

This message is sent by the RNC to the CN with information about the UE location.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Area Identity | O | | 9.2.3.10 | | YES | ignore |
| Cause | O | | 9.2.1.4 | | YES | ignore |
| Request Type | O | | 9.2.1.16 | | YES | ignore |
| Last Known Service Area | O | | 9.2.3.22 | | YES | ignore |

9.1.31 DATA VOLUME REPORT REQUEST

This message is sent by the CN to request unsuccessfully transmitted data volumes for specific RABs.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-----------------------------------|----------|--------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RABs Data Volume Report List | M | | | | YES | ignore |
| >RABs Data Volume Report Item IEs | | 1 to <maxnoofRABs> | | | EACH | reject |
| >>RAB ID | M | | 9.2.1.2 | | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.32 DATA VOLUME REPORT

This message is sent by the RNC and informs the CN about unsuccessfully transmitted data volumes for requested RABs.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|--------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| RABs Data Volume Report List | O | | | | YES | ignore |
| >RABs Data Volume Report Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>>RAB Data Volume Report List | O | | | | - | |
| >>>>RAB Data Volume Report Item IEs | | 1 to <maxnoofVol> | | | - | |
| >>>>Unsuccessfully Transmitted DL Data Volume | M | | 9.2.3.12 | | - | |
| >>>>Data Volume Reference | O | | 9.2.3.13 | | - | |
| RABs Failed To Report List | O | | | | YES | ignore |
| >RABs Failed To Report Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>Cause | M | | 9.2.1.4 | | - | |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |

| Range bound | Explanation |
|-------------|--|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |
| maxnoofVol | Maximum no. of reported data volume for one RAB. Value is 2. |

9.1.33 INITIAL UE MESSAGE

This message is sent by the RNC to transfer the radio interface initial layer 3 message to the CN.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| CN Domain Indicator | M | | 9.2.1.5 | | YES | ignore |
| LAI | M | | 9.2.3.6 | | YES | ignore |
| RAC | C - ifPS | | 9.2.3.7 | | YES | ignore |
| SAI | M | | 9.2.3.9 | | YES | ignore |
| NAS-PDU | M | | 9.2.3.5 | | YES | ignore |
| Iu Signalling Connection Identifier | M | | 9.2.1.38 | | YES | ignore |
| Global RNC-ID | M | | 9.2.1.39 | | YES | ignore |

| Condition | Explanation |
|-----------|--|
| ifPS | This IE shall be present if the <i>CN Domain Indicator</i> IE is set to 'PS domain'. |

9.1.34 DIRECT TRANSFER

This message is sent by both the CN and the RNC and is used for carrying NAS information over the Iu interface.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| NAS-PDU | M | | 9.2.3.5 | | YES | ignore |
| LAI | O | | 9.2.3.6 | | YES | ignore |
| RAC | O | | 9.2.3.7 | | YES | ignore |
| SAI | O | | 9.2.3.9 | | YES | ignore |
| SAPI | O | | 9.2.3.8 | | YES | ignore |

9.1.35 CN INFORMATION BROADCAST REQUEST

Void.

9.1.36 CN INFORMATION BROADCAST CONFIRM

Void.

9.1.37 CN INFORMATION BROADCAST REJECT

Void.

9.1.38 OVERLOAD

This message is sent by both the CN and the RNC to indicate that the node is overloaded.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connectionless.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Number Of Steps | O | | 9.2.1.32 | | YES | ignore |
| Global RNC-ID | O | | 9.2.1.39 | | YES | ignore |
| CN Domain Indicator | O | | 9.2.1.5 | | YES | ignore |

9.1.39 RESET

This message is sent by both the CN and the RNC and is used to request that the other node shall be reset.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connectionless.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |
| CN Domain Indicator | M | | 9.2.1.5 | | YES | reject |
| Global RNC-ID | O | | 9.2.1.39 | | YES | ignore |
| Global CN-ID | O | | 9.2.1.46 | | YES | ignore |

9.1.40 RESET ACKNOWLEDGE

This message is sent by both the CN and the RNC as a response to RESET message.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connectionless.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| CN Domain Indicator | M | | 9.2.1.5 | | YES | reject |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |
| Global RNC-ID | O | | 9.2.1.39 | | YES | ignore |
| Global CN-ID | O | | 9.2.1.46 | | YES | ignore |

9.1.41 ERROR INDICATION

This message is sent by both the CN and the RNC and is used to indicate that some error has been detected in the node.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connection oriented or connectionless.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Cause | O | | 9.2.1.4 | | YES | ignore |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |
| CN Domain Indicator | O | | 9.2.1.5 | | YES | ignore |
| Global RNC-ID | O | | 9.2.1.39 | | YES | ignore |
| Global CN-ID | O | | 9.2.1.46 | | YES | ignore |

9.1.42 CN DEACTIVATE TRACE

This message is sent by the CN to request the RNC to stop producing a trace record for the indicated trace reference.

Direction: CN → RNC.

Signalling bearer mode: Connection Oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|-----------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Trace Reference | M | | 9.2.1.8 | | YES | ignore |
| Trigger ID | O | | 9.2.1.7 | | YES | ignore |

9.1.43 RANAP RELOCATION INFORMATION

This message is part of a special RANAP Relocation Information procedure, and is sent between RNCs during Relocation.

Direction: RNC - RNC.

Signalling bearer mode: Not applicable.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|--------------------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | ignore |
| Direct Transfer Information List | O | | | | YES | ignore |
| >Direct Transfer Information Item IEs | | 1 to <maxnoofDT> | | Information received in one or more DIRECT TRANSFER messages and that needs to be transferred to target RNC for further transmission to the UE. | EACH | ignore |
| >>NAS-PDU | M | | 9.2.3.5 | | - | |
| >>SAPI | M | | 9.2.3.8 | | - | |
| >>CN Domain Indicator | M | | 9.2.1.5 | | - | |
| RAB Contexts List | O | | | | YES | ignore |
| >RAB Contexts Item IEs | | 1 to <maxnoofRABs> | | | EACH | ignore |
| >>RAB ID | M | | 9.2.1.2 | | - | |
| >>DL GTP-PDU Sequence Number | O | | 9.2.2.3 | | - | |
| >>UL GTP-PDU Sequence Number | O | | 9.2.2.4 | | - | |
| >>DL N-PDU Sequence Number | O | | 9.2.1.33 | | - | |
| >>UL N-PDU Sequence Number | O | | 9.2.1.34 | | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofDT | Maximum no. of DT information. Value is 15. |
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.44 RESET RESOURCE

This message is sent by either CN or RNC. The sending entity informs the receiving entity that the sending requests the receiving entity to release resources and references associated to Iu signalling connection identifiers in the message.

Direction: CN ← → RNC.

Signalling bearer mode: Connectionless.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------------------------|----------|---------------------------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| CN Domain Indicator | M | | 9.2.1.5 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |
| Reset Resource List | M | | | | YES | ignore |
| >Reset Resource Item IEs | | 1 to <maxnoofluSigConIds> | | | EACH | reject |
| >>Iu Signalling Connection Identifier | M | | 9.2.1.38 | | - | |
| Global RNC-ID | O | | 9.2.1.39 | | YES | ignore |
| Global CN-ID | O | | 9.2.1.46 | | YES | ignore |

| Range bound | Explanation |
|--------------------|--|
| maxnoofluSigConlds | Maximum no. of lu signalling connection identifiers. Value is 250. |

9.1.45 RESET RESOURCE ACKNOWLEDGE

This message is sent by either the CN or RNC inform the CN or RNC that the RESET RESOURCE message has been received.

Direction: CN ← → RNC.

Signalling bearer mode: Connectionless.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------------------------|----------|---------------------------|-----------------------|--|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| CN Domain Indicator | M | | 9.2.1.5 | | YES | reject |
| Reset Resource List | M | | | | YES | ignore |
| >Reset Resource Item IEs | | 1 to <maxnoofluSigConIds> | | This list shall be in the same order as the list received in the RESET RESOURCE message. | EACH | reject |
| >>lu Signalling Connection Identifier | M | | 9.2.1.38 | | - | |
| Global RNC-ID | O | | 9.2.1.39 | | YES | ignore |
| Criticality Diagnostics | O | | 9.2.1.35 | | YES | ignore |
| Global CN-ID | O | | 9.2.1.46 | | YES | ignore |

| Range bound | Explanation |
|--------------------|--|
| maxnoofluSigConIds | Maximum no. of lu signalling connection identifiers. Value is 250. |

9.1.46 RAB MODIFY REQUEST

This message is sent by the RNC to the CN to request modification of one or more RABs for the same UE.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---|----------|-----------------------|-----------------------|---|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | Ignore |
| RABs To Be Modified List | M | | | | YES | Ignore |
| >RABs To Be Modified Item IEs | | 1 to <maxnoofRABs> | | | EACH | Ignore |
| >>RAB ID | M | | 9.2.1.2 | Uniquely identifies the RAB for a specific CN domain, for a particular UE. | - | |
| >> Requested RAB Parameter Values | M | | 9.2.1.45 | Includes RAB parameters for which different values than what was originally negotiated are being requested. | - | |

| Range bound | Explanation |
|-------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |

9.1.47 LOCATION RELATED DATA REQUEST

This message is sent by the CN either to initiate delivery of dedicated assistance data from the RNC to the UE, or to retrieve deciphering keys for the broadcasted assistance data.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|------------------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Location Related Data Request Type | M | | 9.2.3.19 | | YES | reject |

9.1.48 LOCATION RELATED DATA RESPONSE

This message is sent by the RNC to report the successful response of the LOCATION RELATED DATA REQUEST message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Broadcast Assistance Data Deciphering Keys | O | | 9.2.3.20 | | YES | ignore |

9.1.49 LOCATION RELATED DATA FAILURE

This message is sent by the RNC to report the unsuccessful response of the LOCATION RELATED DATA REQUEST message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.1.1 | | YES | reject |
| Cause | M | | 9.2.1.4 | | YES | ignore |

9.2 Information Element Definitions

9.2.0 General

Subclause 9.2 presents the RANAP 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.

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

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

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------|----------|-------|--|------------------------------------|
| Message Type | | | | Assumed max no of messages is 256. |
| >Procedure Code | M | | (RAB Assignment, RAB Release Request, Iu Release Request, Iu Release, Relocation Preparation, Relocation Resource Allocation, Relocation Detect, Relocation Complete, Relocation Cancel, SRNS Context Transfer, SRNS Data Forwarding Initiation, SRNS Context Forwarding from Source RNC to CN, SRNS Context Forwarding to Target RNC from CN, Paging, Common ID, CN Invoke Trace, Security Mode Control, Location Reporting Control, Location Report, Data Volume Report, Initial UE Message Direct Transfer, Overload Control, Reset, Error Indication, CN Deactivate Trace, RANAP Relocation Information, Reset Resource, ..., RAB Modify Request, Location Related Data) | |
| >Type of Message | M | | CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, Outcome, ...) | |

9.2.1.2 RAB ID

This element uniquely identifies the radio access bearer for a specific CN domain for a particular UE, which makes the RAB ID unique over one Iu connection. The RAB ID shall remain the same for the duration of the RAB even when the RAB is relocated to another Iu connection.

The purpose of the element is to bind data stream from the Non-Access Stratum point of view (e.g. bearer of call or PDP context) and radio access bearer in Access Stratum. The value is also used in the RNC to relate Radio Bearers to a RAB. The content of this information element is transferred unchanged from the CN node (i.e., MSC or SGSN) via RNC to UE by RANAP messages and RRC messages. For RRC messages refer to [10].

The element contains binary representation of either the Stream Identifier (SI) for CS domain or the Network Service Access Point Identifier (NSAPI) for PS domain. These identifiers are coded in the RAB ID element in accordance with the coding of the *Stream Identifier* IE and with the coding of the *NSAPI* IE in [8].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|-----------------------|
| RAB ID | M | | BIT STRING (8) | |

9.2.1.3 RAB Parameters

The purpose of the *RAB parameters* IE group and other parameters within the *RAB parameters* IE group is to indicate all RAB attributes as defined in [7] for both directions.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------|--------------------------------|--------------------------------------|---|--|
| RAB parameters | | | | |
| >Traffic Class | M | | ENUMERATED (conversational, streaming, interactive, background, ...) | Desc.: This IE indicates the type of application for which the Radio Access Bearer service is optimised |
| >RAB Asymmetry Indicator | M | | ENUMERATED (Symmetric bidirectional, Asymmetric Uni directional downlink, Asymmetric Uni directional Uplink, Asymmetric Bidirectional, ...) | Desc.: This IE indicates asymmetry or symmetry of the RAB and traffic direction |
| >Maximum Bit Rate | M | 1 to <nbr-SeparateTrafficDirections> | INTEGER (1..16,000,000) | Desc.: This IE indicates the maximum number of bits delivered by UTRAN and to UTRAN at a SAP within a period of time, divided by the duration of the period. The unit is: bit/s Usage: When nbr-SeparateTrafficDirections is equal to 2, then Maximum Bit Rate attribute for downlink is signalled first, then Maximum Bit Rate attribute for uplink |
| >Guaranteed Bit Rate | C- iftrafficCon v-Stream | 0 to <nbr-SeparateTrafficDirections> | INTEGER (0..16,000,000) | Desc.: This IE indicates the guaranteed number of bits delivered at a SAP within a period of time (provided that there is data to deliver), divided by the duration of the period. The unit is: bit/s Usage: 1. When nbr-SeparateTrafficDirections is equal to 2, then Guaranteed Bit Rate for downlink is signalled first, then Guaranteed Bit Rate for uplink 2. Delay and reliability attributes only apply up to the guaranteed bit rate 3. Conditional value for the case of Support Mode for pre-defined SDU sizes: Set to highest not rate controllable bitrate, where bitrate is either – one of the RAB subflow combination bitrate IEs (when present) or – one of the calculated values given when dividing |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|-------------------------|-----------------------|--|---|
| RAB parameters | | | | |
| | | | | the compound Subflow combination SDU sizes by the value of the IE Maximum SDU Size and then multiplying this result by the value of the IE Maximum Bit Rate. |
| >Delivery Order | M | | ENUMERATED (delivery order requested, delivery order not requested) | Desc: This IE indicates whether the RAB shall provide in-sequence SDU delivery or not Usage: Delivery order requested: in sequence delivery shall be guaranteed by UTRAN on all RAB SDUs Delivery order not requested: in sequence delivery is not required from UTRAN |
| >Maximum SDU Size | M | | INTEGER (0..32768) | Desc.: This IE indicates the maximum allowed SDU size The unit is: bit. Usage: Conditional value: Set to largest RAB Subflow Combination compound SDU size (when present) among the different RAB Subflow Combinations |
| >SDU parameters | | 1 to <maxRABSubflows> | See below | Desc.: This IE contains the parameters characterizing the RAB SDUs Usage Given per subflow with first occurrence corresponding to subflow#1 etc... |
| >Transfer Delay | C-iftrafficCon v-Stream | | INTEGER (0..65535) | Desc.: This IE indicates the maximum delay for 95th percentile of the distribution of delay for all delivered SDUs during the lifetime of a RAB, where delay for an SDU is defined as the time from a request to transfer an SDU at one SAP to its delivery at the other SAP The unit is: millisecond. Usage: - |
| >Traffic Handling Priority | C-iftrafficInteractiv | | INTEGER {spare (0), highest (1), ..., lowest (14), no priority (15)} (0..15) | Desc.: This IE specifies the relative importance for handling of all SDUs belonging to the radio access bearer compared to the SDUs of other bearers Usage: Values between 1 and 14 are ordered in decreasing order of priority, '1' being the highest and '14' the lowest. Value 0 shall be treated as a logical error if received. |
| >Allocation/Retention priority | O | | See below | Desc.: This IE specifies the relative importance compared to other Radio access bearers for allocation and retention of the Radio access bearer. Usage: If this IE is not received, the request is regarded as it cannot trigger the pre-emption process and it is vulnerable to the pre-emption process. |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|------------------------|-------|--|---|
| RAB parameters | | | | |
| >Source Statistics Descriptor | C-iftrafficConv-Stream | | ENUMERATED (speech, unknown, ...) | Desc.: This IE specifies characteristics of the source of submitted SDUs Usage: - |
| >Relocation Requirement | O | | ENUMERATED (lossless, none, ..., realtime) | This IE shall be present for RABs towards the PS domain, otherwise it shall not be present. Desc.: This IE is no longer used. Usage: It shall always be set to 'none' when sent and it shall always be ignored when received. |

| Range Bound | Explanation |
|------------------------------|--|
| nbr-SeparateTrafficDirection | Number of Traffic Directions being signalled separately. Set to 2 if RAB asymmetry indicator is asymmetric bidirectional. Set to 1 in all other cases. |

| Range Bound | Explanation |
|----------------|--|
| maxRABSubflows | Maximum number of Subflows per RAB. Value is 7 |

| Condition | Explanation |
|----------------------|---|
| IftrafficConv-Stream | This IE shall be present if the <i>Traffic Class</i> IE is set to 'Conversational' or 'Streaming' |
| IftrafficInteractiv | This IE shall be present if the <i>Traffic Class</i> IE is set to 'Interactive' |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|------------------|-------|-----------------------|---|
| SDU parameters | | | | |
| > SDU Error Ratio | C-ifErroneousSDU | | | Desc.: This IE indicates the fraction of SDUs lost or detected as erroneous. This is a Reliability attribute Usage: The attribute is coded as follows: Mantissa * 10 ^{-exponent} |
| >>Mantissa | M | | INTEGER (1..9) | |
| >>Exponent | M | | INTEGER (1..6) | |
| >Residual Bit Error Ratio | M | | | Desc.: This IE indicates the undetected bit error ratio for each subflow in the delivered SDU. This is a Reliability attribute. Usage: The attribute is coded as follows: Mantissa * 10 ^{-exponent} |

| | | | | |
|-----------------------------------|---|-----------------------------------|--|---|
| >>Mantissa | M | | INTEGER (1..9) | |
| >>Exponent | M | | INTEGER (1..8) | |
| >Delivery Of Erroneous SDU | M | | ENUMERATED (yes, no, no-error-detection-consideration) | <p>Desc.: This IE indicates whether SDUs with detected errors shall be delivered or not. In case of unequal error protection, the attribute is set per subflow This is a Reliability attribute</p> <p>Usage: Yes: error detection applied, erroneous SDU delivered No. Error detection is applied , erroneous SDU discarded no-error-detection-consideration: SDUs delivered without considering error detection. If the RNC receives this IE set to "Yes" and the <i>User Plane Mode</i> IE is set to "transparent mode", it should consider it as "no-error-detection-consideration".</p> |
| >SDU format information Parameter | O | 1 to <maxRABSubflow Combinations> | See below | <p>Desc.: This IE contains the list of possible exact sizes of SDUs and/or RAB Subflow Combination bit rates. Given per RAB Subflow Combination with first occurrence corresponding to RAB Subflow Combination number 1. It shall always be present for rate controllable RABs.</p> |

| Range Bound | Explanation |
|---------------------------|--|
| maxRABSubflowCombinations | Maximum number of RAB Subflow Combinations. Value is 64. |

| Condition | Explanation |
|----------------|--|
| IfErroneousSDU | This IE shall be present if the <i>Delivery Of Erroneous SDU</i> IE is set to 'Yes' or 'No'. |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|-----------------------------|--|
| SDU Format Information Parameter | | | | At least one of the <i>Subflow SDU size</i> IE and the <i>RAB Subflow Combination bit rate</i> IE shall be present when <i>SDU format information Parameter</i> IE is present. For the case subflow SDUs are transmitted at constant time interval, only one of the two IEs shall be present. |
| >Subflow SDU Size | O | | INTEGER (0..4095) | Desc.: This IE indicates the exact size of the SDU. The unit is: bit. Usage: This IE is only used for RABs that have predefined SDU size(s). It shall be present for RABs having more than one subflow. For RABs having only one subflow, this IE shall be present only when the RAB is rate controllable and the SDU size of some RAB Subflow Combination(s) is different than the IE Maximum SDU Size. When this IE is not present and SDU format information Parameter is present, then the Subflow SDU size for the only existing subflow takes the value of the IE Maximum SDU size. |
| >RAB Subflow Combination Bit Rate | O | | INTEGER (0..16,000,000) | Desc.: This IE indicates the RAB Subflow Combination bit rate. The unit is: bit/s. Usage: When this IE is not present and SDU format information parameter is present then all Subflow SDUs are transmitted (when there is data to be transmitted) at a constant time interval. The value of this IE shall not exceed the maximum value of the IEs "Maximum Bit Rate". The value 0 of RAB Subflow Combination bitrate indicates that the RAB uses discontinuous transfer of the SDUs. |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------------|----------|-------|--|---|
| Allocation/Retention Priority | | | | |
| >Priority Level | M | | INTEGER {spare (0), highest (1), ..., lowest (14), no priority (15)} (0..15) | Desc.: This IE indicates the priority of the request. Usage: Values between 1 and 14 are ordered in decreasing order of priority, '1' being the highest and '14' the lowest. Value 0 shall be treated as a logical error if received. The priority level and the preemption indicators may be used to determine whether the request has to be performed unconditionally and immediately |
| >Pre-emption Capability | M | | ENUMERATE D(shall not trigger pre-emption, may trigger pre-emption) | Desc.: This IE indicates the pre-emption capability of the request on other RABs Usage: The RAB shall not pre-empt other RABs or, the RAB may pre-empt other RABs The Pre-emption Capability indicator applies to the allocation of resources for a RAB and as such it provides the trigger to the pre-emption procedures/processes of the RNS. |
| >Pre-emption Vulnerability | M | | ENUMERATE D(not pre-emptable, pre-emptable) | Desc.: This IE indicates the vulnerability of the RAB to pre-emption of other RABs. Usage: The RAB shall not be pre-empted by other RABs or the RAB may be pre-empted by other RABs. Pre-emption Vulnerability indicator applies for the entire duration of the RAB, unless modified and as such indicates whether the RAB is a target of the pre-emption procedures/processes of the RNS |
| >Queuing Allowed | M | | ENUMERATE D(queuing not allowed, queuing allowed) | Desc.: This IE indicates whether the request can be placed into a resource allocation queue or not. Usage: Queuing of the RAB is allowed Queuing of the RAB is not allowed Queuing allowed indicator applies for the entire duration of the RAB, unless modified. |

9.2.1.4 Cause

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

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|--|------------------------|
| Choice Cause >Radio Network Layer Cause | | | INTEGER (RAB pre-empted(1), Trelocoverall Expiry(2), Trelocprep Expiry(3), Treloccomplete Expiry(4), Tqueing Expiry(5), Relocation Triggered(6), Unable to Establish During Relocation(8), Unknown Target RNC(9), Relocation Cancelled(10), Successful Relocation(11), Requested Ciphery and/or Integrity Protection Algorithms not Supported(12), Conflict with already existing Integrity protection and/or Ciphery information (13), Failure in the Radio Interface Procedure(14), Release due to UTRAN Generated Reason(15), User Inactivity(16), Time Critical Relocation(17), Requested Traffic Class not Available(18), Invalid RAB Parameters Value(19), Requested | Value range is 1 – 64. |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|---|-----------------------|
| Choice Cause | | | | |
| | | | Maximum Bit Rate not Available(20), Requested Maximum Bit Rate for DL not Available(33), Requested Maximum Bit Rate for UL not Available(34), Requested Guaranteed Bit Rate not Available(21), Requested Guaranteed Bit Rate for DL not Available(35), Requested Guaranteed Bit Rate for UL not Available(36), Requested Transfer Delay not Achievable(22), Invalid RAB Parameters Combination(23), Condition Violation for SDU Parameters(24), Condition Violation for Traffic Handling Priority(25), Condition Violation for Guaranteed Bit Rate(26), User Plane Versions not Supported(27), Iu UP Failure(28), TRELAlloc Expiry (7), Relocation Failure in Target CN/RNC or Target System (29), Invalid RAB ID(30), | |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|---|-----------------------|
| Choice Cause | | | | |
| | | | <p>No remaining RAB(31),</p> <p>Interaction with other procedure(32),</p> <p>Repeated Integrity Checking Failure(37),</p> <p>Requested Request Type not supported(38),</p> <p>Request superseded(39),</p> <p>Release due to UE generated signalling connection release(40),</p> <p>Resource Optimisation Relocation(41),</p> <p>Requested Information Not Available(42),</p> <p>Relocation desirable for radio reasons (43),</p> <p>Relocation not supported in Target RNC or Target system(44),</p> <p>Directed Retry (45),</p> <p>Radio Connection With UE Lost(46),</p> <p>RNC unable to establish all RFCs (47),</p> <p>Deciphering Keys Not Available(48),</p> <p>Dedicated Assistance data Not Available(49),</p> <p>Relocation Target not allowed(50),</p> <p>Location Reporting Congestion(51))</p> | |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------|----------|-------|---|--|
| Choice Cause | | | | |
| >Transport Layer Cause | | | INTEGER (Signalling Transport Resource Failure(65), lu Transport Connection Failed to Establish(66)) | Value range is 65 – 80. |
| >NAS Cause | | | INTEGER (User Restriction Start Indication(81), User Restriction End Indication(82), Normal Release(83)) | Value range is 81 – 96. |
| >Protocol Cause | | | INTEGER (Transfer Syntax Error(97), Semantic Error (98), Message not compatible with receiver state (99), Abstract Syntax Error (Reject) (100), Abstract Syntax Error (Ignore and Notify) (101), Abstract Syntax Error (Falsely Constructed Message) (102)) | Value range is 97 – 112. |
| >Miscellaneous Cause | | | INTEGER (O&M Intervention(113), No Resource Available(114), Unspecified Failure(115), Network Optimisation(116)) | Value range is 113 – 128. |
| >Non-standard Cause | | | INTEGER () | Value range is 129 – 256. Cause value 256 shall not be used. |

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

| Radio Network Layer cause | Meaning |
|--|--|
| Deciphering Keys Not Available | The action failed because RNC is not able to provide requested deciphering keys. |
| Conflict with already existing Integrity protection and/or Ciphering information | The action was not performed due to that the requested security mode configuration was in conflict with the already existing security mode configuration. |
| Condition Violation For Guaranteed Bit Rate | The action was not performed due to condition violation for guaranteed bit rate. |
| Condition Violation For SDU Parameters | The action was not performed due to condition violation for SDU parameters. |
| Condition Violation For Traffic Handling Priority | The action was not performed due to condition violation for traffic handling priority. |
| Dedicated Assistance data Not Available | The action failed because RNC is not able to successfully deliver the requested dedicated assistance data to the UE. |
| Directed Retry | The reason for action is Directed Retry |
| Failure In The Radio Interface Procedure | Radio interface procedure has failed. |
| Interaction With Other Procedure | Relocation was cancelled due to interaction with other procedure. |
| Invalid RAB ID | The action failed because the RAB ID is unknown in the RNC. |
| Invalid RAB Parameters Combination | The action failed due to invalid RAB parameters combination. |
| Invalid RAB Parameters Value | The action failed due to invalid RAB parameters value. |
| Iu UP Failure | The action failed due to Iu UP failure. |
| No remaining RAB | The reason for the action is no remaining RAB. |
| RAB Pre-empted | The reason for the action is that RAB is pre-empted. |
| Radio Connection With UE Lost | The action is requested due to losing radio connection to the UE |
| Release Due To UE Generated Signalling Connection Release | Release requested due to UE generated signalling connection release. |
| Release Due To UTRAN Generated Reason | Release is initiated due to UTRAN generated reason. |
| Relocation Cancelled | The reason for the action is relocation cancellation. |
| Relocation Desirable for Radio Reasons | The reason for requesting relocation is radio related. |
| Relocation Failure In Target CN/RNC Or Target System | Relocation failed due to a failure in target CN/RNC or target system. |
| Relocation Not Supported In Target RNC Or Target System | Relocation failed because relocation was not supported in target RNC or target system. |
| Relocation Target not allowed | Relocation to the indicated target cell is not allowed for the UE in question. |
| Relocation Triggered | The action failed due to relocation. |
| Repeated Integrity Checking Failure | The action is requested due to repeated failure in integrity checking. |
| Request Superseded | The action failed because there was a second request on the same RAB. |
| Requested Ciphering And/Or Integrity Protection Algorithms Not Supported | The UTRAN or the UE is unable to support the requested ciphering and/or integrity protection algorithms. |
| Requested Guaranteed Bit Rate For DL Not Available | The action failed because requested guaranteed bit rate for DL is not available. |
| Requested Guaranteed Bit Rate For UL Not Available | The action failed because requested guaranteed bit rate for UL is not available. |
| Requested Guaranteed Bit Rate Not Available | The action failed because requested guaranteed bit rate is not available. |
| Requested Information Not Available | The action failed because requested information is not available. |
| Requested Maximum Bit Rate For DL Not Available | The action failed because requested maximum bit rate for DL is not available. |
| Requested Maximum Bit Rate For UL Not Available | The action failed because requested maximum bit rate for UL is not available. |
| Requested Maximum Bit Rate Not Available | The action failed because requested maximum bit rate is not available. |
| Requested Request Type Not Supported | The RNC is not supporting the requested location request type either because it doesn't support the requested event or it doesn't support the requested report area. |
| Location Reporting Congestion | The action was not performed due to an inability to support |

| | |
|---|---|
| | location reporting caused by overload. |
| Requested Traffic Class Not Available | The action failed because requested traffic class is not available. |
| Requested Transfer Delay Not Achievable | The action failed because requested transfer delay is not achievable. |
| Resource Optimisation Relocation | The reason for requesting relocation is resource optimisation. |
| Successful Relocation | The reason for the action is completion of successful relocation. |
| Time Critical Relocation | Relocation is requested for time critical reason. |
| T _{QUEUING} Expiry | The action failed due to expiry of the timer T _{QUEUING} . |
| T _{RELOCalloc} Expiry | Relocation Resource Allocation procedure failed due to expiry of the timer T _{RELOCalloc} . |
| T _{RELOCcomplete} Expiry | The reason for the action is expiry of timer T _{RELOCcomplete} . |
| T _{RELOCoverall} Expiry | The reason for the action is expiry of timer T _{RELOCoverall} . |
| T _{RELOCprep} Expiry | Relocation Preparation procedure is cancelled when timer T _{RELOCprep} expires. |
| Unable To Establish During Relocation | RAB failed to establish during relocation because it cannot be supported in the target RNC. |
| Unknown Target RNC | Relocation rejected because the target RNC is not known to the CN. |
| User Inactivity | The action is requested due to user inactivity on one or several non real time RABs e.g. in order to optimise radio resource. |
| User Plane Versions Not Supported | The action failed because requested user plane versions were not supported. |
| RNC unable to establish all RFCs | RNC couldn't establish all RAB subflow combinations indicated within the <i>RAB Parameters</i> IE. |

| Transport Layer cause | Meaning |
|---|---|
| Iu Transport Connection Failed to Establish | The action failed because the Iu Transport Network Layer connection could not be established. |
| Signalling Transport Resource Failure | Signalling transport resources have failed (e.g. processor reset). |

| NAS cause | Meaning |
|-----------------------------------|--|
| Normal Release | The release is normal. |
| User Restriction Start Indication | A location report is generated due to entering a classified area set by O&M. |
| User Restriction End Indication | A location report is generated due to leaving a classified area set by O&M. |

| Protocol cause | Meaning |
|---|--|
| Abstract Syntax Error (Reject) | The received message included an abstract syntax error and the concerning criticality indicated "reject". |
| Abstract Syntax Error (Ignore And Notify) | The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify". |
| Abstract Syntax Error (Falsely Constructed Message) | The received message contained IEs or IE groups in wrong order or with too many occurrences. |
| Message Not Compatible With Receiver State | The received message was not compatible with the receiver state. |
| Semantic Error | The received message included a semantic error. |
| Transfer Syntax Error | The received message included a transfer syntax error. |

| Miscellaneous cause | Meaning |
|-----------------------|---|
| Network Optimisation | The action is performed for network optimisation. |
| No Resource Available | No requested resource is available. |
| O&M Intervention | The action is due to O&M intervention. |
| Unspecified Failure | Sent when none of the specified cause values applies. |

9.2.1.5 CN Domain Indicator

Indicates the CN domain from which the message originates or to which the message shall be sent.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------|----------|-------|-----------------------------------|-----------------------|
| CN Domain Indicator | M | | ENUMERATED (CS domain, PS domain) | |

9.2.1.6 Trace Type

Indicates the type of trace information to be recorded.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|---|
| Trace Type | M | | OCTET STRING (1) | Coded as the Trace Type specified in 3GPP TS based on [12]. |

9.2.1.7 Trigger ID

Indicates the identity of the entity which initiated the trace.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|----------------------------|
| Trigger ID | M | | OCTET STRING (3..22) | Typically an OMC identity. |

Note: Due to inconsistency in the definition of Trigger ID between TS 25.413 and [24], it shall be ensured that the *Trigger ID* IE is coded with at least the minimum number of octets required.

9.2.1.8 Trace Reference

Provides a trace reference number allocated by the triggering entity.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------|----------|-------|-----------------------|-----------------------|
| Trace Reference | M | | OCTET STRING (2..3) | |

NOTE: Due to inconsistency in the definition of Trace Reference between TS 25.413 and [24], it shall be ensured that the *Trace Reference* IE is coded with at least the minimum number of octets required.

9.2.1.9 UE Identity

This element identifies the element to be traced i.e. the subscriber or the user equipment.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|-------------------------------|--|
| Choice UE Identity | | | | |
| >IMSI | | | OCTET STRING (SIZE (3..8)) | <ul style="list-style-type: none"> - 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 <p>-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.</p> |
| >IMEI | | | OCTET STRING (SIZE (8)) | <ul style="list-style-type: none"> - hexadecimal digits 0 to F, two hexadecimal digits per octet, - each hexadecimal digit encoded 0000 to 1111, - 1111 used as filler for bits 8 to 5 of last octet - bit 4 to 1 of octet n encoding digit 2n-1 - bit 8 to 5 of octet n encoding digit 2n <p>Number of hexadecimal digits shall be 15.</p> |

9.2.1.10 OMC ID

A variable length element indicating the destination address of the Operation and Maintenance Center (OMC) to which trace information is to be sent.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-------------------------|---|
| OMC ID | M | | OCTET STRING (3..22) | Coded as the OMC ID specified in UMTS TS based on GSM [25]. |

NOTE: Due to inconsistency in the definition of OMC ID between TS 25.413 and [24], it shall be ensured that the *OMC ID* IE is coded with at least the minimum number of octets required.

9.2.1.11 Integrity Protection Information

This element contains the integrity protection information (key and permitted algorithms).

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|---------|-------------------------------|--|
| Integrity Protection Information | | | | |
| >Permitted Integrity Protection Algorithms | | | | |
| >>Integrity Protection Algorithm | M | 1 to 16 | INTEGER (standard UIA1 (0)) | Value range is 0 to 15. Only one value used. |
| >Integrity Protection Key | M | | BIT STRING (128) | |

9.2.1.12 Encryption Information

This element contains the user data encryption information (key and permitted algorithms) used to control any encryption equipment at the RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|---------|---|---|
| Encryption Information | | | | |
| >Permitted Encryption Algorithms | | | | |
| >>Encryption Algorithm | M | 1 to 16 | INTEGER (no encryption (0), standard UEA1 (1)) | Value range is 0 to 15. Only two values used. |
| >Encryption Key | M | | Bit string (128) | |

9.2.1.13 Chosen Integrity Protection Algorithm

This element indicates the integrity protection algorithm being used by the RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------------|----------|-------|--|---|
| Chosen Integrity Protection Algorithm | M | | INTEGER (standard UIA1 (0), no value (15)) | Value range is 0 to 15. Only one value used. The value "no value" shall only be used in case of RANAP signalling over MAP/E [23]. |

9.2.1.14 Chosen Encryption Algorithm

This element indicates the encryption algorithm being used by the RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------|----------|-------|---|---|
| Chosen Encryption Algorithm | M | | INTEGER (no encryption (0), standard UEA1 (1)) | Value range is 0 to 15. Only two values used. |

9.2.1.15 Categorisation Parameters

Void.

9.2.1.16 Request Type

This element indicates the type of UE location to be reported from RNC and it is either a Service Area or Geographical Area.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------|----------|-------|---|--|
| Request Type | | | | |
| >Event | M | | ENUMERATED(Stop Change of service area, Direct, Change of service area, ..., Stop Direct) | |
| >Report Area | M | | ENUMERATED(Service Area, Geographical Area, ...) | When the Event IE is set to 'Stop Change of service area' or to "Stop Direct", the value of the Report area IE shall be the same as in the LOCATION REPORTING CONTROL message that initiated the location reporting. |
| >Accuracy Code | O | | INTEGER(0..127) | The requested accuracy "r" is derived from the "accuracy code" k by $r = 10 \times (1.1^k - 1)$. The Accuracy Code IE shall be understood as the horizontal accuracy code. |

9.2.1.17 Data Volume Reporting Indication

This information element indicates whether or not RNC has to calculate the unsuccessfully transmitted NAS data amount for the RAB and to report the amount of data when the RAB is released.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------------------|----------|-------|---------------------------------------|-----------------------|
| Data Volume Reporting Indication | M | | ENUMERATED (do report, do not report) | |

9.2.1.18 User Plane Mode

This element indicates the mode of operation of the Iu User plane requested for realising the RAB. The Iu User plane modes are defined in [6].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------|----------|-------|---|--|
| User Plane Mode | M | | ENUMERATED (transparent mode, support mode for predefined SDU sizes, ...) | This IE contains the mode of operation of the Iu UP protocol |

9.2.1.19 UP Mode Versions

UP mode versions IE is an information element that is sent by CN to RNC. It is a bit string that indicates the versions for the selected Iu UP mode that are required and supported by the CN. The Iu User plane mode versions shall be defined and coded as the "Iu UP Mode versions supported" field defined in [6]. This reference is applicable for both the transparent mode and the support mode for predefined SDU sizes.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------|----------|-------|-----------------------|--|
| UP Mode Versions | M | | BIT STRING (16) | Indicates the versions of the selected UP mode that are required and supported by the CN |

9.2.1.20 Chosen UP Version

Void.

9.2.1.21 Paging Area ID

This element uniquely identifies the area, where the PAGING message shall be broadcasted. The Paging area ID is either a Location Area ID or Routing Area ID.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------------|----------|-------|-----------------------|-----------------------|
| Choice Paging Area ID | | | | |
| >LAI | | | 9.2.3.6 | |
| >RAI | | | | |
| >>LAI | M | | 9.2.3.6 | |
| >>RAC | M | | 9.2.3.7 | |

9.2.1.22 Non Searching Indication

This parameter allows the RNC not to search Common ID when receiving a PAGING message from the CN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------|----------|-------|---------------------------------------|-----------------------|
| Non Searching Indication | M | | ENUMERATED (non-searching, searching) | |

9.2.1.23 Relocation Type

This information element indicates whether the relocation of SRNS is to be executed with or without involvement of the UE. If the UE is involved then a radio interface handover command shall be sent to the UE to trigger the execution of the relocation. If the UE is not involved then the relocation execution is triggered via Iur.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------|----------|-------|---|-----------------------|
| Relocation Type | M | | ENUMERATED (UE not involved in relocation of SRNS, UE involved in relocation of SRNS) | |

9.2.1.24 Source ID

Source ID IE identifies the source for the relocation of SRNS. The Source ID may be e.g. Source RNC-ID (for UMTS-UMTS relocation) or the SAI of the relocation source (in case of UMTS to GSM relocation).

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|-------------------------|--|
| Choice Source ID | | | | |
| > Source RNC-ID | – | | | |
| >>PLMN identity | M | | OCTET STRING (SIZE (3)) | - digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n -The PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC). |
| >>RNC-ID | M | | INTEGER (0..4095) | |
| >SAI | – | | 9.2.3.9 | |

9.2.1.25 Target ID

Target ID IE identifies the target for the relocation of SRNS. The target ID may be e.g. Target RNC-ID (for UMTS-UMTS relocation) or Cell Global ID of the relocation target (in case of UMTS to GSM relocation).

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|-----------------------|-----------------------|
| Choice Target ID | | | | |
| > Target RNC-ID | | | | |
| >>LAI | M | | 9.2.3.6 | |
| >>RAC | O | | 9.2.3.7 | |
| >>RNC-ID | M | | INTEGER (0..4095) | |
| > CGI | | | | |
| >>LAI | M | | 9.2.3.6 | |
| >>CI | M | | OCTET STRING (2) | |

9.2.1.26 MS Classmark 2

The coding of this element is described in [10].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|-----------------------|--------------------------|
| MS Classmark 2 | M | | OCTET STRING | Contents defined in [10] |

9.2.1.27 MS Classmark 3

The coding of this element is described in [10].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|-----------------------|--------------------------|
| MS Classmark 3 | M | | OCTET STRING | Contents defined in [10] |

9.2.1.28 Source RNC to Target RNC Transparent Container

Source RNC to Target RNC Transparent Container IE is an information element that is produced by source RNC and is transmitted to target RNC. In inter-system handover the IE is transmitted from external relocation source to target RNC.

This IE is transparent to CN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------------------------|---------------------|------------------------|------------------------|---|-------------|----------------------|
| RRC Container | M | | OCTET STRING | | - | - |
| Number of Iu Instances | M | | INTEGER (1..2) | | - | - |
| Relocation Type | M | | 9.2.1.23 | | - | - |
| Chosen Integrity Protection Algorithm | O | | 9.2.1.13 | Indicates the integrity protection algorithm. | - | - |
| Integrity Protection Key | O | | Bit String (128) | | - | - |
| Chosen Encryption Algorithm | O | | 9.2.1.14 | Indicates the algorithm for ciphering of signalling data. | - | - |
| Ciphering Key | O | | Bit String (128) | | - | - |
| Chosen Encryption Algorithm | O | | 9.2.1.14 | Indicates the algorithm for ciphering of CS user data. | - | - |
| Chosen Encryption Algorithm | O | | 9.2.1.14 | Indicates the algorithm for ciphering of PS user data. | - | - |
| d-RNTI | C - ifUEnotinvolved | | INTEGER (0..1048575) | | - | - |
| Target Cell ID | C - ifUEinvolved | | INTEGER (0..268435455) | This information element identifies a cell uniquely within UTRAN and consists of RNC-ID (12 bits) and C-ID (16 bits) as defined in TS 25.401 [3]. | - | - |
| RAB TrCH Mapping | O | 1 to <maxnoof RABs> | | | - | - |
| >RAB ID | M | | 9.2.1.2 | | - | - |
| >RAB Subflow | M | 1 to <maxRAB-Subflows> | | The RAB Subflows shall be presented in an order that corresponds to the order in which the RBs are presented per RAB in the RRC container included in this IE. | - | - |
| >> Transport Channel IDs | | | | | - | - |
| >>> DCH ID | O | | INTEGER (0..255) | The DCH ID is the identifier of an active dedicated transport channel. It is unique for each active DCH among the active DCHs simultaneously allocated for the same UE. | - | - |

| | | | | | | |
|-------------------------|---|--------------------|------------------|--|--------|--------|
| >>> DSCH ID | O | | INTEGER (0..255) | The DSCH ID is the identifier of an active downlink shared transport channel. It is unique for each DSCH among the active DSCHs simultaneously allocated for the same UE. | - | - |
| >>> USCH ID | O | | INTEGER (0..255) | The USCH ID is the identifier of an active uplink shared transport channel. It is unique for each USCH among the active USCHs simultaneously allocated for the same UE. | - | - |
| >CN Domain Indicator | M | | 9.2.1.5 | | YES | Ignore |
| SRB TrCH Mapping | O | 1 to <maxnoofSRBs> | | | GLOBAL | Reject |
| >SRB ID | M | | INTEGER (1..32) | The SRB ID is the absolute value of the SRB. | - | |
| >DCH ID | O | | INTEGER (0..255) | The DCH ID is the identifier of an active dedicated transport channel over Iur. It is unique for each active DCH among the active DCHs simultaneously allocated for the same UE. | - | |
| >DSCH ID | O | | INTEGER (0..255) | The DSCH ID is the identifier of an active downlink shared transport channel over Iur. It is unique for each DSCH among the active DSCHs simultaneously allocated for the same UE. | - | |
| >USCH ID | O | | INTEGER (0..255) | The USCH ID is the identifier of an active uplink shared transport channel over Iur. It is unique for each USCH among the active USCHs simultaneously allocated for the same UE. | - | |

| Condition | Explanation |
|-----------------|--|
| IfUEnotinvolved | This IE shall be present if the <i>Relocation type</i> IE is set to "UE not involved in relocation of SRNS". |
| IfUEinvolved | This IE shall be present if the <i>Relocation type</i> IE is set to "UE involved in relocation of SRNS". |

| Range bound | Explanation |
|----------------|---|
| maxnoofRABs | Maximum no. of RABs for one UE. Value is 256. |
| maxRABSubflows | Maximum no. of subflows per RAB. Value is 7. |
| maxnoofSRBs | Maximum no. of SRBs per RAB. Value is 8. |

9.2.1.29 Old BSS to New BSS Information

The coding of this element is described in [11].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------|----------|-------|-----------------------|--|
| Old BSS To New BSS Information | M | | OCTET STRING | Coded as the <i>Old BSS to New BSS information elements</i> field of the <i>Old BSS to New BSS Information</i> IE defined in [11]. |

9.2.1.30 Target RNC to Source RNC Transparent Container

Target RNC to Source RNC Transparent Container IE is an information element that is produced by target RNC and is transmitted to source RNC. In inter-system handover the IE is transmitted from target RNC to the external relocation source.

This IE is transparent to CN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|---|
| RRC Container | M | | OCTET STRING | |
| d-RNTI | O | | INTEGER (0..1048575) | May be included to allow the triggering of the Relocation Detect procedure from the Iur Interface |

9.2.1.31 L3 Information

The coding of this element is described in [11].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|-----------------------|---|
| L3 Information | M | | OCTET STRING | Coded as the value part of the <i>Layer 3 Information</i> IE defined in [11] (i.e. excluding the <i>Element Identifier</i> and the <i>Length</i> fields). |

9.2.1.32 Number of Steps

Indicates the number of steps to reduce traffic in overload situation.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------|----------|-------|-----------------------|-----------------------|
| Number Of Steps | M | | INTEGER (1..16) | |

9.2.1.33 DL N-PDU Sequence Number

This IE indicates the radio interface sequence number (PDCP) [17] of the next downlink N-PDU (PDCP SDU) that would have been sent to the UE by a source system.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------|----------|-------|-----------------------|--|
| DL N-PDU Sequence Number | M | | INTEGER (0..65535) | This IE indicates the sequence number of the next DL N-PDU that would have been sent to the UE by a source system. This is the 16 bit sequence number. |

9.2.1.34 UL N-PDU Sequence Number

This IE indicates the radio interface sequence number (PDCP) [17] of the next uplink N-PDU (PDCP SDU) that would have been expected from the UE by a source system.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------|----------|-------|-----------------------|--|
| UL N-PDU Sequence Number | M | | INTEGER (0..65535) | This IE indicates the sequence number of the next UL N-PDU that would have been expected from the UE by a source system. This is the 16 bit sequence number. |

9.2.1.35 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the RNC or the CN 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 that were not comprehended or were missing.

For further details on how to use the *Criticality Diagnostics* IE, see Annex A.2.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-----------------------|--|--|
| Criticality Diagnostics | | | | |
| >Procedure Code | O | | INTEGER (0..255) | Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error |
| >Triggering Message | O | | ENUMERATED (initiating message, successful outcome, unsuccessful outcome, outcome) | The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure. |
| >Procedure Criticality | O | | ENUMERATED (reject, ignore, notify) | This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure). |
| Information Element Criticality Diagnostics | | 0 to <maxnoof errors> | | |
| >IE Criticality | M | | ENUMERATED (reject, ignore, notify) | The IE Criticality is used for reporting the criticality of the triggering IE. The value 'ignore' shall not be used. |
| >IE ID | M | | INTEGER (0..65535) | The IE ID of the not understood or missing IE |
| >Repetition Number | O | | INTEGER (0..255) | <p>The <i>Repetition Number</i> IE gives</p> <ul style="list-style-type: none"> in case of a not understood IE: The number of occurrences of the reported IE up to and including the not understood occurrence in case of a missing IE: The number of occurrences up to but not including the missing occurrence. <p>Note: All the counted occurrences of the reported IE must have the same topdown hierarchical message structure of IEs with assigned criticality above them.</p> |
| >Message Structure | O | | 9.2.1.42 | <p>The <i>Message Structure</i> IE describes the structure where the not understood or missing IE was detected.</p> <p>This IE is included if the not understood IE is not the top level of the message.</p> |
| >Type of Error | M | | ENUMERATED (not understood, missing, ...) | |

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

9.2.1.36 Key Status

This IE tells if the keys included in SECURITY MODE COMMAND message are new or if they have been used previously.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|----------------------------|-----------------------|
| Key Status | M | | ENUMERATED (old, new, ...) | |

9.2.1.37 DRX Cycle Length Coefficient

This IE indicates the DRX cycle length coefficient (k) as defined in [10].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------------------|----------|-------|-----------------------|-----------------------|
| DRX Cycle Length Coefficient | M | | INTEGER (6..9) | |

9.2.1.38 Iu Signalling Connection Identifier

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------------|----------|-------|-----------------------|--|
| Iu Signalling Connection Identifier | M | | BIT STRING (SIZE(24)) | The most significant bit of this IE shall indicate the node, that has assigned the value. MSB = '0': assigned by the RNC MSB = '1': assigned by the CN |

9.2.1.39 Global RNC-ID

Global RNC-ID is used to globally identify an RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|-------|-------------------------|---|
| Global RNC-ID | | | | |
| >PLMN identity | M | | OCTET STRING (SIZE (3)) | - digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n -The PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC). |
| >RNC-ID | M | | INTEGER (0..4095) | |

9.2.1.40 PDP Type Information

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------|----------|-----------------------------|---|---|
| PDP Type Information | | | | |
| >PDP Type | M | 1 to <maxnoofPDPDirections> | ENUMERATED(empty, PPP, OSP:IHOSS, IPv4, IPv6,...) | PDP Type is defined in [8], and the restrictions on usage shall comply with [8]. Usage: When the IE is repeated then PDP Type for downlink is signalled first, followed by PDP Type for uplink; when the IE is not repeated, the PDP Type shall apply to both uplink and downlink. OSP:IHOSS: This value shall not be used. |

| Range bound | Explanation |
|----------------------|---|
| maxnoofPDPDirections | Number of directions for which PDP Type is signalled separately |

9.2.1.41 Service Handover

This IE tells if intersystem handover to GSM should, should not, or shall not be performed for the RAB in question.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|------------------|----------|-------|--|-----------------------|
| Service Handover | M | | ENUMERATED (Handover to GSM should be performed, Handover to GSM should not be performed, Handover to GSM shall not be performed, ...) | |

9.2.1.42 Message Structure

The *Message Structure* IE gives information for each level with assigned criticality in an hierarchical message structure from top level down to the lowest level above the reported level for the occurred error (reported in the *Information Element Criticality Diagnostics* IE).

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|--------------------------|----------|----------------------|-----------------------|--|-------------|----------------------|
| Message structure | | 1 to <maxnooflevels> | | The first repetition of the <i>Message Structure</i> IE corresponds to the top level of the message. The last repetition of the <i>Message Structure</i> IE corresponds to the level above the reported level for the occurred error of the message. | GLOBAL | ignore |
| >IE ID | M | | INTEGER (0..65535) | The IE ID of this level's IE containing the not understood or missing IE. | - | |
| >Repetition Number | O | | INTEGER (1..256) | The <i>Repetition Number</i> IE gives, if applicable, the number of occurrences of this level's reported IE up to and including the occurrence containing the not understood or missing IE. Note: All the counted occurrences of the reported IE must have the same topdown hierarchical message structure of IEs with assigned criticality above them. | - | |

| Range bound | Explanation |
|---------------|--|
| maxnooflevels | Maximum no. of message levels to report. The value for maxnooflevels is 256. |

9.2.1.43 Alternative RAB Parameter Values

The purpose of the *Alternative RAB Parameter Values* IE is to indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|--------------------------------------|--------------------------------------|--|--|
| Alternative RAB parameter values | | | | |
| >Alternative Maximum Bit Rate Information | O | | | Included only if negotiation is allowed for this IE. |
| >>Type of Alternative Maximum Bit Rate Information | M | | ENUMERATED (Unspecified, Value range, Discrete values) | Unspecified means that negotiation is allowed, but no alternative values are provided from the CN i.e. the RNC is allowed to assign any value equal or below the ones indicated in the <i>RAB Parameters</i> IE. |
| >>>Alternative Maximum Bit Rates | C - ifValueRangeorDiscreteValuesM BR | 1 to <nbr-Alternative Values> | | For Value Range, one value limit is given here and the other given by Maximum Bit Rate in the <i>RAB Parameters</i> IE. For Discrete Values, 1 to 16 discrete values can be given. |
| >>>Bit Rate | M | 1 to <nbr-SeparateTrafficDirections> | INTEGER (1..16,000,000) | When nbr-SeparateTrafficDirections is equal to 2, then the Bit Rate attribute for downlink is signalled first, then the Bit Rate attribute for uplink. |
| >Alternative Guaranteed Bit Rate Information | O | | | Included only if negotiation is allowed for this IE. |
| >>Type of Alternative Guaranteed Bit Rate Information | M | | ENUMERATED (Unspecified, Value range, Discrete values) | Unspecified means that negotiation is allowed, but no alternative values are provided from the CN i.e. the RNC is allowed to assign any value equal or below the ones indicated in the <i>RAB Parameters</i> IE. |
| >>>Alternative Guaranteed Bit Rates | C ifValueRangeorDiscreteValuesG BR | 1 to <nbr-Alternative Values> | | For Value Range, one value limit is given here and the other given by Guaranteed Bit Rate in the <i>RAB Parameters</i> IE. For Discrete Values, 1 to 16 discrete values can be given. |
| >>>Bit Rate | M | 1 to <nbr-SeparateTrafficDirections> | INTEGER (0..16,000,000) | When nbr-SeparateTrafficDirections is equal to 2, then the Bit Rate attribute for downlink is signalled first, then the Bit Rate attribute for uplink. |

| Range Bound | Explanation |
|------------------------------|---|
| nbr-AlternativeValues | Maximum number of alternative values. Value is 1 in case of Value Range and 16 in case of Discrete Values. |

| | |
|------------------------------|---|
| nbr-SeparateTrafficDirection | <p>Number of Traffic Directions being signalled separately.</p> <p>Set to 2 if RAB asymmetry indicator is asymmetric bidirectional.</p> <p>Set to 1 in all other cases.</p> |
|------------------------------|---|

| Condition | Explanation |
|---------------------------------|---|
| ifValueRangeorDiscreteValuesMBR | This IE shall be present if the <i>Type of Alternative Maximum Bit Rates Information</i> IE is set to "Value range" or "Discrete values". |
| ifValueRangeorDiscreteValuesGBR | This IE shall be present if the <i>Type of Guaranteed Bit Rates Information</i> IE is set to 'Value range' or 'Discrete values'. |

9.2.1.44 Assigned RAB Parameter Values

The purpose of the *Assigned RAB Parameter Values* IE is to indicate that RAB QoS negotiation has been performed for certain RAB parameters and which values that have been chosen.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------------|----------|--------------------------------------|-------------------------|--|
| Assigned RAB parameter values | | | | |
| >Assigned Maximum Bit Rate | O | 1 to <nbr-SeparateTrafficDirections> | INTEGER (1..16,000,000) | When nbr-SeparateTrafficDirections is equal to 2, then Assigned Maximum Bit Rate attribute for downlink is signalled first, then Assigned Maximum Bit Rate attribute for uplink. |
| >Assigned Guaranteed Bit Rate | O | 1 to <nbr-SeparateTrafficDirections> | INTEGER (0..16,000,000) | When nbr-SeparateTrafficDirections is equal to 2, then Assigned Guaranteed Bit Rate for downlink is signalled first, then Assigned Guaranteed Bit Rate for uplink. |

| Range Bound | Explanation |
|------------------------------|---|
| nbr-SeparateTrafficDirection | <p>Number of Traffic Directions being signalled separately.</p> <p>Set to 2 if RAB asymmetry indicator is asymmetric bidirectional.</p> <p>Set to 1 in all other cases.</p> |

9.2.1.45 Requested RAB Parameter Values

The purpose of *Requested RAB Parameter Values* IE is to indicate the RAB parameters for which different values are being requested, as well as those different RAB parameter values.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------------|----------|--------------------------------------|-------------------------|---|
| Requested RAB Parameter Values | | | | |
| >Requested Maximum Bit Rate | O | 0 to <nbr-SeparateTrafficDirections> | INTEGER (1..16,000,000) | When nbr-SeparateTrafficDirections is equal to 2, Requested Maximum Bit Rate attribute for downlink is signalled first, then Requested Maximum Bit Rate attribute for uplink. |
| >Requested Guaranteed Bit Rate | O | 0 to <nbr-SeparateTrafficDirections> | INTEGER (0..16,000,000) | When nbr-SeparateTrafficDirections is equal to 2, Requested Guaranteed Bit Rate for downlink is signalled first, then Requested Guaranteed Bit Rate for uplink. |

| Range bound | Explanation |
|------------------------------|--|
| nbr-SeparateTrafficDirection | Number of Traffic Directions being signalled separately. Set to 2 if RAB Asymmetry Indicator is asymmetric bidirectional. Set to 1 in all other cases. |

9.2.1.46 Global CN-ID

Global CN-ID is used to globally identify a CN node.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------|----------|-------|-------------------------|--|
| Global CN-ID | | | | |
| >PLMN identity | M | | OCTET STRING (SIZE (3)) | <ul style="list-style-type: none"> - 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 <p>-The PLMN identity consists of 3 digits from MCC followed by either</p> <ul style="list-style-type: none"> -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). |
| >CN-ID | M | | INTEGER (0..4095) | |

9.2.1.46a Vertical Accuracy Code

This element includes information about the requested vertical accuracy.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|-----------------------|---|
| Vertical Accuracy Code | | | | |
| >Vertical Accuracy Code | M | | INTEGER(0..127) | The requested accuracy "v" is derived from the "accuracy code" k by $v = 45 \times (1.025^k - 1)$. |

9.2.1.46b Response Time

This element includes information about the requested response time.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------|----------|-------|--|---------------------------|
| Response Time | | | | |
| >Response Time | M | | ENUMERATED (Low Delay, Delay Tolerant, ...) | The value refers to [26]. |

9.2.1.46c Positioning Priority

This element includes information about the requested positioning priority.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------|----------|-------|---|---------------------------|
| Positioning Priority | | | | |
| >Positioning Priority | M | | ENUMERATED(High Priority, Normal Priority, ...) | The value refers to [26]. |

9.2.1.46d Client Type

This element includes information about the client type.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------|----------|-------|---|--------------------------------|
| Client Type | | | | |
| >Client Type | M | | ENUMERATED(Emergency Services, Value Added Services, PLMN Operator Services, Lawful Intercept Services, PLMN Operator - broadcast services, PLMN Operator - O&M, PLMN Operator - anonymous statistics, PLMN Operator - Target MS service support, ...) | Identifies the type of client. |

9.2.2 Transport Network Layer Related IEs

9.2.2.1 Transport Layer Address

For the PS domain this information element is an IP address to be used for the user plane transport. For the CS domain this address is to be used for Transport Network Control Plane signalling to set up the transport bearer.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------|----------|-------|--------------------------|--|
| Transport Layer Address | M | | BIT STRING (1..160, ...) | The Radio Network layer is not supposed to interpret the address information. It should pass it to the transport layer for interpretation. For details on the Transport Layer Address, see ref. [9]. |

9.2.2.2 Iu Transport Association

This element is used to associate the RAB and the corresponding transport bearer. For the CS domain this information element is the Binding ID to be used in Transport Network Control Plane signalling during set up of the transport bearer. In PS domain this information element is the GTP Tunnel Endpoint Identifier.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------|----------|-------|-----------------------|-----------------------|
| Choice Iu Transport Association | | | | |
| >GTP TEID | | | OCTET STRING (4) | |
| >Binding ID | | | OCTET STRING (4) | |

9.2.2.3 DL GTP-PDU Sequence Number

This IE indicates the sequence number of the GTP-PDU which is the next to be sent to the UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------------|----------|-------|-----------------------|--|
| DL GTP-PDU Sequence Number | M | | INTEGER (0..65535) | This IE indicates the sequence number of the GTP-PDU which is next to be sent to the UE. |

9.2.2.4 UL GTP-PDU Sequence Number

This IE indicates the sequence number of the GTP-PDU which is the next to be sent to the SGSN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------------|----------|-------|-----------------------|--|
| UL GTP-PDU Sequence Number | M | | INTEGER (0..65535) | This IE indicates the sequence number of the GTP-PDU which is next to be sent to the SGSN. |

9.2.3 NAS Related IEs

9.2.3.1 Permanent NAS UE Identity

This element is used to identify the UE commonly in UTRAN and in CN. RNC uses it to find other existing signalling connections of this same UE (e.g. RRC or Iu signalling connections) Initially this is of the type of IMSI.

NOTE: IMSI is specified in the [19].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|----------------------------|--|
| Choice Permanent NAS UE Identity | | | | |
| >IMSI | M | | OCTET STRING (SIZE (3..8)) | <ul style="list-style-type: none"> - 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 <p>-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.</p> |

9.2.3.2 Temporary UE ID

Temporary Mobile Subscriber Identity, used for security reasons to hide the identity of a subscriber.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|-----------------------|-----------------------|
| Choice Temporary UE ID | | | | |
| >TMSI | | | OCTET STRING (4) | |
| >P-TMSI | | | OCTET STRING (4) | |

9.2.3.3 Paging Cause

This element indicates the cause of paging to the UE.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|---|-----------------------|
| Paging Cause | M | | ENUMERATED(Terminating Conversational Call, Terminating Streaming Call, Terminating Interactive Call, Terminating Background Call, Terminating Low Priority Signalling, ..., Terminating High Priority Signalling) | |

9.2.3.4 NAS Broadcast Information

Void

9.2.3.5 NAS PDU

This information element contains the CN – UE or UE – CN message that is transferred without interpretation in the RNC. Typically it contains call control, session management, supplementary services, short message service and mobility management messages.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|-----------------------|
| NAS PDU | M | | OCTET STRING | |

9.2.3.6 LAI

This element is used to uniquely identify a Location Area.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|-------------------------|--|
| LAI | | | | |
| >PLMN identity | M | | OCTET STRING (SIZE (3)) | <ul style="list-style-type: none"> - 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 <p>-The PLMN identity consists of 3 digits from MCC followed by either</p> <ul style="list-style-type: none"> -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). |
| >LAC | M | | OCTET STRING (2) | 0000 and FFFE not allowed. |

9.2.3.7 RAC

This element is used to identify a Routing Area within a Location Area. It is used for PS services.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|-----------------------|-----------------------|
| RAC | M | | OCTET STRING (1) | |

9.2.3.8 SAPI

The *SAPI* IE is used to indicate the specific service provided for the message.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------|----------|-------|----------------------------------|-----------------------|
| SAPI | M | | ENUMERATED (SAPI 0, SAPI 3, ...) | |

9.2.3.9 SAI

Service Area Identifier (SAI) IE information (see ref. [3]) is used to identify an area consisting of one or more cells belonging to the same Location Area. Such an area is called a Service Area and can be used for indicating the location of a UE to the CN. For this protocol, only a Service Area that is defined to be applicable to the PS and CS domains shall be used.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------|----------|-------|-------------------------|---|
| SAI | | | | |
| >PLMN identity | M | | OCTET STRING (SIZE (3)) | - digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n -The PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC). |
| >LAC | M | | OCTET STRING (2) | 0000 and FFFE not allowed. |
| >SAC | M | | OCTET STRING (2) | |

9.2.3.10 Area Identity

This information element is used for indicating the location of a UE and is either a Service Area or Geographical Area.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------------|----------|-------|-----------------------|-----------------------|
| Choice Area Identity | | | | |
| >SAI | | | 9.2.3.9 | |
| >Geographical Area | | | 9.2.3.11 | |

9.2.3.11 Geographical Area

Geographical Area IE is used to identify an area, as seen from the CN, using geographical coordinates. The reference system is the same as the one used in [20].

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|-----------------------|---|
| Choice Geographical Area | | | | |
| >Point | | | See below | Ellipsoid point |
| >Point With Uncertainty | | | See below | Ellipsoid point with uncertainty circle |
| >Polygon | | | See below | List of Ellipsoid points |
| >Ellipsoid point with uncertainty Ellipse | | | See below | Ellipsoid point with uncertainty Ellipse |
| >Ellipsoid point with altitude | | | See below | Ellipsoid point with altitude |
| >Ellipsoid point with altitude and uncertainty Ellipsoid | | | See below | Ellipsoid point with altitude and uncertainty Ellipsoid |
| >Ellipsoid Arc | | | See below | Ellipsoid Arc |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|-----------------------|-----------------------|
| Point | | | | |
| >Geographical Coordinates | M | | See below | |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|-----------------------|--|
| Point With Uncertainty | | | | |
| >Geographical Coordinates | M | | See below | |
| >Uncertainty Code | M | | INTEGER(0..127) | The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k - 1)$ |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|----------------------|-----------------------|-----------------------|
| Polygon | | | | |
| >Geographical Coordinates | M | 1 to <maxnoofPoints> | See below | |

| Range bound | Explanation |
|---------------|--|
| maxnoofPoints | Maximum no. of points in polygon. Value is 15. |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|-----------------------|-----------------------|
| Ellipsoid point with uncertainty Ellipse | | | | |
| >Geographical Coordinates | M | | See below | |
| >Uncertainty Ellipse | M | | See below | |
| >Confidence | M | | INTEGER(0..127) | |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------------|----------|-------|-----------------------|-----------------------|
| Ellipsoid point with altitude | | | | |
| >Geographical Coordinates | M | | See below | |
| >Altitude and direction | M | | See below | |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|-----------------------|-----------------------|
| Ellipsoid point with altitude and uncertainty Ellipsoid | | | | |
| >Geographical Coordinates | M | | See below | |
| >Altitude and direction | M | | See below | |
| >Uncertainty Ellipse | M | | See below | |
| >Uncertainty Altitude | M | | INTEGER(0..127) | |
| >Confidence | M | | INTEGER(0..127) | |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|---------------------------------|--|
| Ellipsoid Arc | | | | |
| >Geographical Coordinates | M | | See below | |
| >Inner radius | M | | INTEGER (0..2 ¹⁶ -1) | The relation between the value (N) and the radius (r) in meters it describes is $5N \leq r < 5(N+1)$, except for $N=2^{16}-1$ for which the range is extended to include all greater values of (r). |
| >Uncertainty radius | M | | INTEGER(0..127) | The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k-1)$ |
| >Offset angle | M | | INTEGER(0..179) | The relation between the value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$ |
| >Included angle | M | | INTEGER(0..179) | The relation between the value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$ |
| >Confidence | M | | INTEGER(0..127) | |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------------|----------|-------|---|--|
| Geographical Coordinates | | | | |
| >Latitude Sign | M | | ENUMERATED (North, South) | |
| >Degrees Of Latitude | M | | INTEGER (0..2 ²³ -1) | The IE value (N) is derived by this formula: $N \leq 2^{23} X / 90 < N+1$ X being the latitude in degree (0°.. 90°) |
| >Degrees Of Longitude | M | | INTEGER (-2 ²³ ..2 ²³ -1) | The IE value (N) is derived by this formula: $N \leq 2^{24} X / 360 < N+1$ X being the longitude in degree (-180°..+180°) |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|----------------------------|----------|-------|-----------------------|---|
| Uncertainty Ellipse | | | | |
| >Uncertainty semi-major | M | | INTEGER(0..127) | The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k - 1)$ |
| >Uncertainty semi-minor | M | | INTEGER(0..127) | The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k - 1)$ |
| >Orientation of major axis | M | | INTEGER(0..179) | The relation between the IE value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$. The values 90..179 shall not be used. |

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|----------------------------|--|
| Altitude and direction | | | | |
| >Direction of Altitude | M | | ENUMERATED (Height, Depth) | |
| >Altitude | M | | INTEGER (0.. $2^{15}-1$) | The relation between the value (N) and the altitude (a) in meters it describes is $N \leq a < N+1$, except for $N=2^{15}-1$ for which the range is extended to include all greater values of (a). |

9.2.3.12 Unsuccessfully Transmitted Data Volume

This information element indicates the data volume (octets) that is unsuccessfully transmitted over the radio interface in DL direction for the RAB.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--|----------|-------|---------------------------|-----------------------|
| Unsuccessfully Transmitted Data Volume | M | | INTEGER (0.. $2^{32}-1$) | Unit is octet. |

9.2.3.13 Data Volume Reference

This information element indicates the time when the data volume is counted.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------|----------|-------|-----------------------|-----------------------|
| Data Volume Reference | M | | INTEGER (0..255) | |

9.2.3.14 Information Identity

Void

9.2.3.15 Information Priority

Void

9.2.3.16 Information Control

Void

9.2.3.17 CN Broadcast Area

Void

9.2.3.18 NAS Synchronisation Indicator

This information element contains transparent NAS information that is transferred without interpretation in the RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|-----------------------|-----------------------|
| NAS Synchronisation Indicator | M | | BIT STRING (4) | |

9.2.3.19 Location Related Data Request Type

This element indicates the type of the requested location related data for the indicated positioning method, and provides the assistance data for the Assisted GPS positioning method.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|-----------------|-------|---|-----------------------|
| Location Related Data Request Type | | | | |
| >Requested Location Related Data Type | M | | ENUMERATED(Deciphering Keys for UE Based OTDOA, Deciphering Keys for Assisted GPS, Dedicated Assistance Data for UE Based OTDOA, Dedicated Assistance Data for Assisted GPS, ...) | |
| >Requested GPS Assistance Data | C – ifDedAssGPS | | 9.2.3.21 | |

| Condition | Explanation |
|-------------|--|
| ifDedAssGPS | This IE shall be present if the <i>Requested Location Related Data Type</i> IE is set to "Dedicated Assistance Data for Assisted GPS". |

9.2.3.20 Broadcast Assistance Data Deciphering keys

This information element is used for indicating the deciphering keys that will be used by the UE for deciphering of assistance data broadcast.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---|----------|-------|-----------------------|--|
| Broadcast Assistance Data Deciphering keys | | | | |
| > Ciphering Key Flag | M | | BIT STRING (SIZE(1)) | Indicates the current Ciphering Key Flag that is used for the assistance data broadcast messages in the location area. |
| >Current Deciphering key | M | | BIT STRING (SIZE(56)) | Current deciphering key that is used for deciphering assistance data. |
| >Next Deciphering key | M | | BIT STRING (SIZE(56)) | Next deciphering key that will be used for deciphering assistance data. |

9.2.3.21 Requested GPS Assistance Data

This information element is used for indicating the requested GPS assistance data.

This IE is transparent to CN.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-------------------------------|----------|-------|----------------------------|--|
| Requested GPS Assistance Data | | | OCTET STRING (SIZE(1..38)) | For the corresponding Information Element Definition see 'gpsAssistanceData' [22]. |

9.2.3.22 Last Known Service Area

This information element is used for indicating the last known Service Area and the elapsed time since the UE was known to be in this Service Area. The last known Service Area is reported when the current Service Area is unknown to the RNC.

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|--------------------------------|----------|-------|-----------------------|---|
| Last Known Service Area | | | | |
| >SAI | M | | 9.2.3.9 | |
| >Age of SAI | M | | INTEGER (0..32767) | The value represents the elapsed time in minutes since the reported last known SAI was stored by the RNC. Value '0' shall not be used. Value '32767' indicates that the age of SAI is at least 32767 minutes old. |

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

9.3.0 General

RANAP ASN.1 definition conforms with [14] and [15].

The ASN.1 definition specifies the structure and content of RANAP messages. RANAP 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 RANAP message according to the PDU definitions module and with the following additional rules (Note that in the following IE means an IE in the object set with an explicit id. If one IE needed to appear more than once in one object set, then the different occurrences have different IE ids):

- 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.

If a RANAP 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 RANAP protocol with ASN.1. In case there is contradiction between the ASN.1 definition in this subclause and the tabular format in subclause 9.1 and 9.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.

9.3.1 Usage of private message mechanism for non-standard use

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

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

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

9.3.2 Elementary Procedure Definitions

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

```
-- *****
RANAP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-PDU-Descriptions (0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    ProcedureCode
FROM RANAP-CommonDataTypes

    Iu-ReleaseCommand,
    Iu-ReleaseComplete,
    RelocationCommand,
    RelocationPreparationFailure,
    RelocationRequired,
    RelocationRequest,
    RelocationRequestAcknowledge,
    RelocationFailure,
    RelocationCancel,
    RelocationCancelAcknowledge,
    SRNS-ContextRequest,
    SRNS-ContextResponse,
    SecurityModeCommand,
    SecurityModeComplete,
    SecurityModeReject,
    DataVolumeReportRequest,
    DataVolumeReport,
    Reset,
    ResetAcknowledge,
    RAB-ReleaseRequest,
    Iu-ReleaseRequest,
    RelocationDetect,
    RelocationComplete,
    Paging,
    CommonID,
    CN-InvokeTrace,
    CN-DeactivateTrace,
    LocationReportingControl,
    LocationReport,
    InitialUE-Message,
    DirectTransfer,
    Overload,
    ErrorIndication,
```



```

SRNS-DataForwardCommand,
ForwardSRNS-Context,
RAB-AssignmentRequest,
RAB-AssignmentResponse,
RAB-ModifyRequest,
PrivateMessage,
ResetResource,
ResetResourceAcknowledge,
RANAP-RelocationInformation,
LocationRelatedDataRequest,
LocationRelatedDataResponse,
LocationRelatedDataFailure
FROM RANAP-PDU-Contents

id-LocationRelatedData,
id-CN-DeactivateTrace,
id-CN-InvokeTrace,
id-CommonID,
id-DataVolumeReport,
id-DirectTransfer,
id-ErrorIndication,
id-ForwardSRNS-Context,
id-InitialUE-Message,
id-Iu-Release,
id-Iu-ReleaseRequest,
id-LocationReport,
id-LocationReportingControl,
id-OverloadControl,
id-Paging,
id-privateMessage,
id-RAB-Assignment,
id-RAB-ReleaseRequest,
id-RAB-ModifyRequest,
id-RANAP-Relocation,
id-RelocationCancel,
id-RelocationComplete,
id-RelocationDetect,
id-RelocationPreparation,
id-RelocationResourceAllocation,
id-Reset,
id-SRNS-ContextTransfer,
id-SRNS-DataForward,
id-SecurityModeControl,
id-ResetResource
FROM RANAP-Constants;

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

RANAP-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage

```

```

    &SuccessfulOutcome          OPTIONAL,
    &UnsuccessfulOutcome        OPTIONAL,
    &Outcome                     OPTIONAL,
    &procedureCode               ProcedureCode  UNIQUE,
    &criticality                 Criticality    DEFAULT ignore
}
WITH SYNTAX {
  INITIATING MESSAGE      &InitiatingMessage
  [SUCCESSFUL OUTCOME    &SuccessfulOutcome]
  [UNSUCCESSFUL OUTCOME  &UnsuccessfulOutcome]
  [OUTCOME                &Outcome]
  PROCEDURE CODE         &procedureCode
  [CRITICALITY           &criticality]
}

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

RANAP-PDU ::= CHOICE {
  initiatingMessage  InitiatingMessage,
  successfulOutcome  SuccessfulOutcome,
  unsuccessfulOutcome UnsuccessfulOutcome,
  outcome            Outcome,
  ...
}

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

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

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

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

-- *****

```

```

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

RANAP-ELEMENTARY-PROCEDURES RANAP-ELEMENTARY-PROCEDURE ::= {
    RANAP-ELEMENTARY-PROCEDURES-CLASS-1 |
    RANAP-ELEMENTARY-PROCEDURES-CLASS-2 |
    RANAP-ELEMENTARY-PROCEDURES-CLASS-3 ,
    ...
}

RANAP-ELEMENTARY-PROCEDURES-CLASS-1 RANAP-ELEMENTARY-PROCEDURE ::= {
    iu-Release |
    relocationPreparation |
    relocationResourceAllocation |
    relocationCancel |
    sRNS-ContextTransfer |
    securityModeControl |
    dataVolumeReport |
    reset |
    resetResource ,
    ... ,
    locationRelatedData
}

RANAP-ELEMENTARY-PROCEDURES-CLASS-2 RANAP-ELEMENTARY-PROCEDURE ::= {
    rAB-ReleaseRequest |
    iu-ReleaseRequest |
    relocationDetect |
    relocationComplete |
    paging |
    commonID |
    cN-InvokeTrace |
    cN-DeactivateTrace |
    locationReportingControl |
    locationReport |
    initialUE-Message |
    directTransfer |
    overloadControl |
    errorIndication |
    sRNS-DataForward |
    forwardSRNS-Context |
    privateMessage |
    rANAP-Relocation ,
    ... ,
    rAB-ModifyRequest
}

RANAP-ELEMENTARY-PROCEDURES-CLASS-3 RANAP-ELEMENTARY-PROCEDURE ::= {
    rAB-Assignment ,
    ...
}

```

```
-- *****  
--  
-- Interface Elementary Procedures  
--  
-- *****  
  
iu-Release RANAP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE    Iu-ReleaseCommand  
    SUCCESSFUL OUTCOME    Iu-ReleaseComplete  
    PROCEDURE CODE        id-Iu-Release  
    CRITICALITY           reject  
}  
  
relocationPreparation RANAP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE    RelocationRequired  
    SUCCESSFUL OUTCOME    RelocationCommand  
    UNSUCCESSFUL OUTCOME  RelocationPreparationFailure  
    PROCEDURE CODE        id-RelocationPreparation  
    CRITICALITY           reject  
}  
  
relocationResourceAllocation RANAP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE    RelocationRequest  
    SUCCESSFUL OUTCOME    RelocationRequestAcknowledge  
    UNSUCCESSFUL OUTCOME  RelocationFailure  
    PROCEDURE CODE        id-RelocationResourceAllocation  
    CRITICALITY           reject  
}  
  
relocationCancel RANAP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE    RelocationCancel  
    SUCCESSFUL OUTCOME    RelocationCancelAcknowledge  
    PROCEDURE CODE        id-RelocationCancel  
    CRITICALITY           reject  
}  
  
srns-ContextTransfer RANAP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE    SRNS-ContextRequest  
    SUCCESSFUL OUTCOME    SRNS-ContextResponse  
    PROCEDURE CODE        id-SRNS-ContextTransfer  
    CRITICALITY           reject  
}  
  
securityModeControl RANAP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE    SecurityModeCommand  
    SUCCESSFUL OUTCOME    SecurityModeComplete  
    UNSUCCESSFUL OUTCOME  SecurityModeReject  
    PROCEDURE CODE        id-SecurityModeControl  
    CRITICALITY           reject  
}  
  
dataVolumeReport RANAP-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE    DataVolumeReportRequest
```

```
SUCCESSFUL OUTCOME  DataVolumeReport
PROCEDURE CODE      id-DataVolumeReport
CRITICALITY         reject
}

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

rAB-ReleaseRequest RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  RAB-ReleaseRequest
  PROCEDURE CODE      id-RAB-ReleaseRequest
  CRITICALITY         ignore
}

iu-ReleaseRequest RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  Iu-ReleaseRequest
  PROCEDURE CODE      id-Iu-ReleaseRequest
  CRITICALITY         ignore
}

relocationDetect RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  RelocationDetect
  PROCEDURE CODE      id-RelocationDetect
  CRITICALITY         ignore
}

relocationComplete RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  RelocationComplete
  PROCEDURE CODE      id-RelocationComplete
  CRITICALITY         ignore
}

paging RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  Paging
  PROCEDURE CODE      id-Paging
  CRITICALITY         ignore
}

commonID RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  CommonID
  PROCEDURE CODE      id-CommonID
  CRITICALITY         ignore
}

cN-InvokeTrace RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  CN-InvokeTrace
  PROCEDURE CODE      id-CN-InvokeTrace
  CRITICALITY         ignore
}
```

```
cN-DeactivateTrace RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  CN-DeactivateTrace
  PROCEDURE CODE      id-CN-DeactivateTrace
  CRITICALITY         ignore
}

locationReportingControl RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  LocationReportingControl
  PROCEDURE CODE      id-LocationReportingControl
  CRITICALITY         ignore
}

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

initialUE-Message RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  InitialUE-Message
  PROCEDURE CODE      id-InitialUE-Message
  CRITICALITY         ignore
}

directTransfer RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  DirectTransfer
  PROCEDURE CODE      id-DirectTransfer
  CRITICALITY         ignore
}

overloadControl RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  Overload
  PROCEDURE CODE      id-OverloadControl
  CRITICALITY         ignore
}

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

srns-DataForward RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  SRNS-DataForwardCommand
  PROCEDURE CODE      id-SRNS-DataForward
  CRITICALITY         ignore
}

forwardSRNS-Context RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  ForwardSRNS-Context
  PROCEDURE CODE      id-ForwardSRNS-Context
  CRITICALITY         ignore
}
```

```

rAB-Assignment RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  RAB-AssignmentRequest
  OUTCOME             RAB-AssignmentResponse
  PROCEDURE CODE      id-RAB-Assignment
  CRITICALITY         reject
}

privateMessage RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  PrivateMessage

  PROCEDURE CODE      id-privateMessage
  CRITICALITY         ignore
}

resetResource RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  ResetResource
  SUCCESSFUL OUTCOME  ResetResourceAcknowledge
  PROCEDURE CODE      id-ResetResource
  CRITICALITY         reject
}

rANAP-Relocation RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  RANAP-RelocationInformation
  PROCEDURE CODE      id-RANAP-Relocation
  CRITICALITY         ignore
}

rAB-ModifyRequest RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  RAB-ModifyRequest
  PROCEDURE CODE      id-RAB-ModifyRequest
  CRITICALITY         ignore
}

locationRelatedData RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE      LocationRelatedDataRequest
  SUCCESSFUL OUTCOME      LocationRelatedDataResponse
  UNSUCCESSFUL OUTCOME    LocationRelatedDataFailure
  PROCEDURE CODE          id-LocationRelatedData
  CRITICALITY             reject
}

END

```

9.3.3 PDU Definitions

```

-- *****
--
-- PDU definitions for RANAP.
--
-- *****

RANAP-PDU-Contents {

```

```
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-PDU-Contents (1) }
```

```
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN
```

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

```
IMPORTS
```

```
BroadcastAssistanceDataDecipheringKeys,
LocationRelatedDataRequestType,
DataVolumeReference,
AreaIdentity,
CN-DomainIndicator,
Cause,
ClientType,
CriticalityDiagnostics,
ChosenEncryptionAlgorithm,
ChosenIntegrityProtectionAlgorithm,
ClassmarkInformation2,
ClassmarkInformation3,
DL-GTP-PDU-SequenceNumber,
DL-N-PDU-SequenceNumber,
DataVolumeReportingIndication,
DRX-CycleLengthCoefficient,
EncryptionInformation,
GlobalCN-ID,
GlobalRNC-ID,
IntegrityProtectionInformation,
IuSignallingConnectionIdentifier,
IuTransportAssociation,
KeyStatus,
L3-Information,
LAI,
LastKnownServiceArea,
NAS-PDU,
NAS-SynchronisationIndicator,
NonSearchingIndication,
NumberOfSteps,
OMC-ID,
OldBSS-ToNewBSS-Information,
PagingAreaID,
PagingCause,
PDP-TypeInformation,
PermanentNAS-UE-ID,
PositioningPriority,
RAB-ID,
RAB-Parameters,
RAC,
```



```
RelocationType,  
RequestType,  
Requested-RAB-Parameter-Values,  
ResponseTime,  
SAI,  
SAPI,  
Service-Handover,  
SourceID,  
SourceRNC-ToTargetRNC-TransparentContainer,  
TargetID,  
TargetRNC-ToSourceRNC-TransparentContainer,  
TemporaryUE-ID,  
TraceReference,  
TraceType,  
UnsuccessfullyTransmittedDataVolume,  
TransportLayerAddress,  
TriggerID,  
UE-ID,  
UL-GTP-PDU-SequenceNumber,  
UL-N-PDU-SequenceNumber,  
UP-ModeVersions,  
UserPlaneMode,  
VerticalAccuracyCode,  
Alt-RAB-Parameters,  
Ass-RAB-Parameters  
FROM RANAP-IEs
```

```
PrivateIE-Container{},  
ProtocolExtensionContainer{},  
ProtocolIE-ContainerList{},  
ProtocolIE-ContainerPair{},  
ProtocolIE-ContainerPairList{},  
ProtocolIE-Container{},  
RANAP-PRIVATE-IES,  
RANAP-PROTOCOL-EXTENSION,  
RANAP-PROTOCOL-IES,  
RANAP-PROTOCOL-IES-PAIR  
FROM RANAP-Containers
```

```
maxNrOfDTs,  
maxNrOfErrors,  
maxNrOfIuSigConIds,  
maxNrOfRABs,  
maxNrOfVol,  
  
id-AreaIdentity,  
id-Alt-RAB-Parameters,  
id-Ass-RAB-Parameters,  
id-BroadcastAssistanceDataDecipheringKeys,  
id-LocationRelatedDataRequestType,  
id-CN-DomainIndicator,  
id-Cause,  
id-ChosenEncryptionAlgorithm,
```

id-ChosenIntegrityProtectionAlgorithm,
id-ClassmarkInformation2,
id-ClassmarkInformation3,
id-ClientType,
id-CriticalityDiagnostics,
id-DRX-CycleLengthCoefficient,
id-DirectTransferInformationItem-RANAP-RelocInf,
id-DirectTransferInformationList-RANAP-RelocInf,
id-DL-GTP-PDU-SequenceNumber,
id-EncryptionInformation,
id-GlobalCN-ID,
id-GlobalRNC-ID,
id-IntegrityProtectionInformation,
id-IuSigConId,
id-IuSigConIdItem,
id-IuSigConIdList,
id-IuTransportAssociation,
id-KeyStatus,
id-L3-Information,
id-LAI,
id-LastKnownServiceArea,
id-NAS-PDU,
id-NonSearchingIndication,
id-NumberOfSteps,
id-OMC-ID,
id-OldBSS-ToNewBSS-Information,
id-PagingAreaID,
id-PagingCause,
id-PermanentNAS-UE-ID,
id-PositioningPriority,
id-RAB-ContextItem,
id-RAB-ContextList,
id-RAB-ContextFailedtoTransferItem,
id-RAB-ContextFailedtoTransferList,
id-RAB-ContextItem-RANAP-RelocInf,
id-RAB-ContextList-RANAP-RelocInf,
id-RAB-DataForwardingItem,
id-RAB-DataForwardingItem-SRNS-CtxReq,
id-RAB-DataForwardingList,
id-RAB-DataForwardingList-SRNS-CtxReq,
id-RAB-DataVolumeReportItem,
id-RAB-DataVolumeReportList,
id-RAB-DataVolumeReportRequestItem,
id-RAB-DataVolumeReportRequestList,
id-RAB-FailedItem,
id-RAB-FailedList,
id-RAB-FailedtoReportItem,
id-RAB-FailedtoReportList,
id-RAB-ID,
id-RAB-ModifyList,
id-RAB-ModifyItem,
id-RAB-QueuedItem,
id-RAB-QueuedList,
id-RAB-ReleaseFailedList,

```

id-RAB-ReleaseItem,
id-RAB-ReleasedItem-IuRelComp,
id-RAB-ReleaseList,
id-RAB-ReleasedItem,
id-RAB-ReleasedList,
id-RAB-ReleasedList-IuRelComp,
id-RAB-RelocationReleaseItem,
id-RAB-RelocationReleaseList,
id-RAB-SetupItem-RelocReq,
id-RAB-SetupItem-RelocReqAck,
id-RAB-SetupList-RelocReq,
id-RAB-SetupList-RelocReqAck,
id-RAB-SetupOrModifiedItem,
id-RAB-SetupOrModifiedList,
id-RAB-SetupOrModifyItem,
id-RAB-SetupOrModifyList,
id-RAC,
id-RelocationType,
id-RequestType,
id-ResponseTime,
id-SAI,
id-SAPI,
id-SourceID,
id-SourceRNC-ToTargetRNC-TransparentContainer,
id-TargetID,
id-TargetRNC-ToSourceRNC-TransparentContainer,
id-TemporaryUE-ID,
id-TraceReference,
id-TraceType,
id-TransportLayerAddress,
id-TriggerID,
id-UE-ID,
id-UL-GTP-PDU-SequenceNumber,
id-VerticalAccuracyCode
FROM RANAP-Constants;

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

RAB-IE-ContainerList          { RANAP-PROTOCOL-IES      : IEsSetParam } ::= ProtocolIE-ContainerList   { 1, maxNrOfRABs,   {IEsSetParam} }
}
RAB-IE-ContainerPairList     { RANAP-PROTOCOL-IES-PAIR : IEsSetParam } ::= ProtocolIE-ContainerPairList { 1, maxNrOfRABs,   {IEsSetParam} }
}
ProtocolError-IE-ContainerList { RANAP-PROTOCOL-IES      : IEsSetParam } ::= ProtocolIE-ContainerList   { 1, maxNrOfRABs,   {IEsSetParam} }
}
IuSigConId-IE-ContainerList  { RANAP-PROTOCOL-IES      : IEsSetParam } ::= ProtocolIE-ContainerList   { 1, maxNrOfIuSigConIds,
{IEsSetParam} } }
DirectTransfer-IE-ContainerList { RANAP-PROTOCOL-IES      : IEsSetParam } ::= ProtocolIE-ContainerList   { 1, maxNrOfDTs,     {IEsSetParam} }

-- *****
--

```

```

-- Iu RELEASE ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Iu Release Command
--
-- *****

Iu-ReleaseCommand ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {Iu-ReleaseCommandIEs} },
    protocolExtensions   ProtocolExtensionContainer { {Iu-ReleaseCommandExtensions} }          OPTIONAL,
    ...
}

Iu-ReleaseCommandIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE mandatory },
    ...
}

Iu-ReleaseCommandExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Iu Release Complete
--
-- *****

Iu-ReleaseComplete ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {Iu-ReleaseCompleteIEs} },
    protocolExtensions   ProtocolExtensionContainer { {Iu-ReleaseCompleteExtensions} }          OPTIONAL,
    ...
}

Iu-ReleaseCompleteIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataVolumeReportList      CRITICALITY ignore TYPE RAB-DataVolumeReportList      PRESENCE optional } |
    { ID id-RAB-ReleasedList-IuRelComp    CRITICALITY ignore TYPE RAB-ReleasedList-IuRelComp    PRESENCE optional } |
    { ID id-CriticalityDiagnostics        CRITICALITY ignore TYPE CriticalityDiagnostics        PRESENCE optional },
    ...
}

RAB-DataVolumeReportList ::= RAB-IE-ContainerList { {RAB-DataVolumeReportItemIEs} }

RAB-DataVolumeReportItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataVolumeReportItem      CRITICALITY ignore TYPE RAB-DataVolumeReportItem      PRESENCE mandatory },
    ...
}

RAB-DataVolumeReportItem ::= SEQUENCE {
    rAB-ID          RAB-ID,
    dl-UnsuccessfullyTransmittedDataVolume DataVolumeList          OPTIONAL
}

```

```

-- This IE shall always be present although its presence is optional --,
iE-Extensions          ProtocolExtensionContainer { {RAB-DataVolumeReportItem-ExtIEs} }    OPTIONAL,
...
}

RAB-DataVolumeReportItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
...
}

RAB-ReleasedList-IuRelComp          ::= RAB-IE-ContainerList { {RAB-ReleasedItem-IuRelComp-IEs} }

RAB-ReleasedItem-IuRelComp-IEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ReleasedItem-IuRelComp          CRITICALITY ignore  TYPE RAB-ReleasedItem-IuRelComp          PRESENCE mandatory  },
  ...
}

RAB-ReleasedItem-IuRelComp ::= SEQUENCE {
  rAB-ID          RAB-ID,
  dL-GTP-PDU-SequenceNumber  DL-GTP-PDU-SequenceNumber  OPTIONAL,
  uL-GTP-PDU-SequenceNumber  UL-GTP-PDU-SequenceNumber  OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { {RAB-ReleasedItem-IuRelComp-ExtIEs} }    OPTIONAL,
  ...
}

RAB-ReleasedItem-IuRelComp-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
...
}

Iu-ReleaseCompleteExtensions RANAP-PROTOCOL-EXTENSION ::= {
...
}

-- *****
--
-- RELOCATION PREPARATION ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Relocation Required
--
-- *****

RelocationRequired ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container          { {RelocationRequiredIEs} },
  protocolExtensions          ProtocolExtensionContainer { {RelocationRequiredExtensions} }    OPTIONAL,
  ...
}

RelocationRequiredIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RelocationType          CRITICALITY reject  TYPE RelocationType          PRESENCE mandatory  } |
  { ID id-Cause          CRITICALITY ignore  TYPE Cause          PRESENCE mandatory  } |

```

```

{ ID id-SourceID          CRITICALITY ignore  TYPE SourceID          PRESENCE mandatory } |
{ ID id-TargetID         CRITICALITY reject  TYPE TargetID          PRESENCE mandatory } |
{ ID id-ClassmarkInformation2 CRITICALITY reject  TYPE ClassmarkInformation2 PRESENCE conditional
-- This IE shall be present if the Target ID IE contains a CGI IE -- } |
{ ID id-ClassmarkInformation3 CRITICALITY ignore  TYPE ClassmarkInformation3 PRESENCE conditional
-- This IE shall be present if the Target ID IE contains a CGI IE -- } |
{ ID id-SourceRNC-ToTargetRNC-TransparentContainer
          CRITICALITY reject  TYPE SourceRNC-ToTargetRNC-TransparentContainer PRESENCE conditional
-- This IE shall be present if the Target ID IE contains a RNC-ID IE -- } |
{ ID id-OldBSS-ToNewBSS-Information CRITICALITY ignore  TYPE OldBSS-ToNewBSS-Information PRESENCE optional } ,
...
}

RelocationRequiredExtensions RANAP-PROTOCOL-EXTENSION ::= {
...
}

-- *****
--
-- Relocation Command
--
-- *****

RelocationCommand ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container          { {RelocationCommandIEs} },
  protocolExtensions  ProtocolExtensionContainer { {RelocationCommandExtensions} }          OPTIONAL,
  ...
}

RelocationCommandIEs RANAP-PROTOCOL-IES ::= {
  { ID id-TargetRNC-ToSourceRNC-TransparentContainer
          CRITICALITY reject  TYPE TargetRNC-ToSourceRNC-TransparentContainer PRESENCE optional } |
  { ID id-L3-Information          CRITICALITY ignore  TYPE L3-Information          PRESENCE optional } |
  { ID id-RAB-RelocationReleaseList CRITICALITY ignore  TYPE RAB-RelocationReleaseList PRESENCE optional } |
  { ID id-RAB-DataForwardingList CRITICALITY ignore  TYPE RAB-DataForwardingList PRESENCE optional } |
  { ID id-CriticalityDiagnostics CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional },
  ...
}

RAB-RelocationReleaseList ::= RAB-IE-ContainerList { {RAB-RelocationReleaseItemIEs} }

RAB-RelocationReleaseItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-RelocationReleaseItem CRITICALITY ignore  TYPE RAB-RelocationReleaseItem PRESENCE mandatory } ,
  ...
}

RAB-RelocationReleaseItem ::= SEQUENCE {
  rAB-ID          RAB-ID,
  iE-Extensions  ProtocolExtensionContainer { {RAB-RelocationReleaseItem-ExtIEs} }          OPTIONAL,
  ...
}

RAB-RelocationReleaseItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
...
}

```

```

}
RAB-DataForwardingList ::= RAB-IE-ContainerList { {RAB-DataForwardingItemIEs} }
RAB-DataForwardingItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-DataForwardingItem          CRITICALITY ignore  TYPE RAB-DataForwardingItem          PRESENCE mandatory  },
  ...
}
RAB-DataForwardingItem ::= SEQUENCE {
  rAB-ID                RAB-ID,
  transportLayerAddress TransportLayerAddress,
  iuTransportAssociation IuTransportAssociation,
  iE-Extensions         ProtocolExtensionContainer { {RAB-DataForwardingItem-ExtIEs} }          OPTIONAL,
  ...
}
RAB-DataForwardingItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}
RelocationCommandExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}
-- *****
--
-- Relocation Preparation Failure
--
-- *****

RelocationPreparationFailure ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container { {RelocationPreparationFailureIEs} },
  protocolExtensions   ProtocolExtensionContainer { {RelocationPreparationFailureExtensions} }          OPTIONAL,
  ...
}
RelocationPreparationFailureIEs RANAP-PROTOCOL-IES ::= {
  { ID id-Cause          CRITICALITY ignore  TYPE Cause          PRESENCE mandatory } |
  { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics          PRESENCE optional },
  ...
}
RelocationPreparationFailureExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}
-- *****
--
-- RELOCATION RESOURCE ALLOCATION ELEMENTARY PROCEDURE
--
-- *****
-- *****

```

```

--
-- Relocation Request
--
-- *****
RelocationRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {RelocationRequestIEs} },
    protocolExtensions   ProtocolExtensionContainer { {RelocationRequestExtensions} }          OPTIONAL,
    ...
}

RelocationRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-PermanentNAS-UE-ID          CRITICALITY ignore TYPE PermanentNAS-UE-ID          PRESENCE optional } |
    { ID id-Cause                        CRITICALITY ignore TYPE Cause                    PRESENCE mandatory } |
    { ID id-CN-DomainIndicator           CRITICALITY reject TYPE CN-DomainIndicator       PRESENCE mandatory } |
    { ID id-SourceRNC-ToTargetRNC-TransparentContainer
      CRITICALITY reject TYPE SourceRNC-ToTargetRNC-TransparentContainer PRESENCE mandatory } |
    { ID id-RAB-SetupList-RelocReq       CRITICALITY reject TYPE RAB-SetupList-RelocReq       PRESENCE optional } |
    { ID id-IntegrityProtectionInformation
      CRITICALITY ignore TYPE IntegrityProtectionInformation PRESENCE optional } |
    { ID id-EncryptionInformation        CRITICALITY ignore TYPE EncryptionInformation        PRESENCE optional } |
    { ID id-IuSigConId                   CRITICALITY ignore TYPE IuSignallingConnectionIdentifier PRESENCE mandatory },
    ...
}

RAB-SetupList-RelocReq ::= RAB-IE-ContainerList { {RAB-SetupItem-RelocReq-IEs} }

RAB-SetupItem-RelocReq-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-SetupItem-RelocReq       CRITICALITY reject TYPE RAB-SetupItem-RelocReq       PRESENCE mandatory },
    ...
}

RAB-SetupItem-RelocReq ::= SEQUENCE {
    rAB-ID                RAB-ID,
    nAS-SynchronisationIndicator   NAS-SynchronisationIndicator   OPTIONAL,
    rAB-Parameters        RAB-Parameters,
    dataVolumeReportingIndication   DataVolumeReportingIndication   OPTIONAL
    -- This IE shall be present if the CN domain indicator IE is set to "PS domain" --,
    pdp-TypeInformation     PDP-TypeInformation     OPTIONAL
    -- This IE shall be present if the CN domain indicator IE is set to "PS domain" --,
    userPlaneInformation    UserPlaneInformation,
    transportLayerAddress   TransportLayerAddress,
    iuTransportAssociation   IuTransportAssociation,
    service-Handover        Service-Handover        OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {RAB-SetupItem-RelocReq-ExtIEs} }          OPTIONAL,
    ...
}

RAB-SetupItem-RelocReq-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    -- Extension for Release 4 to enable RAB Quality of Service negotiation over Iu --
    {ID id-Alt-RAB-Parameters   CRITICALITY ignore     EXTENSION Alt-RAB-Parameters   PRESENCE optional},
    ...
}

UserPlaneInformation ::= SEQUENCE {

```



```

    userPlaneMode           UserPlaneMode,
    uP-ModeVersions         UP-ModeVersions,
    iE-Extensions           ProtocolExtensionContainer { {UserPlaneInformation-ExtIEs} }      OPTIONAL,
    ...
}

UserPlaneInformation-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RelocationRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
    { ID id-GlobalCN-ID           CRITICALITY reject           EXTENSION GlobalCN-ID           PRESENCE optional},
    ...
}

-- *****
--
-- Relocation Request Acknowledge
--
-- *****

RelocationRequestAcknowledge ::= SEQUENCE {
    protocolIEs           ProtocolIE-Container           { {RelocationRequestAcknowledgeIEs} },
    protocolExtensions     ProtocolExtensionContainer { {RelocationRequestAcknowledgeExtensions} }      OPTIONAL,
    ...
}

RelocationRequestAcknowledgeIEs RANAP-PROTOCOL-IES ::= {
    { ID id-TargetRNC-ToSourceRNC-TransparentContainer
        CRITICALITY ignore TYPE TargetRNC-ToSourceRNC-TransparentContainer PRESENCE optional } |
    { ID id-RAB-SetupList-RelocReqAck           CRITICALITY ignore TYPE RAB-SetupList-RelocReqAck           PRESENCE optional } |
    { ID id-RAB-FailedList                       CRITICALITY ignore TYPE RAB-FailedList                       PRESENCE optional } |
    { ID id-ChosenIntegrityProtectionAlgorithm CRITICALITY ignore TYPE ChosenIntegrityProtectionAlgorithm PRESENCE optional } |
    { ID id-ChosenEncryptionAlgorithm           CRITICALITY ignore TYPE ChosenEncryptionAlgorithm           PRESENCE optional } |
    { ID id-CriticalityDiagnostics              CRITICALITY ignore TYPE CriticalityDiagnostics              PRESENCE optional },
    ...
}

RAB-SetupList-RelocReqAck ::= RAB-IE-ContainerList { {RAB-SetupItem-RelocReqAck-IEs} }

RAB-SetupItem-RelocReqAck-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-SetupItem-RelocReqAck           CRITICALITY reject TYPE RAB-SetupItem-RelocReqAck           PRESENCE mandatory },
    ...
}

RAB-SetupItem-RelocReqAck ::= SEQUENCE {
    rAB-ID           RAB-ID,
    transportLayerAddress TransportLayerAddress OPTIONAL,
    iuTransportAssociation IuTransportAssociation OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {RAB-SetupItem-RelocReqAck-ExtIEs} }      OPTIONAL,
    ...
}

```

```

RAB-SetupItem-RelocReqAck-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 to enable RAB Quality of Service negotiation over Iu --
  { ID id-Ass-RAB-Parameters    CRITICALITY ignore      EXTENSION Ass-RAB-Parameters    PRESENCE optional } ,
  ...
}

RAB-FailedList ::= RAB-IE-ContainerList { {RAB-FailedItemIEs} }

RAB-FailedItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-FailedItem          CRITICALITY ignore  TYPE RAB-FailedItem          PRESENCE mandatory } ,
  ...
}

RAB-FailedItem ::= SEQUENCE {
  rAB-ID          RAB-ID,
  cause          Cause,
  iE-Extensions  ProtocolExtensionContainer { {RAB-FailedItem-ExtIEs} }    OPTIONAL,
  ...
}

RAB-FailedItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

RelocationRequestAcknowledgeExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- Relocation Failure
--
-- *****

RelocationFailure ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    { {RelocationFailureIEs} } ,
  protocolExtensions  ProtocolExtensionContainer { {RelocationFailureExtensions} }    OPTIONAL,
  ...
}

RelocationFailureIEs RANAP-PROTOCOL-IES ::= {
  { ID id-Cause          CRITICALITY ignore  TYPE Cause          PRESENCE mandatory } |
  { ID id-CriticalityDiagnostics  CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional } ,
  ...
}

RelocationFailureExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- RELOCATION CANCEL ELEMENTARY PROCEDURE
--

```

```

-- *****
-- *****
--
-- Relocation Cancel
--
-- *****

RelocationCancel ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {RelocationCancelIEs} },
    protocolExtensions ProtocolExtensionContainer { {RelocationCancelExtensions} }      OPTIONAL,
    ...
}

RelocationCancelIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore  TYPE Cause          PRESENCE mandatory },
    ...
}

RelocationCancelExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Relocation Cancel Acknowledge
--
-- *****

RelocationCancelAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {RelocationCancelAcknowledgeIEs} },
    protocolExtensions ProtocolExtensionContainer { {RelocationCancelAcknowledgeExtensions} }      OPTIONAL,
    ...
}

RelocationCancelAcknowledgeIEs RANAP-PROTOCOL-IES ::= {
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics          PRESENCE optional },
    ...
}

RelocationCancelAcknowledgeExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- SRNS CONTEXT TRANSFER OPEARATION
--
-- *****

-- *****
--
-- SRNS Context Request
--

```

```

-- *****
SRNS-ContextRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {SRNS-ContextRequestIEs} },
    protocolExtensions  ProtocolExtensionContainer { {SRNS-ContextRequestExtensions} }      OPTIONAL,
    ...
}

SRNS-ContextRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataForwardingList-SRNS-CtxReq  CRITICALITY ignore  TYPE RAB-DataForwardingList-SRNS-CtxReq      PRESENCE mandatory  },
    ...
}

RAB-DataForwardingList-SRNS-CtxReq      ::= RAB-IE-ContainerList { {RAB-DataForwardingItem-SRNS-CtxReq-IEs} }

RAB-DataForwardingItem-SRNS-CtxReq-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataForwardingItem-SRNS-CtxReq  CRITICALITY reject  TYPE RAB-DataForwardingItem-SRNS-CtxReq      PRESENCE mandatory  },
    ...
}

RAB-DataForwardingItem-SRNS-CtxReq ::= SEQUENCE {
    rAB-ID          RAB-ID,
    iE-Extensions  ProtocolExtensionContainer { {RAB-DataForwardingItem-SRNS-CtxReq-ExtIEs} }      OPTIONAL,
    ...
}

RAB-DataForwardingItem-SRNS-CtxReq-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

SRNS-ContextRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- SRNS Context Response
--
-- *****

SRNS-ContextResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {SRNS-ContextResponseIEs} },
    protocolExtensions  ProtocolExtensionContainer { {SRNS-ContextResponseExtensions} }      OPTIONAL,
    ...
}

SRNS-ContextResponseIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-ContextList          CRITICALITY ignore  TYPE RAB-ContextList          PRESENCE optional  } |
    { ID id-RAB-ContextFailedtoTransferList  CRITICALITY ignore  TYPE RAB-ContextFailedtoTransferList  PRESENCE optional  } |
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics          PRESENCE optional  },
    ...
}

RAB-ContextList      ::= RAB-IE-ContainerList { {RAB-ContextItemIEs} }

```

```

RAB-ContextItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ContextItem          CRITICALITY ignore  TYPE RAB-ContextItem          PRESENCE mandatory },
  ...
}

RAB-ContextItem ::= SEQUENCE {
  rAB-ID                RAB-ID,
  dl-GTP-PDU-SequenceNumber  DL-GTP-PDU-SequenceNumber  OPTIONAL,
  ul-GTP-PDU-SequenceNumber  UL-GTP-PDU-SequenceNumber  OPTIONAL,
  dl-N-PDU-SequenceNumber    DL-N-PDU-SequenceNumber    OPTIONAL,
  ul-N-PDU-SequenceNumber    UL-N-PDU-SequenceNumber    OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { {RAB-ContextItem-ExtIEs} }  OPTIONAL,
  ...
}

RAB-ContextItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

RAB-ContextFailedtoTransferList ::= RAB-IE-ContainerList { {RABs-ContextFailedtoTransferItemIEs} }

RABs-ContextFailedtoTransferItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ContextFailedtoTransferItem  CRITICALITY ignore  TYPE RABs-ContextFailedtoTransferItem  PRESENCE mandatory },
  ...
}

RABs-ContextFailedtoTransferItem ::= SEQUENCE {
  rAB-ID                RAB-ID,
  cause                 Cause,
  iE-Extensions          ProtocolExtensionContainer { { RABs-ContextFailedtoTransferItem-ExtIEs} }  OPTIONAL,
  ...
}

RABs-ContextFailedtoTransferItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

SRNS-ContextResponseExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- SECURITY MODE CONTROL ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Security Mode Command
--
-- *****

```

```

SecurityModeCommand ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {SecurityModeCommandIEs} },
    protocolExtensions   ProtocolExtensionContainer { {SecurityModeCommandExtensions} }          OPTIONAL,
    ...
}

SecurityModeCommandIEs RANAP-PROTOCOL-IES ::= {
    { ID id-IntegrityProtectionInformation          CRITICALITY reject  TYPE IntegrityProtectionInformation          PRESENCE mandatory } |
    { ID id-EncryptionInformation                  CRITICALITY ignore   TYPE EncryptionInformation          PRESENCE optional } |
    { ID id-KeyStatus                              CRITICALITY reject  TYPE KeyStatus                      PRESENCE mandatory},
    ...
}

SecurityModeCommandExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Security Mode Complete
--
-- *****

SecurityModeComplete ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {SecurityModeCompleteIEs} },
    protocolExtensions   ProtocolExtensionContainer { {SecurityModeCompleteExtensions} }          OPTIONAL,
    ...
}

SecurityModeCompleteIEs RANAP-PROTOCOL-IES ::= {
    { ID id-ChosenIntegrityProtectionAlgorithm      CRITICALITY reject  TYPE ChosenIntegrityProtectionAlgorithm  PRESENCE mandatory } |
    { ID id-ChosenEncryptionAlgorithm              CRITICALITY ignore  TYPE ChosenEncryptionAlgorithm          PRESENCE optional } |
    { ID id-CriticalityDiagnostics                  CRITICALITY ignore  TYPE CriticalityDiagnostics             PRESENCE optional },
    ...
}

SecurityModeCompleteExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Security Mode Reject
--
-- *****

SecurityModeReject ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {SecurityModeRejectIEs} },
    protocolExtensions   ProtocolExtensionContainer { {SecurityModeRejectExtensions} }          OPTIONAL,
    ...
}

SecurityModeRejectIEs RANAP-PROTOCOL-IES ::= {

```

```

    { ID id-Cause                CRITICALITY ignore  TYPE Cause                PRESENCE mandatory } |
    { ID id-CriticalityDiagnostics CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

SecurityModeRejectExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- DATA VOLUME REPORT ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Data Volume Report Request
--
-- *****

DataVolumeReportRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {DataVolumeReportRequestIEs} },
    protocolExtensions   ProtocolExtensionContainer { {DataVolumeReportRequestExtensions} } OPTIONAL,
    ...
}

DataVolumeReportRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataVolumeReportRequestList CRITICALITY ignore  TYPE RAB-DataVolumeReportRequestList PRESENCE mandatory },
    ...
}

RAB-DataVolumeReportRequestList ::= RAB-IE-ContainerList { {RAB-DataVolumeReportRequestItemIEs} }

RAB-DataVolumeReportRequestItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataVolumeReportRequestItem CRITICALITY reject  TYPE RAB-DataVolumeReportRequestItem PRESENCE mandatory },
    ...
}

RAB-DataVolumeReportRequestItem ::= SEQUENCE {
    rAB-ID                RAB-ID,
    iE-Extensions         ProtocolExtensionContainer { {RAB-DataVolumeReportRequestItem-ExtIEs} } OPTIONAL,
    ...
}

RAB-DataVolumeReportRequestItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

DataVolumeReportRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****

```

```

--
-- Data Volume Report
--
-- *****
DataVolumeReport ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {DataVolumeReportIEs} },
    protocolExtensions  ProtocolExtensionContainer { {DataVolumeReportExtensions} }    OPTIONAL,
    ...
}

DataVolumeReportIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataVolumeReportList          CRITICALITY ignore TYPE RAB-DataVolumeReportList          PRESENCE optional } |
    { ID id-RAB-FailedtoReportList           CRITICALITY ignore TYPE RAB-FailedtoReportList           PRESENCE optional } |
    { ID id-CriticalityDiagnostics            CRITICALITY ignore TYPE CriticalityDiagnostics            PRESENCE optional },
    ...
}

DataVolumeReportExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-FailedtoReportList ::= RAB-IE-ContainerList { {RABs-failed-to-reportItemIEs} }

RABs-failed-to-reportItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-FailedtoReportItem           CRITICALITY ignore TYPE RABs-failed-to-reportItem           PRESENCE mandatory },
    ...
}

RABs-failed-to-reportItem ::= SEQUENCE {
    rAB-ID          RAB-ID,
    cause           Cause,
    iE-Extensions  ProtocolExtensionContainer { { RABs-failed-to-reportItem-ExtIEs } }    OPTIONAL,
    ...
}

RABs-failed-to-reportItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- RESET ELEMENTARY PROCEDURE
--
-- *****
-- *****
--
-- Reset
--
-- *****

```



```

Reset ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {ResetIEs} },
    protocolExtensions ProtocolExtensionContainer { {ResetExtensions} }          OPTIONAL,
    ...
}

ResetIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE mandatory } |
    { ID id-CN-DomainIndicator CRITICALITY reject TYPE CN-DomainIndicator PRESENCE mandatory } |
    { ID id-GlobalRNC-ID    CRITICALITY ignore TYPE GlobalRNC-ID    PRESENCE optional },
    ...
}

ResetExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
    { ID id-GlobalCN-ID      CRITICALITY ignore      EXTENSION GlobalCN-ID          PRESENCE optional},
    ...
}

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

ResetAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {ResetAcknowledgeIEs} },
    protocolExtensions ProtocolExtensionContainer { {ResetAcknowledgeExtensions} }          OPTIONAL,
    ...
}

ResetAcknowledgeIEs RANAP-PROTOCOL-IES ::= {
    { ID id-CN-DomainIndicator CRITICALITY reject TYPE CN-DomainIndicator PRESENCE mandatory } |
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional } |
    { ID id-GlobalRNC-ID      CRITICALITY ignore TYPE GlobalRNC-ID      PRESENCE optional },
    ...
}

ResetAcknowledgeExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
    { ID id-GlobalCN-ID      CRITICALITY ignore      EXTENSION GlobalCN-ID          PRESENCE optional},
    ...
}

-- *****
--
-- RESET RESOURCE ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Reset Resource
--

```

```

-- *****
ResetResource ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {ResetResourceIEs} },
    protocolExtensions   ProtocolExtensionContainer { {ResetResourceExtensions} }          OPTIONAL,
    ...
}

ResetResourceIEs RANAP-PROTOCOL-IES ::= {
    { ID id-CN-DomainIndicator          CRITICALITY reject  TYPE CN-DomainIndicator          PRESENCE mandatory } |
    { ID id-Cause                       CRITICALITY ignore TYPE Cause                       PRESENCE mandatory } |
    { ID id-IuSigConIdList              CRITICALITY ignore TYPE ResetResourceList        PRESENCE mandatory } |
    { ID id-GlobalRNC-ID                CRITICALITY ignore TYPE GlobalRNC-ID              PRESENCE optional },
    ...
}

ResetResourceList ::= IuSigConId-IE-ContainerList{ {ResetResourceItemIEs} }

ResetResourceItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-IuSigConIdItem              CRITICALITY reject  TYPE      ResetResourceItem          PRESENCE mandatory },
    ...
}

ResetResourceItem ::= SEQUENCE {
    iuSigConId          IuSignallingConnectionIdentifier,
    IE-Extensions       ProtocolExtensionContainer { { ResetResourceItem-ExtIEs} }          OPTIONAL,
    ...
}

ResetResourceItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

ResetResourceExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
    { ID id-GlobalCN-ID                CRITICALITY ignore      EXTENSION GlobalCN-ID              PRESENCE optional},
    ...
}

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

ResetResourceAcknowledge ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {ResetResourceAcknowledgeIEs} },
    protocolExtensions   ProtocolExtensionContainer { {ResetResourceAcknowledgeExtensions} }          OPTIONAL,
    ...
}

ResetResourceAcknowledgeIEs RANAP-PROTOCOL-IES ::= {
    { ID id-CN-DomainIndicator          CRITICALITY reject  TYPE CN-DomainIndicator          PRESENCE mandatory } |
    { ID id-IuSigConIdList              CRITICALITY ignore  TYPE ResetResourceAckList        PRESENCE mandatory } |

```

```

    { ID id-GlobalRNC-ID          CRITICALITY ignore  TYPE GlobalRNC-ID          PRESENCE optional } |
    { ID id-CriticalityDiagnostics CRITICALITY ignore  TYPE CriticalityDiagnostics    PRESENCE optional },
    ...
}
ResetResourceAckList ::= IuSigConId-IE-ContainerList { {ResetResourceAckItemIEs} }

ResetResourceAckItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-IuSigConIdItem          CRITICALITY reject  TYPE      ResetResourceAckItem          PRESENCE mandatory },
    ...
}

ResetResourceAckItem ::= SEQUENCE {
    iuSigConId          IuSignallingConnectionIdentifier,
    iE-Extensions       ProtocolExtensionContainer { {ResetResourceAckItem-ExtIEs} }    OPTIONAL,
    ...
}

ResetResourceAckItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

ResetResourceAcknowledgeExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
    { ID id-GlobalCN-ID          CRITICALITY ignore      EXTENSION GlobalCN-ID          PRESENCE optional},
    ...
}

-- *****
--
-- RAB RELEASE REQUEST ELEMENTARY PROCEDURE
--
-- *****
--
-- RAB Release Request
--
-- *****

RAB-ReleaseRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {RAB-ReleaseRequestIEs} },
    protocolExtensions   ProtocolExtensionContainer { {RAB-ReleaseRequestExtensions} }    OPTIONAL,
    ...
}

RAB-ReleaseRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-ReleaseList          CRITICALITY ignore  TYPE RAB-ReleaseList          PRESENCE mandatory },
    ...
}

RAB-ReleaseList ::= RAB-IE-ContainerList { {RAB-ReleaseItemIEs} }

RAB-ReleaseItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-ReleaseItem          CRITICALITY ignore  TYPE RAB-ReleaseItem          PRESENCE mandatory },

```

```

    ...
}

RAB-ReleaseItem ::= SEQUENCE {
    rAB-ID          RAB-ID,
    cause          Cause,
    iE-Extensions  ProtocolExtensionContainer { {RAB-ReleaseItem-ExtIEs} } OPTIONAL,
    ...
}

RAB-ReleaseItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-ReleaseRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Iu RELEASE REQUEST ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Iu Release Request
--
-- *****

Iu-ReleaseRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container { {Iu-ReleaseRequestIEs} },
    protocolExtensions  ProtocolExtensionContainer { {Iu-ReleaseRequestExtensions} } OPTIONAL,
    ...
}

Iu-ReleaseRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE mandatory },
    ...
}

Iu-ReleaseRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- RELOCATION DETECT ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Relocation Detect

```

```

--
-- *****
RelocationDetect ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {RelocationDetectIEs} },
    protocolExtensions   ProtocolExtensionContainer { {RelocationDetectExtensions} }
    ...
}
RelocationDetectIEs RANAP-PROTOCOL-IES ::= {
    ...
}
RelocationDetectExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
-- *****
--
-- RELOCATION COMPLETE ELEMENTARY PROCEDURE
--
-- *****
--
-- Relocation Complete
--
-- *****

RelocationComplete ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {RelocationCompleteIEs} },
    protocolExtensions   ProtocolExtensionContainer { {RelocationCompleteExtensions} }
    ...
}
RelocationCompleteIEs RANAP-PROTOCOL-IES ::= {
    ...
}
RelocationCompleteExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
-- *****
--
-- PAGING ELEMENTARY PROCEDURE
--
-- *****
--
-- Paging
--
-- *****

```

```

Paging ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {PagingIEs} },
    protocolExtensions ProtocolExtensionContainer { {PagingExtensions} }          OPTIONAL,
    ...
}

PagingIEs RANAP-PROTOCOL-IES ::= {
    { ID id-CN-DomainIndicator          CRITICALITY ignore TYPE CN-DomainIndicator          PRESENCE mandatory } |
    { ID id-PermanentNAS-UE-ID          CRITICALITY ignore TYPE PermanentNAS-UE-ID          PRESENCE mandatory } |
    { ID id-TemporaryUE-ID              CRITICALITY ignore TYPE TemporaryUE-ID          PRESENCE optional } |
    { ID id-PagingAreaID                CRITICALITY ignore TYPE PagingAreaID          PRESENCE optional } |
    { ID id-PagingCause                  CRITICALITY ignore TYPE PagingCause          PRESENCE optional } |
    { ID id-NonSearchingIndication       CRITICALITY ignore TYPE NonSearchingIndication PRESENCE optional } |
    { ID id-DRX-CycleLengthCoefficient   CRITICALITY ignore TYPE DRX-CycleLengthCoefficient PRESENCE optional } ,
    ...
}

PagingExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- COMMON ID ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Common ID
--
-- *****

CommonID ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { {CommonID-IEs} },
    protocolExtensions ProtocolExtensionContainer { {CommonIDExtensions} }          OPTIONAL,
    ...
}

CommonID-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-PermanentNAS-UE-ID          CRITICALITY ignore TYPE PermanentNAS-UE-ID          PRESENCE mandatory } ,
    ...
}

CommonIDExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- CN INVOKE TRACE ELEMENTARY PROCEDURE
--
-- *****

```

```

-- *****
--
-- CN Invoke Trace
--
-- *****

CN-InvokeTrace ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {CN-InvokeTraceIEs} },
    protocolExtensions   ProtocolExtensionContainer { {CN-InvokeTraceExtensions} }          OPTIONAL,
    ...
}

CN-InvokeTraceIEs RANAP-PROTOCOL-IES ::= {
    { ID id-TraceType          CRITICALITY ignore TYPE TraceType          PRESENCE mandatory } |
    { ID id-TraceReference     CRITICALITY ignore TYPE TraceReference     PRESENCE mandatory } |
    { ID id-TriggerID          CRITICALITY ignore TYPE TriggerID          PRESENCE optional } |
    { ID id-UE-ID              CRITICALITY ignore TYPE UE-ID              PRESENCE optional } |
    { ID id-OMC-ID             CRITICALITY ignore TYPE OMC-ID             PRESENCE optional },
    ...
}

CN-InvokeTraceExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- CN DEACTIVATE TRACE ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- CN Deactivate Trace
--
-- *****

CN-DeactivateTrace ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {CN-DeactivateTraceIEs} },
    protocolExtensions   ProtocolExtensionContainer { {CN-DeactivateTraceExtensions} }          OPTIONAL,
    ...
}

CN-DeactivateTraceIEs RANAP-PROTOCOL-IES ::= {
    { ID id-TraceReference     CRITICALITY ignore TYPE TraceReference     PRESENCE mandatory } |
    { ID id-TriggerID          CRITICALITY ignore TYPE TriggerID          PRESENCE optional },
    ...
}

CN-DeactivateTraceExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

-- *****
--
-- LOCATION REPORTING CONTROL ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Location Reporting Control
--
-- *****

LocationReportingControl ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    { {LocationReportingControlIEs} },
    protocolExtensions   ProtocolExtensionContainer { {LocationReportingControlExtensions} }    OPTIONAL,
    ...
}

LocationReportingControlIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RequestType          CRITICALITY ignore  TYPE RequestType          PRESENCE mandatory },
    ...
}

LocationReportingControlExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 to enhance the location request over Iu --
    { ID id-VerticalAccuracyCode          CRITICALITY ignore  EXTENSION VerticalAccuracyCode          PRESENCE optional } |
-- Extension for Release 4 to enhance the location request over Iu --
    { ID id-ResponseTime                  CRITICALITY ignore  EXTENSION ResponseTime                  PRESENCE optional } |
-- Extension for Release 4 to enhance the location request over Iu --
    { ID id-PositioningPriority            CRITICALITY ignore  EXTENSION PositioningPriority            PRESENCE optional } |
-- Extension for Release 4 to enhance the location request over Iu --
    { ID id-ClientType                    CRITICALITY ignore  EXTENSION ClientType                    PRESENCE optional },
    ...
}

-- *****
--
-- LOCATION REPORT ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Location Report
--
-- *****

LocationReport ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    { {LocationReportIEs} },
    protocolExtensions   ProtocolExtensionContainer { {LocationReportExtensions} }    OPTIONAL,
    ...
}

LocationReportIEs RANAP-PROTOCOL-IES ::= {

```



```

    { ID id-AreaIdentity          CRITICALITY ignore TYPE AreaIdentity          PRESENCE optional } |
    { ID id-Cause                 CRITICALITY ignore TYPE Cause                PRESENCE optional } |
    { ID id-RequestType           CRITICALITY ignore TYPE RequestType         PRESENCE optional } ,
    ...
}

LocationReportExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 to enable report of Last Known Service Area with its Age over Iu --
    { ID id-LastKnownServiceArea  CRITICALITY ignore EXTENSION LastKnownServiceArea PRESENCE optional},
    ...
}

-- *****
--
-- INITIAL UE MESSAGE ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Initial UE Message
--
-- *****

InitialUE-Message ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {InitialUE-MessageIEs} },
    protocolExtensions   ProtocolExtensionContainer { {InitialUE-MessageExtensions} }          OPTIONAL,
    ...
}

InitialUE-MessageIEs RANAP-PROTOCOL-IES ::= {
    { ID id-CN-DomainIndicator    CRITICALITY ignore TYPE CN-DomainIndicator          PRESENCE mandatory } |
    { ID id-LAI                  CRITICALITY ignore TYPE LAI                    PRESENCE mandatory } |
    { ID id-RAC                  CRITICALITY ignore TYPE RAC                    PRESENCE conditional } |
    -- This IE shall be present if the CN Domain Indicator IE is set to "PS domain" --
    { ID id-SAI                  CRITICALITY ignore TYPE SAI                    PRESENCE mandatory } |
    { ID id-NAS-PDU              CRITICALITY ignore TYPE NAS-PDU              PRESENCE mandatory } |
    { ID id-IuSigConId           CRITICALITY ignore TYPE IuSignallingConnectionIdentifier PRESENCE mandatory } |
    { ID id-GlobalRNC-ID         CRITICALITY ignore TYPE GlobalRNC-ID          PRESENCE mandatory },
    ...
}

InitialUE-MessageExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- DIRECT TRANSFER ELEMENTARY PROCEDURE
--
-- *****
--
-- *****

```

```

--
-- Direct Transfer
--
-- *****

DirectTransfer ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {DirectTransferIEs} },
    protocolExtensions   ProtocolExtensionContainer { {DirectTransferExtensions} }          OPTIONAL,
    ...
}

DirectTransferIEs RANAP-PROTOCOL-IES ::= {
    { ID id-NAS-PDU          CRITICALITY ignore TYPE NAS-PDU          PRESENCE mandatory } |
    { ID id-LAI             CRITICALITY ignore TYPE LAI              PRESENCE optional } |
    { ID id-RAC             CRITICALITY ignore TYPE RAC              PRESENCE optional } |
    { ID id-SAI             CRITICALITY ignore TYPE SAI              PRESENCE optional } |
    { ID id-SAPI            CRITICALITY ignore TYPE SAPI            PRESENCE optional },
    ...
}

DirectTransferExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- OVERLOAD CONTROL ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Overload
--
-- *****

Overload ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {OverloadIEs} },
    protocolExtensions   ProtocolExtensionContainer { {OverloadExtensions} }          OPTIONAL,
    ...
}

OverloadIEs RANAP-PROTOCOL-IES ::= {
    { ID id-NumberOfSteps   CRITICALITY ignore TYPE NumberOfSteps   PRESENCE optional } |
    { ID id-GlobalRNC-ID    CRITICALITY ignore TYPE GlobalRNC-ID    PRESENCE optional },
    ...
}

OverloadExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 99 to enable the indication to the RNC which CN domain is suffering the signalling traffic overload --
    { ID id-CN-DomainIndicator CRITICALITY ignore EXTENSION CN-DomainIndicator PRESENCE optional } ,
    ...
}

```

```

-- *****
--
-- ERROR INDICATION ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Error Indication
--
-- *****

ErrorIndication ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    { {ErrorIndicationIEs} },
    protocolExtensions   ProtocolExtensionContainer { {ErrorIndicationExtensions} }        OPTIONAL,
    ...
}

ErrorIndicationIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE optional } |
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional } |
    { ID id-CN-DomainIndicator CRITICALITY ignore TYPE CN-DomainIndicator PRESENCE optional } |
    { ID id-GlobalRNC-ID    CRITICALITY ignore TYPE GlobalRNC-ID    PRESENCE optional },
    ...
}

ErrorIndicationExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
    { ID id-GlobalCN-ID    CRITICALITY ignore EXTENSION GlobalCN-ID    PRESENCE optional},
    ...
}

-- *****
--
-- SRNS DATA FORWARD ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- SRNS Data Forward Command
--
-- *****

SRNS-DataForwardCommand ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    { {SRNS-DataForwardCommandIEs} },
    protocolExtensions   ProtocolExtensionContainer { {SRNS-DataForwardCommandExtensions} }        OPTIONAL,
    ...
}

SRNS-DataForwardCommandIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-DataForwardingList CRITICALITY ignore TYPE RAB-DataForwardingList PRESENCE optional },
    ...
}

```

```

SRNS-DataForwardCommandExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- FORWARD SRNS CONTEXT ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Forward SRNS Context
--
-- *****

ForwardSRNS-Context ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {ForwardSRNS-ContextIEs} },
  protocolExtensions  ProtocolExtensionContainer { {ForwardSRNS-ContextExtensions} }      OPTIONAL,
  ...
}

ForwardSRNS-ContextIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ContextList      CRITICALITY ignore  TYPE RAB-ContextList      PRESENCE mandatory },
  ...
}

ForwardSRNS-ContextExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- RAB ASSIGNMENT ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- RAB Assignment Request
--
-- *****

RAB-AssignmentRequest ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {RAB-AssignmentRequestIEs} },
  protocolExtensions  ProtocolExtensionContainer { {RAB-AssignmentRequestExtensions} }      OPTIONAL,
  ...
}

RAB-AssignmentRequestIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-SetupOrModifyList  CRITICALITY ignore  TYPE RAB-SetupOrModifyList  PRESENCE optional } |
  { ID id-RAB-ReleaseList        CRITICALITY ignore  TYPE RAB-ReleaseList        PRESENCE optional },
  ...
}

```

```

}
RAB-SetupOrModifyList ::= RAB-IE-ContainerPairList { {RAB-SetupOrModifyItem-IEs} }

RAB-SetupOrModifyItem-IEs RANAP-PROTOCOL-IES-PAIR ::= {
  { ID id-RAB-SetupOrModifyItem      FIRST CRITICALITY reject  FIRST TYPE RAB-SetupOrModifyItemFirst
    SECOND CRITICALITY ignore  SECOND TYPE RAB-SetupOrModifyItemSecond
                                     PRESENCE mandatory },
  ...
}

RAB-SetupOrModifyItemFirst ::= SEQUENCE {
  rAB-ID                RAB-ID,
  nAS-SynchronisationIndicator  NAS-SynchronisationIndicator  OPTIONAL,
  rAB-Parameters        RAB-Parameters  OPTIONAL,
  userPlaneInformation  UserPlaneInformation  OPTIONAL,
  transportLayerInformation  TransportLayerInformation  OPTIONAL,
  service-Handover      Service-Handover  OPTIONAL,
  iE-Extensions         ProtocolExtensionContainer { {RAB-SetupOrModifyItemFirst-ExtIEs} }  OPTIONAL,
  ...
}

TransportLayerInformation ::= SEQUENCE {
  transportLayerAddress  TransportLayerAddress,
  iuTransportAssociation  IuTransportAssociation,
  iE-Extensions         ProtocolExtensionContainer { {TransportLayerInformation-ExtIEs} }  OPTIONAL,
  ...
}

TransportLayerInformation-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

RAB-SetupOrModifyItemFirst-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

RAB-SetupOrModifyItemSecond ::= SEQUENCE {
  pDP-TypeInformation  PDP-TypeInformation  OPTIONAL,
  dataVolumeReportingIndication  DataVolumeReportingIndication  OPTIONAL,
  dl-GTP-PDU-SequenceNumber  DL-GTP-PDU-SequenceNumber  OPTIONAL,
  ul-GTP-PDU-SequenceNumber  UL-GTP-PDU-SequenceNumber  OPTIONAL,
  dl-N-PDU-SequenceNumber  DL-N-PDU-SequenceNumber  OPTIONAL,
  ul-N-PDU-SequenceNumber  UL-N-PDU-SequenceNumber  OPTIONAL,
  iE-Extensions         ProtocolExtensionContainer { {RAB-SetupOrModifyItemSecond-ExtIEs} }  OPTIONAL,
  ...
}

RAB-SetupOrModifyItemSecond-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  -- Extension for Release 4 to enable RAB Quality of Service negotiation over Iu --
  { ID id-Alt-RAB-Parameters  CRITICALITY ignore  EXTENSION Alt-RAB-Parameters  PRESENCE optional },
  ...
}

```

```

RAB-AssignmentRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- RAB Assignment Response
--
-- *****

RAB-AssignmentResponse ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container      { {RAB-AssignmentResponseIEs} },
  protocolExtensions   ProtocolExtensionContainer { {RAB-AssignmentResponseExtensions} }   OPTIONAL,
  ...
}

RAB-AssignmentResponseIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-SetupOrModifiedList          CRITICALITY ignore TYPE RAB-SetupOrModifiedList          PRESENCE optional } |
  { ID id-RAB-ReleasedList                  CRITICALITY ignore TYPE RAB-ReleasedList                  PRESENCE optional } |

  { ID id-RAB-QueuedList                    CRITICALITY ignore TYPE RAB-QueuedList                    PRESENCE optional } |
  { ID id-RAB-FailedList                    CRITICALITY ignore TYPE RAB-FailedList                    PRESENCE optional } |
  { ID id-RAB-ReleaseFailedList             CRITICALITY ignore TYPE RAB-ReleaseFailedList             PRESENCE optional } |
  { ID id-CriticalityDiagnostics            CRITICALITY ignore TYPE CriticalityDiagnostics            PRESENCE optional },
  ...
}

RAB-SetupOrModifiedList ::= RAB-IE-ContainerList { {RAB-SetupOrModifiedItemIEs} }

RAB-SetupOrModifiedItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-SetupOrModifiedItem          CRITICALITY ignore TYPE RAB-SetupOrModifiedItem          PRESENCE mandatory },
  ...
}

RAB-SetupOrModifiedItem ::= SEQUENCE {
  rAB-ID          RAB-ID,
  transportLayerAddress      TransportLayerAddress   OPTIONAL,
  iuTransportAssociation     IuTransportAssociation   OPTIONAL,
  dl-dataVolumes             DataVolumeList           OPTIONAL,
  iE-Extensions             ProtocolExtensionContainer { {RAB-SetupOrModifiedItem-ExtIEs} }   OPTIONAL,
  ...
}

RAB-SetupOrModifiedItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 to enable RAB Quality of Service negotiation over Iu --
  { ID id-Ass-RAB-Parameters      CRITICALITY ignore      EXTENSION Ass-RAB-Parameters      PRESENCE optional },
  ...
}

RAB-ReleasedList ::= RAB-IE-ContainerList { {RAB-ReleasedItemIEs} }

RAB-ReleasedItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ReleasedItem          CRITICALITY ignore TYPE RAB-ReleasedItem          PRESENCE mandatory },
  ...
}

```

```

}

RAB-ReleasedItem ::= SEQUENCE {
    rAB-ID                RAB-ID,
    dl-dataVolumes        DataVolumeList OPTIONAL,
    dl-GTP-PDU-SequenceNumber DL-GTP-PDU-SequenceNumber OPTIONAL,
    ul-GTP-PDU-SequenceNumber UL-GTP-PDU-SequenceNumber OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {RAB-ReleasedItem-ExtIEs} } OPTIONAL,
    ...
}

RAB-ReleasedItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

DataVolumeList ::= SEQUENCE (SIZE (1..maxNrOfVol)) OF
    SEQUENCE {
        dl-UnsuccessfullyTransmittedDataVolume UnsuccessfullyTransmittedDataVolume,
        dataVolumeReference DataVolumeReference OPTIONAL,
        iE-Extensions         ProtocolExtensionContainer { {DataVolumeList-ExtIEs} } OPTIONAL,
        ...
    }

DataVolumeList-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-QueuedList ::= RAB-IE-ContainerList { {RAB-QueuedItemIEs} }

RAB-QueuedItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-QueuedItem CRITICALITY ignore TYPE RAB-QueuedItem PRESENCE mandatory },
    ...
}

RAB-QueuedItem ::= SEQUENCE {
    rAB-ID                RAB-ID,
    iE-Extensions         ProtocolExtensionContainer { {RAB-QueuedItem-ExtIEs} } OPTIONAL,
    ...
}

RAB-QueuedItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-ReleaseFailedList ::= RAB-FailedList

RAB-AssignmentResponseExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

```

```

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

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

-- *****
--
-- RANAP RELOCATION INFORMATION ELEMENTARY PROCEDURE
--
-- *****

RANAP-RelocationInformation ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container  { {RANAP-RelocationInformationIEs} },
    protocolExtensions  ProtocolExtensionContainer { {RANAP-RelocationInformationExtensions} }    OPTIONAL,
    ...
}

RANAP-RelocationInformationIEs RANAP-PROTOCOL-IES ::= {
    { ID id-DirectTransferInformationList-RANAP-RelocInf
      CRITICALITY ignore TYPE DirectTransferInformationList-RANAP-RelocInf
      PRESENCE optional } |
    { ID id-RAB-ContextList-RANAP-RelocInf      CRITICALITY ignore TYPE RAB-ContextList-RANAP-RelocInf      PRESENCE optional },
    ...
}

DirectTransferInformationList-RANAP-RelocInf      ::= DirectTransfer-IE-ContainerList { {DirectTransferInformationItemIEs-RANAP-RelocInf} }

DirectTransferInformationItemIEs-RANAP-RelocInf RANAP-PROTOCOL-IES ::= {
    { ID id-DirectTransferInformationItem-RANAP-RelocInf
      CRITICALITY ignore TYPE DirectTransferInformationItem-RANAP-RelocInf
      PRESENCE mandatory },
    ...
}

DirectTransferInformationItem-RANAP-RelocInf ::= SEQUENCE {
    nAS-PDU          NAS-PDU,
    sAPI             SAPI,
    cN-DomainIndicator  CN-DomainIndicator,
    iE-Extensions    ProtocolExtensionContainer { {RANAP-DirectTransferInformationItem-ExtIEs-RANAP-RelocInf} }    OPTIONAL,
    ...
}

RANAP-DirectTransferInformationItem-ExtIEs-RANAP-RelocInf RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-ContextList-RANAP-RelocInf      ::= RAB-IE-ContainerList { {RAB-ContextItemIEs-RANAP-RelocInf} }

```



```

RAB-ContextItemIEs-RANAP-RelocInf RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ContextItem-RANAP-RelocInf      CRITICALITY ignore  TYPE RAB-ContextItem-RANAP-RelocInf      PRESENCE mandatory  },
  ...
}

RAB-ContextItem-RANAP-RelocInf ::= SEQUENCE {
  rAB-ID          RAB-ID,
  dl-GTP-PDU-SequenceNumber      DL-GTP-PDU-SequenceNumber  OPTIONAL,
  ul-GTP-PDU-SequenceNumber      UL-GTP-PDU-SequenceNumber  OPTIONAL,
  dl-N-PDU-SequenceNumber        DL-N-PDU-SequenceNumber    OPTIONAL,
  ul-N-PDU-SequenceNumber        UL-N-PDU-SequenceNumber    OPTIONAL,
  iE-Extensions                  ProtocolExtensionContainer { {RAB-ContextItem-ExtIEs-RANAP-RelocInf} }  OPTIONAL,
  ...
}

RAB-ContextItem-ExtIEs-RANAP-RelocInf RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

RANAP-RelocationInformationExtensions RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- RAB MODIFICATION REQUEST ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- RAB Modify Request
--
-- *****

RAB-ModifyRequest ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container      { {RAB-ModifyRequestIEs} },
  protocolExtensions   ProtocolExtensionContainer { {RAB-ModifyRequestExtensions} }  OPTIONAL,
  ...
}

RAB-ModifyRequestIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ModifyList      CRITICALITY ignore  TYPE RAB-ModifyList      PRESENCE mandatory},
  ...
}

RAB-ModifyList      ::= RAB-IE-ContainerList { {RAB-ModifyItemIEs} }

RAB-ModifyItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-RAB-ModifyItem      CRITICALITY ignore  TYPE RAB-ModifyItem      PRESENCE mandatory  },
  ...
}

RAB-ModifyItem ::= SEQUENCE {

```

```

    rAB-ID                RAB-ID,
    requested-RAB-Parameter-Values Requested-RAB-Parameter-Values,
    iE-Extensions         ProtocolExtensionContainer { {RAB-ModifyItem-ExtIEs} }        OPTIONAL,
    ...
}

RAB-ModifyItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-ModifyRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- LOCATION RELATED DATA ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Location Related Data Request
--
-- *****

LocationRelatedDataRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { {LocationRelatedDataRequestIEs} },
    protocolExtensions   ProtocolExtensionContainer { {LocationRelatedDataRequestExtensions} }        OPTIONAL,
    ...
}

LocationRelatedDataRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-LocationRelatedDataRequestType          CRITICALITY reject  TYPE LocationRelatedDataRequestType  PRESENCE mandatory  },
    ...
}

LocationRelatedDataRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Location Related Data Response
--
-- *****

LocationRelatedDataResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { { LocationRelatedDataResponseIEs} },
    protocolExtensions   ProtocolExtensionContainer { { LocationRelatedDataResponseExtensions} }        OPTIONAL,
    ...
}

LocationRelatedDataResponseIEs RANAP-PROTOCOL-IES ::= {

```

```

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

LocationRelatedDataResponseExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Location Related Data Failure
--
-- *****

LocationRelatedDataFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { { LocationRelatedDataFailureIEs } },
    protocolExtensions   ProtocolExtensionContainer { { LocationRelatedDataFailureExtensions } }          OPTIONAL,
    ...
}

LocationRelatedDataFailureIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore  TYPE Cause          PRESENCE mandatory  },
    ...
}

LocationRelatedDataFailureExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

END

```

9.3.4 Information Element Definitions

```

-- *****
--
-- Information Element Definitions
--
-- *****

RANAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    maxNrOfErrors,
    maxNrOfPDPDirections,
    maxNrOfPoints,
    maxNrOfRABs,
    maxNrOfSRBs,

```

```

    maxNrOfSeparateTrafficDirections,
    maxRAB-Subflows,
    maxRAB-SubflowCombination,
    maxNrOfLevels,
    maxNrOfAltValues,

    id-CN-DomainIndicator,
    id-MessageStructure,
    id-SRB-TrCH-Mapping,
    id-TypeOfError

FROM RANAP-Constants

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

    ProtocolExtensionContainer {},
    RANAP-PROTOCOL-EXTENSION
FROM RANAP-Containers;

-- A

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

AllocationOrRetentionPriority-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

Alt-RAB-Parameters ::= SEQUENCE {
    altMaxBitrateInf      Alt-RAB-Parameter-MaxBitrateInf          OPTIONAL,
    altGuaranteedBitrateInf  Alt-RAB-Parameter-GuaranteedBitrateInf  OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {Alt-RAB-Parameters-ExtIEs} } OPTIONAL,
    ...
}

Alt-RAB-Parameters-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

Alt-RAB-Parameter-GuaranteedBitrateInf ::= SEQUENCE {
    altGuaranteedBitrateType  Alt-RAB-Parameter-GuaranteedBitrateType,
    altGuaranteedBitrates     Alt-RAB-Parameter-GuaranteedBitrates  OPTIONAL
    -- This IE shall be present if the Type of Guaranteed Bit Rates Information IE is set to "Value range" or "Discrete values" --,
    ...
}

```

```

}

Alt-RAB-Parameter-GuaranteedBitrateType ::= ENUMERATED{
    unspecified,
    value-range,
    discrete-values,
    ...
}

Alt-RAB-Parameter-GuaranteedBitrates ::= SEQUENCE (SIZE (1..maxNrOfAltValues)) OF
    Alt-RAB-Parameter-GuaranteedBitrateList

Alt-RAB-Parameter-GuaranteedBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF GuaranteedBitrate

Alt-RAB-Parameter-MaxBitrateInf ::= SEQUENCE {
    altMaxBitrateType          Alt-RAB-Parameter-MaxBitrateType,
    altMaxBitrates             Alt-RAB-Parameter-MaxBitrates          OPTIONAL
    -- This IE shall be present if the Type of Alternative Maximun Bit Rates Information IE is set to "Value range" or "Discrete values" --,
    ...
}

Alt-RAB-Parameter-MaxBitrateType ::= ENUMERATED{
    unspecified,
    value-range,
    discrete-values,
    ...
}

Alt-RAB-Parameter-MaxBitrates ::= SEQUENCE (SIZE (1..maxNrOfAltValues)) OF
    Alt-RAB-Parameter-MaxBitrateList

Alt-RAB-Parameter-MaxBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF MaxBitrate

AreaIdentity ::= CHOICE {
    sAI          SAI,
    geographicalArea    GeographicalArea,
    ...
}

Ass-RAB-Parameters ::= SEQUENCE {
    assMaxBitrateInf          Ass-RAB-Parameter-MaxBitrateList          OPTIONAL,
    assGuaranteedBitRateInf  Ass-RAB-Parameter-GuaranteedBitrateList  OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {Ass-RAB-Parameters-ExtIEs} } OPTIONAL,
    ...
}

Ass-RAB-Parameters-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```
Ass-RAB-Parameter-GuaranteedBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF GuaranteedBitrate
```

```
Ass-RAB-Parameter-MaxBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF MaxBitrate
```

```
-- B
```

```
BindingID ::= OCTET STRING (SIZE (4))
```

```
BroadcastAssistanceDataDecipheringKeys ::= SEQUENCE {  
  cipheringKeyFlag      BIT STRING (SIZE (1)),  
  currentDecipheringKey BIT STRING (SIZE (56)),  
  nextDecipheringKey    BIT STRING (SIZE (56)),  
  ...  
}
```

```
-- C
```

```
Cause ::= CHOICE {  
  radioNetwork          CauseRadioNetwork,  
  transmissionNetwork  CauseTransmissionNetwork,  
  nAS                   CauseNAS,  
  protocol              CauseProtocol,  
  misc                  CauseMisc,  
  non-Standard          CauseNon-Standard,  
  ...  
}
```

```
CauseMisc ::= INTEGER {  
  om-intervention (113),  
  no-resource-available (114),  
  unspecified-failure (115),  
  network-optimisation (116)  
} (113..128)
```

```
CauseNAS ::= INTEGER {  
  user-restriction-start-indication (81),  
  user-restriction-end-indication (82),  
  normal-release (83)  
} (81..96)
```

```
CauseProtocol ::= INTEGER {  
  transfer-syntax-error (97),  
  semantic-error (98),  
  message-not-compatible-with-receiver-state (99),  
  abstract-syntax-error-reject (100),  
  abstract-syntax-error-ignore-and-notify (101),  
  abstract-syntax-error-falsely-constructed-message (102)  
} (97..112)
```

```
CauseRadioNetwork ::= INTEGER {  
    rab-pre-empted (1),  
    trelocoverall-expiry (2),  
    trelocprep-expiry (3),  
    treloccomplete-expiry (4),  
    tqueing-expiry (5),  
    relocation-triggered (6),  
    trellocalloc-expiry(7),  
    unable-to-establish-during-relocation (8),  
    unknown-target-rnc (9),  
    relocation-cancelled (10),  
    successful-relocation (11),  
    requested-ciphering-and-or-integrity-protection-algorithms-not-supported (12),  
    conflict-with-already-existing-integrity-protection-and-or-ciphering-information (13),  
    failure-in-the-radio-interface-procedure (14),  
    release-due-to-utran-generated-reason (15),  
    user-inactivity (16),  
    time-critical-relocation (17),  
    requested-traffic-class-not-available (18),  
    invalid-rab-parameters-value (19),  
    requested-maximum-bit-rate-not-available (20),  
    requested-guaranteed-bit-rate-not-available (21),  
    requested-transfer-delay-not-achievable (22),  
    invalid-rab-parameters-combination (23),  
    condition-violation-for-sdu-parameters (24),  
    condition-violation-for-traffic-handling-priority (25),  
    condition-violation-for-guaranteed-bit-rate (26),  
    user-plane-versions-not-supported (27),  
    iu-up-failure (28),  
    relocation-failure-in-target-CN-RNC-or-target-system(29),  
    invalid-RAB-ID (30),  
    no-remaining-rab (31),  
    interaction-with-other-procedure (32),  
    requested-maximum-bit-rate-for-dl-not-available (33),  
    requested-maximum-bit-rate-for-ul-not-available (34),  
    requested-guaranteed-bit-rate-for-dl-not-available (35),  
    requested-guaranteed-bit-rate-for-ul-not-available (36),  
    repeated-integrity-checking-failure (37),  
    requested-request-type-not-supported (38),  
    request-superseded (39),  
    release-due-to-UE-generated-signalling-connection-release (40),  
    resource-optimisation-relocation (41),  
    requested-information-not-available (42),  
    relocation-desirable-for-radio-reasons (43),  
    relocation-not-supported-in-target-RNC-or-target-system (44),  
    directed-retry (45),  
    radio-connection-with-UE-Lost (46),  
    rNC-unable-to-establish-all-RFCs (47),  
    deciphering-keys-not-available(48),  
    dedicated-assistance-data-not-available(49),  
    relocation-target-not-allowed (50),  
    location-reporting-congestion (51)  
} (1..64)
```

```

CauseNon-Standard ::= INTEGER (129..256)
-- Cause value 256 shall not be used --

CauseTransmissionNetwork ::= INTEGER {
    signalling-transport-resource-failure (65),
    iu-transport-connection-failed-to-establish (66)
} (65..80)

ClientType ::= ENUMERATED {
    emergency-Services,
    value-Added-Services,
    pLMN-Operator-Services,
    lawful-Intercept-Services,
    pLMN-Operator-Broadcast-Services,
    pLMN-Operator-O-et-M,
    pLMN-Operator-Anonymous-Statistics,
    pLMN-Operator-Target-MS-Service-Support,
    ...
}

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode          ProcedureCode          OPTIONAL,
    triggeringMessage      TriggeringMessage      OPTIONAL,
    procedureCriticality   Criticality             OPTIONAL,
    iEsCriticalityDiagnostics CriticalityDiagnostics-IE-List OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,
    ...
}

CriticalityDiagnostics-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
        iECriticality      Criticality,
        iE-ID              ProtocolIE-ID,
        repetitionNumber   RepetitionNumber0      OPTIONAL,
        iE-Extensions     ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
    }

CriticalityDiagnostics-IE-List-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 99 to enable reporting the message structure down to the erroneous IE --
    { ID id-MessageStructure CRITICALITY ignore EXTENSION MessageStructure PRESENCE optional } |
-- Extension for Release 99 to enable reporting if a reported error is due to a not understood or a missing IE --
    { ID id-TypeOfError CRITICALITY ignore EXTENSION TypeOfError PRESENCE mandatory },
    ...
}

MessageStructure ::= SEQUENCE (SIZE (1..maxNrOfLevels)) OF
    SEQUENCE {
        iE-ID              ProtocolIE-ID,
        repetitionNumber   RepetitionNumber1      OPTIONAL,
    }

```



```

        iE-Extensions          ProtocolExtensionContainer { {MessageStructure-ExtIEs} } OPTIONAL,
    }
    ...
}

MessageStructure-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

CGI ::= SEQUENCE {
    pLMNidentity          PLMNidentity,
    LAC                   LAC,
    cI                    CI,
    iE-Extensions        ProtocolExtensionContainer { {CGI-ExtIEs} } OPTIONAL
}

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

ChosenEncryptionAlgorithm ::= EncryptionAlgorithm

ChosenIntegrityProtectionAlgorithm ::= IntegrityProtectionAlgorithm

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

ClassmarkInformation2 ::= OCTET STRING

ClassmarkInformation3 ::= OCTET STRING

CN-DomainIndicator ::= ENUMERATED {
    cs-domain,
    ps-domain
}

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

-- D

DataVolumeReference ::= INTEGER (0..255)

DataVolumeReportingIndication ::= ENUMERATED {
    do-report,
    do-not-report
}

DCH-ID ::= INTEGER (0..255)

DeliveryOfErroneousSDU ::= ENUMERATED {
    yes,
    no,
    no-error-detection-consideration
}

```

```
DeliveryOrder ::= ENUMERATED {
    delivery-order-requested,
    delivery-order-not-requested
}

DL-GTP-PDU-SequenceNumber ::= INTEGER (0..65535)
-- Reference: xx.xxx

DL-N-PDU-SequenceNumber ::= INTEGER (0..65535)
-- Reference: xx.xxx

D-RNTI ::= INTEGER (0..1048575)

DRX-CycleLengthCoefficient ::= INTEGER (6..9)

DSCH-ID ::= INTEGER (0..255)

-- E

EncryptionAlgorithm ::= INTEGER { no-encryption (0), standard-UMTS-encryption-algorith-UEA1 (1) } (0..15)

EncryptionInformation ::= SEQUENCE {
    permittedAlgorithms PermittedEncryptionAlgorithms,
    key EncryptionKey,
    iE-Extensions ProtocolExtensionContainer { {EncryptionInformation-ExtIEs} } OPTIONAL
}

EncryptionInformation-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

EncryptionKey ::= BIT STRING (SIZE (128))
-- Reference: 33.102

Event ::= ENUMERATED {
    stop-change-of-service-area,
    direct,
    change-of-servicearea,
    ...,
    stop-direct
}

-- F
-- G

GeographicalArea ::= CHOICE {
    point GA-Point,
    pointWithUncertainty GA-PointWithUncertainty,
    polygon GA-Polygon,
    ...,
    pointWithUncertaintyEllipse GA-PointWithUncertaintyEllipse,
    pointWithAltitude GA-PointWithAltitude,
    pointWithAltitudeAndUncertaintyEllipsoid GA-PointWithAltitudeAndUncertaintyEllipsoid,
```

```

    ellipsoidArc      GA-EllipsoidArc
  }

GeographicalCoordinates ::= SEQUENCE {
    latitudeSign      ENUMERATED { north, south },
    latitude          INTEGER (0..8388607),
    longitude         INTEGER (-8388608..8388607),
    iE-Extensions    ProtocolExtensionContainer { {GeographicalCoordinates-ExtIEs} } OPTIONAL,
    ...
}

GeographicalCoordinates-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-AltitudeAndDirection ::= SEQUENCE {
    directionOfAltitude  ENUMERATED {height, depth},
    altitude            INTEGER (0..32767),
    ...
}

GA-EllipsoidArc ::= SEQUENCE {
    geographicalCoordinates  GeographicalCoordinates,
    innerRadius             INTEGER (0..65535),
    uncertaintyRadius       INTEGER (0..127),
    offsetAngle             INTEGER (0..179),
    includedAngle           INTEGER (0..179),
    confidence              INTEGER (0..127),
    iE-Extensions          ProtocolExtensionContainer { { GA-EllipsoidArc-ExtIEs} } OPTIONAL,
    ...
}

GA-EllipsoidArc-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-Point ::= SEQUENCE {
    geographicalCoordinates  GeographicalCoordinates,
    iE-Extensions          ProtocolExtensionContainer { {GA-Point-ExtIEs} } OPTIONAL,
    ...
}

GA-Point-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-PointWithAltitude ::= SEQUENCE {
    geographicalCoordinates  GeographicalCoordinates,
    altitudeAndDirection    GA-AltitudeAndDirection,
    iE-Extensions          ProtocolExtensionContainer { { GA-PointWithAltitude-ExtIEs} } OPTIONAL,
    ...
}

GA-PointWithAltitude-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {

```

```

}
...
}
GA-PointWithAltitudeAndUncertaintyEllipsoid ::= SEQUENCE {
    geographicalCoordinates    GeographicalCoordinates,
    altitudeAndDirection      GA-AltitudeAndDirection,
    uncertaintyEllipse         GA-UncertaintyEllipse,
    uncertaintyAltitude        INTEGER (0..127),
    confidence                  INTEGER (0..127),
    iE-Extensions              ProtocolExtensionContainer { { GA-PointWithAltitudeAndUncertaintyEllipsoid-ExtIEs } } OPTIONAL,
    ...
}
GA-PointWithAltitudeAndUncertaintyEllipsoid-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
GA-PointWithUnCertainty ::=SEQUENCE {
    geographicalCoordinates    GeographicalCoordinates,
    iE-Extensions              ProtocolExtensionContainer { {GA-PointWithUnCertainty-ExtIEs} } OPTIONAL,
    uncertaintyCode            INTEGER (0..127)
}
GA-PointWithUnCertainty-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
GA-PointWithUnCertaintyEllipse ::= SEQUENCE {
    geographicalCoordinates    GeographicalCoordinates,
    uncertaintyEllipse         GA-UncertaintyEllipse,
    confidence                  INTEGER (0..127),
    iE-Extensions              ProtocolExtensionContainer { { GA-PointWithUnCertaintyEllipse-ExtIEs } } OPTIONAL,
    ...
}
GA-PointWithUnCertaintyEllipse-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
GA-Polygon ::= SEQUENCE (SIZE (1..maxNrOfPoints)) OF
    SEQUENCE {
        geographicalCoordinates    GeographicalCoordinates,
        iE-Extensions              ProtocolExtensionContainer { {GA-Polygon-ExtIEs} } OPTIONAL,
        ...
    }
GA-Polygon-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
GA-UncertaintyEllipse ::= SEQUENCE {
    uncertaintySemi-major        INTEGER (0..127),
    uncertaintySemi-minor        INTEGER (0..127),
    orientationOfMajorAxis       INTEGER (0..179), -- The values 90..179 shall not be used.
}

```

```

}
...
}
GlobalCN-ID ::= SEQUENCE {
    pLMNidentity      PLMNidentity,
    cN-ID             CN-ID
}

GlobalRNC-ID ::= SEQUENCE {
    pLMNidentity      PLMNidentity,
    rNC-ID            RNC-ID
}

GTP-TEI             ::= OCTET STRING (SIZE (4))
-- Reference: xx.xxx

GuaranteedBitrate   ::= INTEGER (0..16000000)
-- Unit is bits per sec

-- H

-- I

IMEI                 ::= OCTET STRING (SIZE (8))
-- Reference: 23.003

IMSI                 ::= TBCD-STRING (SIZE (3..8))
-- Reference: 23.003

IntegrityProtectionAlgorithm ::= INTEGER {
    standard-UMTS-integrity-algorithm-UIA1 (0),
    no-value (15)
} (0..15)

IntegrityProtectionInformation ::= SEQUENCE {
    permittedAlgorithms      PermittedIntegrityProtectionAlgorithms,
    key                       IntegrityProtectionKey,
    iE-Extensions            ProtocolExtensionContainer { {IntegrityProtectionInformation-ExtIEs} } OPTIONAL
}

IntegrityProtectionInformation-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

IntegrityProtectionKey           ::= BIT STRING (SIZE (128))

IuSignallingConnectionIdentifier ::= BIT STRING (SIZE (24))

IuTransportAssociation ::= CHOICE {
    gTP-TEI           GTP-TEI,
    bindingID         BindingID,
    ...
}

```

```
}
-- J
-- K
KeyStatus ::= ENUMERATED {
    old,
    new,
    ...
}
-- L
LAC ::= OCTET STRING (SIZE (2))
LAI ::= SEQUENCE {
    plmnIdentity          PLMNIdentity,
    lAC                   LAC,
    iE-Extensions        ProtocolExtensionContainer { {LAI-ExtIEs} } OPTIONAL
}
LAI-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
LastKnownServiceArea ::= SEQUENCE {
    sAI                   SAI,
    ageOfSAI              INTEGER (0..32767),
    iE-Extensions        ProtocolExtensionContainer { {LastKnownServiceArea-ExtIEs} } OPTIONAL,
    ...
}
LastKnownServiceArea-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
LocationRelatedDataRequestType ::= SEQUENCE {
    requestedLocationRelatedDataType      RequestedLocationRelatedDataType,
    requestedGPSAssistanceData            RequestedGPSAssistanceData OPTIONAL,
    -- This IE shall be present if the Requested Location Related Data Type IE is set to "Dedicated Assistance Data for Assisted GPS" --
    ...
}
L3-Information ::= OCTET STRING
-- M
MaxBitrate ::= INTEGER (1..16000000)
-- Unit is bits per sec
MaxSDU-Size ::= INTEGER (0..32768)
-- MaxSDU-Size
-- Unit is bit
```

```
-- N

NAS-PDU                ::= OCTET STRING

NAS-SynchronisationIndicator ::= BIT STRING (SIZE (4))

NonSearchingIndication ::= ENUMERATED {
    non-searching,
    searching
}

NumberOfIuInstances    ::= INTEGER (1..2)

NumberOfSteps          ::= INTEGER (1..16)

-- O

OldBSS-ToNewBSS-Information ::= OCTET STRING

OMC-ID                 ::= OCTET STRING (SIZE (3..22))
-- Reference: GSM [25]

-- P

PagingAreaID ::= CHOICE {
    LAI          LAI,
    rAI          RAI,
    ...
}

PagingCause ::= ENUMERATED {
    terminating-conversational-call,
    terminating-streaming-call,
    terminating-interactive-call,
    terminating-background-call,
    terminating-low-priority-signalling,
    ...,
    terminating-high-priority-signalling
}

PDP-TypeInformation ::= SEQUENCE (SIZE (1..maxNrOfPDPDirections)) OF
    PDP-Type

PDP-Type ::= ENUMERATED {
    empty,
    PPP,
    osp-ihoss -- this value shall not be used -- ,
    ipv4,
    ipv6,
    ...
}

PermanentNAS-UE-ID ::= CHOICE {
```

```
    IMSI                IMSI,
    ...
}

PermittedEncryptionAlgorithms ::= SEQUENCE (SIZE (1..16)) OF
    EncryptionAlgorithm

PermittedIntegrityProtectionAlgorithms ::= SEQUENCE (SIZE (1..16)) OF
    IntegrityProtectionAlgorithm

PLMNIdentity           ::= TBCD-STRING (SIZE (3))

PositioningPriority ::= ENUMERATED {
    high-Priority,
    normal-Priority,
    ...
}

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

Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable
}

PriorityLevel          ::= INTEGER { spare (0), highest (1), lowest (14), no-priority (15) } (0..15)

P-TMSI                ::= OCTET STRING (SIZE (4))

-- Q

QueuingAllowed ::= ENUMERATED {
    queueing-not-allowed,
    queueing-allowed
}

-- R
RAB-AsymmetryIndicator ::= ENUMERATED {
    symmetric-bidirectional,
    asymmetric-unidirectional-downlink,
    asymmetric-unidirectional-uplink,
    asymmetric-bidirectional,
    ...
}

RAB-ID                ::= BIT STRING (SIZE (8))

RAB-Parameter-GuaranteedBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF GuaranteedBitrate

RAB-Parameter-MaxBitrateList        ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF MaxBitrate
```



```

RAB-Parameters ::= SEQUENCE {
    trafficClass          TrafficClass,
    rAB-AsymmetryIndicator RAB-AsymmetryIndicator,
    maxBitrate           RAB-Parameter-MaxBitrateList,
    guaranteedBitRate    RAB-Parameter-GuaranteedBitrateList OPTIONAL
    -- This IE shall be present the traffic class IE is set to "Conversational" or "Streaming" --,
    deliveryOrder        DeliveryOrder,
    maxSDU-Size          MaxSDU-Size,
    sDU-Parameters       SDU-Parameters,
    transferDelay         TransferDelay OPTIONAL
    -- This IE shall be present the traffic class IE is set to "Conversational" or "Streaming" --,
    trafficHandlingPriority TrafficHandlingPriority OPTIONAL
    -- This IE shall be present the traffic class IE is set to "Interactive" --,
    allocationOrRetentionPriority AllocationOrRetentionPriority OPTIONAL,
    sourceStatisticsDescriptor SourceStatisticsDescriptor OPTIONAL
    -- This IE shall be present the traffic class IE is set to "Conversational" or "Streaming" --,
    relocationRequirement RelocationRequirement OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {RAB-Parameters-ExtIEs} } OPTIONAL,
    ...
}

RAB-Parameters-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-SubflowCombinationBitRate ::= INTEGER (0..16000000)

RAB-TrCH-Mapping ::= SEQUENCE ( SIZE (1..maxNrOfRABs)) OF
    RAB-TrCH-MappingItem

RAB-TrCH-MappingItem ::= SEQUENCE {
    rAB-ID          RAB-ID,
    trCH-ID-List    TrCH-ID-List,
    iE-Extensions   ProtocolExtensionContainer { { RAB-TrCH-MappingItem-ExtIEs} } OPTIONAL,
    ...
}

RAB-TrCH-MappingItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    -- Extension for Release 99 to enable transfer of RAB Subflow mapping onto Iur transport channel Ids for a given indicated domain --
    { ID id-CN-DomainIndicator    CRITICALITY ignore      EXTENSION CN-DomainIndicator    PRESENCE optional },
    ...
}

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

RAI ::= SEQUENCE {
    LAI          LAI,
    rAC          RAC,
    iE-Extensions ProtocolExtensionContainer { {RAI-ExtIEs} } OPTIONAL,
    ...
}

RAI-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}

RateControlAllowed ::= ENUMERATED {
    not-allowed,
    allowed
}

RelocationRequirement ::= ENUMERATED {
    lossless,
    none,
    ...,
    realtime
}

RelocationType ::= ENUMERATED {
    ue-not-involved,
    ue-involved,
    ...
}

RepetitionNumber0 ::= INTEGER (0..255)

RepetitionNumber1 ::= INTEGER (1..256)

ReportArea ::= ENUMERATED {
    service-area,
    geographical-area,
    ...
}

RequestedGPSAssistanceData ::= OCTET STRING (SIZE (1 .. 38 ))
    -- gpsAssistanceData as defined in 24.080 --

RequestedLocationRelatedDataType ::= ENUMERATED {
    decipheringKeysUEBasedOTDOA,
    decipheringKeysAssistedGPS,
    dedicatedAssistanceDataUEBasedOTDOA,
    dedicatedAssistanceDataAssistedGPS,
    ...
}

Requested-RAB-Parameter-Values ::= SEQUENCE {
    requestedMaxBitrates           Requested-RAB-Parameter-MaxBitrateList           OPTIONAL,
    requestedGuaranteedBitrates    Requested-RAB-Parameter-GuaranteedBitrateList    OPTIONAL,
    IE-Extensions                  ProtocolExtensionContainer { { Requested-RAB-Parameter-Values-ExtIEs} } OPTIONAL,
    ...
}

Requested-RAB-Parameter-Values-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

Requested-RAB-Parameter-MaxBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF MaxBitrate

```

```
Requested-RAB-Parameter-GuaranteedBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF GuaranteedBitrate
```

```
RequestType ::= SEQUENCE {
    event                Event,
    reportArea           ReportArea,
    accuracyCode         INTEGER (0..127)    OPTIONAL,
    ...
}

ResidualBitErrorRatio ::= SEQUENCE {
    mantissa             INTEGER (1..9),
    exponent             INTEGER (1..8),
    iE-Extensions        ProtocolExtensionContainer { {ResidualBitErrorRatio-ExtIEs} } OPTIONAL
}
-- ResidualBitErrorRatio = mantissa * 10^-exponent

ResidualBitErrorRatio-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

ResponseTime ::= ENUMERATED {
    lowdelay,
    delaytolerant,
    ...
}

RNC-ID ::= INTEGER (0..4095)
-- RNC-ID ::= BIT STRING (SIZE (12))
-- Harmonized with RNSAP and NBAP definitions

RRC-Container ::= OCTET STRING

-- S

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

SAI ::= SEQUENCE {
    pLMNidentity         PLMNidentity,
    lAC                  LAC,
    sAC                  SAC,
    iE-Extensions        ProtocolExtensionContainer { {SAI-ExtIEs} } OPTIONAL
}

SAI-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

SAPI ::= ENUMERATED {
    sapi-0,
    sapi-3,
    ...
}
```

```

SDU-ErrorRatio ::= SEQUENCE {
    mantissa          INTEGER (1..9),
    exponent          INTEGER (1..6),
    iE-Extensions     ProtocolExtensionContainer { {SDU-ErrorRatio-ExtIEs} } OPTIONAL
}
-- SDU-ErrorRatio = mantissa * 10^-exponent

SDU-ErrorRatio-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

SDU-FormatInformationParameters ::= SEQUENCE (SIZE (1..maxRAB-SubflowCombination)) OF
    SEQUENCE {
        subflowSDU-Size          SubflowSDU-Size          OPTIONAL,
        rAB-SubflowCombinationBitRate RAB-SubflowCombinationBitRate OPTIONAL,
        iE-Extensions           ProtocolExtensionContainer { {SDU-FormatInformationParameters-ExtIEs} } OPTIONAL,
        ...
    }

SDU-FormatInformationParameters-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

SDU-Parameters ::= SEQUENCE (SIZE (1..maxRAB-Subflows)) OF
    SEQUENCE {
        sDU-ErrorRatio          SDU-ErrorRatio OPTIONAL
        -- This IE shall be present if the Delivery Of Erroneous SDU IE is set to "Yes" or "No" --,
        residualBitErrorRatio    ResidualBitErrorRatio,
        deliveryOfErroneousSDU    DeliveryOfErroneousSDU,
        sDU-FormatInformationParameters SDU-FormatInformationParameters OPTIONAL,
        iE-Extensions           ProtocolExtensionContainer { {SDU-Parameters-ExtIEs} } OPTIONAL,
        ...
    }

SDU-Parameters-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

Service-Handover ::= ENUMERATED {
    handover-to-GSM-should-be-performed,
    handover-to-GSM-should-not-be-performed,
    handover-to-GSM-shall-not-be-performed,
    ...
}

SourceID ::= CHOICE {
    sourceRNC-ID          SourceRNC-ID,
    sAI                  SAI,
    ...
}

SourceRNC-ID ::= SEQUENCE {
    plMNidentity          PLMNidentity,

```

```

    rNC-ID          RNC-ID,
    iE-Extensions   ProtocolExtensionContainer { {SourceRNC-ID-ExtIEs} } OPTIONAL
}

SourceRNC-ID-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

SourceRNC-ToTargetRNC-TransparentContainer ::= SEQUENCE {
    rRC-Container      RRC-Container,
    numberOfIuInstances  NumberOfIuInstances,
    relocationType     RelocationType,
    chosenIntegrityProtectionAlgorithm ChosenIntegrityProtectionAlgorithm OPTIONAL,
    integrityProtectionKey IntegrityProtectionKey OPTIONAL,
    chosenEncryptionAlgorithmForSignalling ChosenEncryptionAlgorithm OPTIONAL,
    cipheringKey       EncryptionKey OPTIONAL,
    chosenEncryptionAlgorithmForCS ChosenEncryptionAlgorithm OPTIONAL,
    chosenEncryptionAlgorithmForPS ChosenEncryptionAlgorithm OPTIONAL,
    d-RNTI             D-RNTI OPTIONAL
    -- This IE shall be present if the Relocation type IE is set to "UE not involved in relocation of SRNS" --,
    targetCellId      TargetCellId OPTIONAL
    -- This IE shall be present if the Relocation type IE is set to "UE involved in relocation of SRNS" --,
    rAB-TrCH-Mapping RAB-TrCH-Mapping OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {SourceRNC-ToTargetRNC-TransparentContainer-ExtIEs} } OPTIONAL,
    ...
}

SourceRNC-ToTargetRNC-TransparentContainer-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    -- Extension for Release 99 to enable transfer of SRB mapping onto Iur transport channel Ids --
    { ID id-SRB-TrCH-Mapping CRITICALITY reject EXTENSION SRB-TrCH-Mapping PRESENCE optional },
    ...
}

SourceStatisticsDescriptor ::= ENUMERATED {
    speech,
    unknown,
    ...
}

SRB-ID ::= INTEGER (1..32)

SRB-TrCH-Mapping ::= SEQUENCE ( SIZE (1..maxNrOfSRBs)) OF
    SRB-TrCH-MappingItem

SRB-TrCH-MappingItem ::= SEQUENCE {
    sRB-ID          SRB-ID,
    trCH-ID        TrCH-ID,
    iE-Extensions   ProtocolExtensionContainer { { SRB-TrCH-MappingItem-ExtIEs} } OPTIONAL,
    ...
}

SRB-TrCH-MappingItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}

SubflowSDU-Size          ::= INTEGER (0..4095)
-- Unit is bit

-- T

TargetCellId            ::= INTEGER (0..268435455)

TargetID ::= CHOICE {
    targetRNC-ID          TargetRNC-ID,
    CGI                   CGI,
    ...
}

TargetRNC-ID ::= SEQUENCE {
    LAI                   LAI,
    rAC                   RAC          OPTIONAL
    -- Must always be present towards the PS domain and never towards the CS domain --,
    rNC-ID                RNC-ID,
    iE-Extensions         ProtocolExtensionContainer { {TargetRNC-ID-ExtIEs} } OPTIONAL
}

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

TargetRNC-ToSourceRNC-TransparentContainer ::= SEQUENCE {
    rRC-Container          RRC-Container,
    d-RNTI                D-RNTI          OPTIONAL
    -- May be included to allow the triggering of the Relocation Detect procedure from the Iur Interface --,
    iE-Extensions         ProtocolExtensionContainer { {TargetRNC-ToSourceRNC-TransparentContainer-ExtIEs} } OPTIONAL,
    ...
}

TargetRNC-ToSourceRNC-TransparentContainer-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

TBCD-STRING             ::= OCTET STRING

TemporaryUE-ID ::= CHOICE {
    tMSI                  TMSI,
    p-TMSI                P-TMSI,
    ...
}

TMSI                    ::= OCTET STRING (SIZE (4))

```

```
TraceReference ::= OCTET STRING (SIZE (2..3))

TraceType ::= OCTET STRING (SIZE (1))
-- Reference: GSM TS 12.08

TrafficClass ::= ENUMERATED {
    conversational,
    streaming,
    interactive,
    background,
    ...
}

TrafficHandlingPriority ::= INTEGER { spare (0), highest (1), lowest (14), no-priority-used (15) } (0..15)

TransferDelay ::= INTEGER (0..65535)
-- Unit is millisecond

UnsuccessfullyTransmittedDataVolume ::= INTEGER (0..4294967295)

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

TrCH-ID ::= SEQUENCE {
    dCH-ID DCH-ID OPTIONAL,
    dSCH-ID DSCH-ID OPTIONAL,
    uSCH-ID USCH-ID OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { TrCH-ID-ExtIEs } } OPTIONAL,
    ...
}

TrCH-ID-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

TrCH-ID-List ::= SEQUENCE (SIZE (1..maxRAB-Subflows)) OF
    TrCH-ID

TriggerID ::= OCTET STRING (SIZE (3..22))

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

-- U

UE-ID ::= CHOICE {
    imsi IMSI,
    imei IMEI,
    ...
}
```

```

UL-GTP-PDU-SequenceNumber ::= INTEGER (0..65535)
UL-N-PDU-SequenceNumber   ::= INTEGER (0..65535)
UP-ModeVersions           ::= BIT STRING (SIZE (16))
USCH-ID                   ::= INTEGER (0..255)

UserPlaneMode ::= ENUMERATED {
    transparent-mode,
    support-mode-for-predefined-SDU-sizes,
    ...
}

-- V

VerticalAccuracyCode      ::= INTEGER (0..127)

END

```

9.3.5 Common Definitions

```

-- *****
--
-- Common definitions
--
-- *****

RANAP-CommonDataTypes {
    itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
    umts-Access (20) modules (3) ranap (0) version1 (1) ranap-CommonDataTypes (3) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

Criticality ::= ENUMERATED { reject, ignore, notify }

Presence ::= ENUMERATED { optional, conditional, mandatory }

PrivateIE-ID ::= CHOICE {
    local INTEGER (0..65535),
    global OBJECT IDENTIFIER
}

ProcedureCode ::= INTEGER (0..255)

ProtocolExtensionID ::= INTEGER (0..65535)

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

```



```
TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome, outcome }
```

```
END
```

9.3.6 Constant Definitions

```
-- *****
--
-- Constant definitions
--
-- *****

RANAP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

id-RAB-Assignment                INTEGER ::= 0
id-Iu-Release                    INTEGER ::= 1
id-RelocationPreparation         INTEGER ::= 2
id-RelocationResourceAllocation  INTEGER ::= 3
id-RelocationCancel             INTEGER ::= 4
id-SRNS-ContextTransfer         INTEGER ::= 5
id-SecurityModeControl          INTEGER ::= 6
id-DataVolumeReport             INTEGER ::= 7
id-Reset                        INTEGER ::= 9
id-RAB-ReleaseRequest           INTEGER ::= 10
id-Iu-ReleaseRequest            INTEGER ::= 11
id-RelocationDetect             INTEGER ::= 12
id-RelocationComplete           INTEGER ::= 13
id-Paging                       INTEGER ::= 14
id-CommonID                     INTEGER ::= 15
id-CN-InvokeTrace               INTEGER ::= 16
id-LocationReportingControl      INTEGER ::= 17
id-LocationReport               INTEGER ::= 18
id-InitialUE-Message            INTEGER ::= 19
id-DirectTransfer                INTEGER ::= 20
id-OverloadControl              INTEGER ::= 21
id-ErrorIndication              INTEGER ::= 22
id-SRNS-DataForward             INTEGER ::= 23
id-ForwardSRNS-Context          INTEGER ::= 24
id-privateMessage                INTEGER ::= 25
id-CN-DeactivateTrace           INTEGER ::= 26
id-ResetResource                INTEGER ::= 27
```

```

id-RANAP-Relocation                INTEGER ::= 28
id-RAB-ModifyRequest               INTEGER ::= 29
id-LocationRelatedData             INTEGER ::= 30

-- *****
--
-- Extension constants
--
-- *****

maxPrivateIEs                      INTEGER ::= 65535
maxProtocolExtensions              INTEGER ::= 65535
maxProtocolIEs                    INTEGER ::= 65535

-- *****
--
-- Lists
--
-- *****

maxNrOfDTs                        INTEGER ::= 15
maxNrOfErrors                      INTEGER ::= 256
maxNrOfIuSigConIds                INTEGER ::= 250
maxNrOfPDPDirections              INTEGER ::= 2
maxNrOfPoints                     INTEGER ::= 15
maxNrOfRABs                       INTEGER ::= 256
maxNrOfSeparateTrafficDirections  INTEGER ::= 2
maxNrOfSRBs                       INTEGER ::= 8
maxNrOfVol                        INTEGER ::= 2
maxNrOfLevels                     INTEGER ::= 256
maxNrOfAltValues                  INTEGER ::= 16

maxRAB-Subflows                   INTEGER ::= 7
maxRAB-SubflowCombination          INTEGER ::= 64

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

id-AreaIdentity                    INTEGER ::= 0
id-CN-DomainIndicator              INTEGER ::= 3
id-Cause                           INTEGER ::= 4
id-ChosenEncryptionAlgorithm       INTEGER ::= 5
id-ChosenIntegrityProtectionAlgorithm INTEGER ::= 6
id-ClassmarkInformation2           INTEGER ::= 7
id-ClassmarkInformation3           INTEGER ::= 8
id-CriticalityDiagnostics          INTEGER ::= 9
id-DL-GTP-PDU-SequenceNumber      INTEGER ::= 10
id-EncryptionInformation           INTEGER ::= 11
id-IntegrityProtectionInformation  INTEGER ::= 12
id-IuTransportAssociation           INTEGER ::= 13

```

| | |
|---|----------------|
| id-L3-Information | INTEGER ::= 14 |
| id-LAI | INTEGER ::= 15 |
| id-NAS-PDU | INTEGER ::= 16 |
| id-NonSearchingIndication | INTEGER ::= 17 |
| id-NumberOfSteps | INTEGER ::= 18 |
| id-OMC-ID | INTEGER ::= 19 |
| id-OldBSS-ToNewBSS-Information | INTEGER ::= 20 |
| id-PagingAreaID | INTEGER ::= 21 |
| id-PagingCause | INTEGER ::= 22 |
| id-PermanentNAS-UE-ID | INTEGER ::= 23 |
| id-RAB-ContextItem | INTEGER ::= 24 |
| id-RAB-ContextList | INTEGER ::= 25 |
| id-RAB-DataForwardingItem | INTEGER ::= 26 |
| id-RAB-DataForwardingItem-SRNS-CtxReq | INTEGER ::= 27 |
| id-RAB-DataForwardingList | INTEGER ::= 28 |
| id-RAB-DataForwardingList-SRNS-CtxReq | INTEGER ::= 29 |
| id-RAB-DataVolumeReportItem | INTEGER ::= 30 |
| id-RAB-DataVolumeReportList | INTEGER ::= 31 |
| id-RAB-DataVolumeReportRequestItem | INTEGER ::= 32 |
| id-RAB-DataVolumeReportRequestList | INTEGER ::= 33 |
| id-RAB-FailedItem | INTEGER ::= 34 |
| id-RAB-FailedList | INTEGER ::= 35 |
| id-RAB-ID | INTEGER ::= 36 |
| id-RAB-QueuedItem | INTEGER ::= 37 |
| id-RAB-QueuedList | INTEGER ::= 38 |
| id-RAB-ReleaseFailedList | INTEGER ::= 39 |
| id-RAB-ReleaseItem | INTEGER ::= 40 |
| id-RAB-ReleaseList | INTEGER ::= 41 |
| id-RAB-ReleasedItem | INTEGER ::= 42 |
| id-RAB-ReleasedList | INTEGER ::= 43 |
| id-RAB-ReleasedList-IuRelComp | INTEGER ::= 44 |
| id-RAB-RelocationReleaseItem | INTEGER ::= 45 |
| id-RAB-RelocationReleaseList | INTEGER ::= 46 |
| id-RAB-SetupItem-RelocReq | INTEGER ::= 47 |
| id-RAB-SetupItem-RelocReqAck | INTEGER ::= 48 |
| id-RAB-SetupList-RelocReq | INTEGER ::= 49 |
| id-RAB-SetupList-RelocReqAck | INTEGER ::= 50 |
| id-RAB-SetupOrModifiedItem | INTEGER ::= 51 |
| id-RAB-SetupOrModifiedList | INTEGER ::= 52 |
| id-RAB-SetupOrModifyItem | INTEGER ::= 53 |
| id-RAB-SetupOrModifyList | INTEGER ::= 54 |
| id-RAC | INTEGER ::= 55 |
| id-RelocationType | INTEGER ::= 56 |
| id-RequestType | INTEGER ::= 57 |
| id-SAI | INTEGER ::= 58 |
| id-SAPI | INTEGER ::= 59 |
| id-SourceID | INTEGER ::= 60 |
| id-SourceRNC-ToTargetRNC-TransparentContainer | INTEGER ::= 61 |
| id-TargetID | INTEGER ::= 62 |
| id-TargetRNC-ToSourceRNC-TransparentContainer | INTEGER ::= 63 |
| id-TemporaryUE-ID | INTEGER ::= 64 |
| id-TraceReference | INTEGER ::= 65 |
| id-TraceType | INTEGER ::= 66 |
| id-TransportLayerAddress | INTEGER ::= 67 |

```

id-TriggerID                INTEGER ::= 68
id-UE-ID                     INTEGER ::= 69
id-UL-GTP-PDU-SequenceNumber INTEGER ::= 70
id-RAB-FailedtoReportItem    INTEGER ::= 71
id-RAB-FailedtoReportList    INTEGER ::= 72
id-KeyStatus                 INTEGER ::= 75
id-DRX-CycleLengthCoefficient INTEGER ::= 76
id-IuSigConIdList           INTEGER ::= 77
id-IuSigConIdItem           INTEGER ::= 78
id-IuSigConId                INTEGER ::= 79
id-DirectTransferInformationItem-RANAP-RelocInf INTEGER ::= 80
id-DirectTransferInformationList-RANAP-RelocInf INTEGER ::= 81
id-RAB-ContextItem-RANAP-RelocInf INTEGER ::= 82
id-RAB-ContextList-RANAP-RelocInf INTEGER ::= 83
id-RAB-ContextFailedtoTransferItem INTEGER ::= 84
id-RAB-ContextFailedtoTransferList INTEGER ::= 85
id-GlobalRNC-ID             INTEGER ::= 86
id-RAB-ReleasedItem-IuRelComp INTEGER ::= 87
id-MessageStructure          INTEGER ::= 88
id-Alt-RAB-Parameters        INTEGER ::= 89
id-Ass-RAB-Parameters        INTEGER ::= 90
id-RAB-ModifyList           INTEGER ::= 91
id-RAB-ModifyItem           INTEGER ::= 92
id-TypeOfError               INTEGER ::= 93
id-BroadcastAssistanceDataDecipheringKeys INTEGER ::= 94
id-LocationRelatedDataRequestType INTEGER ::= 95
id-GlobalCN-ID              INTEGER ::= 96
id-LastKnownServiceArea     INTEGER ::= 97
id-SRB-TrCH-Mapping          INTEGER ::= 98
id-VerticalAccuracyCode      INTEGER ::= 111
id-ResponseTime              INTEGER ::= 112
id-PositioningPriority        INTEGER ::= 113
id-ClientType                INTEGER ::= 114

```

END

9.3.7 Container Definitions

```

-- *****
--
-- Container definitions
--
-- *****

RANAP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

```

```

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

IMPORTS
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolExtensionID,
    ProtocolIE-ID
FROM RANAP-CommonDataTypes

    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs
FROM RANAP-Constants;

-- *****
--
-- Class Definition for Protocol IEs
--
-- *****

RANAP-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
--
-- *****

RANAP-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
--
-- *****

RANAP-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
--
-- *****

RANAP-PRIVATE-IES ::= CLASS {
    &id                PrivateIE-ID,
    &criticality        Criticality,
    &Value,
    &presence          Presence
}
WITH SYNTAX {
    ID                &id
    CRITICALITY        &criticality
    TYPE              &Value
    PRESENCE          &presence
}

-- *****
--
-- Container for Protocol IEs
--
-- *****

ProtocolIE-Container {RANAP-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-Field {{IEsSetParam}}

```

```

ProtocolIE-Field {RANAP-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
    id                RANAP-PROTOCOL-IES.&id                ({IEsSetParam}),
    criticality       RANAP-PROTOCOL-IES.&criticality       ({IEsSetParam}@id}),
    value            RANAP-PROTOCOL-IES.&Value            ({IEsSetParam}@id)
}

-- *****
--
-- Container for Protocol IE Pairs
--
-- *****

ProtocolIE-ContainerPair {RANAP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-FieldPair {{IEsSetParam}}

ProtocolIE-FieldPair {RANAP-PROTOCOL-IES-PAIR : IEsSetParam} ::= SEQUENCE {
    id                RANAP-PROTOCOL-IES-PAIR.&id                ({IEsSetParam}),
    firstCriticality  RANAP-PROTOCOL-IES-PAIR.&firstCriticality  ({IEsSetParam}@id}),
    firstValue       RANAP-PROTOCOL-IES-PAIR.&FirstValue       ({IEsSetParam}@id}),
    secondCriticality RANAP-PROTOCOL-IES-PAIR.&secondCriticality ({IEsSetParam}@id}),
    secondValue      RANAP-PROTOCOL-IES-PAIR.&SecondValue      ({IEsSetParam}@id)
}

-- *****
--
-- Container Lists for Protocol IE Containers
--
-- *****

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

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

-- *****
--
-- Container for Protocol Extensions
--
-- *****

ProtocolExtensionContainer {RANAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
    SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
    ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {RANAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
    id                RANAP-PROTOCOL-EXTENSION.&id                ({ExtensionSetParam}),
    criticality       RANAP-PROTOCOL-EXTENSION.&criticality       ({ExtensionSetParam}@id}),
    extensionValue    RANAP-PROTOCOL-EXTENSION.&Extension        ({ExtensionSetParam}@id)
}

```

```
-- *****
--
-- Container for Private IEs
--
-- *****

PrivateIE-Container {RANAP-PRIVATE-IES : IEsSetParam } ::=
  SEQUENCE (SIZE (1.. maxPrivateIEs)) OF
    PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {RANAP-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
  id          RANAP-PRIVATE-IES.&id          ({IEsSetParam}),
  criticality RANAP-PRIVATE-IES.&criticality ({IEsSetParam}@id),
  value       RANAP-PRIVATE-IES.&Value      ({IEsSetParam}@id)
}

END
```


9.4 Message Transfer Syntax

RANAP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ref. [13].

The following encoding rules apply in addition to what has been specified in X.691 [13]:

When a bitstring value is placed in a bit-field as specified in 15.6 to 15.11 in [13], the leading bit of the bitstring value shall be placed in the leading bit of the bit-field, and the trailing bit of the bitstring value shall be placed in the trailing bit of the bit-field.

NOTE - When using the "bstring" notation, the leading bit of the bitstring value is on the left, and the trailing bit of the bitstring value is on the right. The term "leading bit" is to be interpreted as equal to the term "first bit" defined in [14].

9.5 Timers

$T_{\text{RELOCprep}}$

- Specifies the maximum time for Relocation Preparation procedure in the source RNC.

$T_{\text{RELOCoverall}}$

- Specifies the maximum time for the protection of overall Relocation procedure in the source RNC.

$T_{\text{RELOCalloc}}$

- Specifies the maximum time for Relocation Resource Allocation procedure in the CN.

$T_{\text{RELOCcomplete}}$

- Specifies the maximum time for waiting the relocation completion in the CN.

T_{RABAssgt}

- Specifies the maximum time in the CN for the whole RAB Assignment procedure.

T_{QUEUING}

- Specifies the maximum time in the RNC for queuing of the request of RAB establishment or modification.

T_{DATAfwd}

- Specifies the maximum time for GTP-PDU forwarding at the source RNC during relocation of SRNS.

T_{igOC}

- While this timer is running, all OVERLOAD messages or signalling point congested information received at the CN are ignored.

T_{igOR}

- While this timer is running, all OVERLOAD messages or signalling point congested information received at the RNC are ignored.

T_{inTC}

- While this timer is running, the CN is not allowed to increase traffic.

T_{inTR}

- While this timer is running, the RNC is not allowed to increase traffic.

T_{RafC}

- Specifies the maximum time for Reset procedure in the RNC.

T_{RatC}

- Specifies a guard period in the RNC before sending a RESET ACKNOWLEDGE message.

T_{RatR}

- Specifies the maximum time for Reset procedure in the CN.

T_{RatR}

- Specifies a guard period in the CN before sending a RESET ACKNOWLEDGE message.

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:



Figure 39: Protocol Errors in RANAP.

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 RANAP 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 (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 RANAP 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).

Note that this restriction is not applicable to a sending entity for constructing messages.

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, RANAP 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 RANAP-PROTOCOL-IES, RANAP-PROTOCOL-IES-PAIR, RANAP-PROTOCOL-EXTENSION or RANAP-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 IEs/IE group other than the *Procedure Code* 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. In the *Information Element Criticality Diagnostics* IE the *Repetition Number* IE shall be included and in addition, if the not comprehended IE/IE group is not at message hierarchy level 1 (top level; see annex A2) also the *Message Structure* IE shall be included.

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. In the *Information Element Criticality Diagnostics* IE the *Repetition Number* IE shall be included and in

addition, if the not comprehended IE/IE group is not at message hierarchy level 1 (top level; see annex A2) also the *Message Structure IE* shall be included.

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 message *initiating* a procedure that does not have a message to report the outcome of the 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 initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.
- if a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.

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/IE groups 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. In the *Information Element Criticality Diagnostics IE* the *Repetition Number IE* shall be included and in addition, if the missing IE/IE group is not at message hierarchy level 1 (top level; see annex A2) also the *Message Structure IE* shall be included.

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. In the *Information Element Criticality Diagnostics IE* the *Repetition Number IE* shall be included and in

addition, if the missing IE/IE group is not at message hierarchy level 1 (top level; see annex A2) also the *Message Structure* IE shall be included.

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.

Class 3:

Where the logical error occurs in a request message of a class 3 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 3 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 3 procedure, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.

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.

11 Special Procedures for RNC to RNC Communication

11.1 General

This subclause specifies special procedures that are used for RNC to RNC communication, and use other transport means than the RANAP procedures specified in clause 8.

11.2 RANAP Relocation Information

11.2.1 General

The purpose of the RANAP Relocation Information procedure is to handle the RANAP related information that is carried transparently during relocation from source RNC to target RNC by RNSAP via Iur Interface.

11.2.2 Operation

When during relocation it becomes necessary in the source RNC to generate RANAP information for transfer to the relocation target, the RNC shall form a RANAP RELOCATION INFORMATION message. The message shall be encoded according to the encoding rules specified for RANAP in the similar manner as for the normal RANAP messages. The outcome of the encoding will be an octet string, which shall not be sent to the CN via the Iu Interface, but it shall be given to the appropriate local process for transparent transfer to the target RNC.

When the RANAP process in the target RNC receives an octet string containing RANAP RELOCATION INFORMATION message that had been transparently transferred from the source RNC, it shall decode it according to

the encoding rules specified for RANAP. This process is similar to receiving any normal RANAP message. The decoded information shall be passed to the appropriate processes in the RNC.

The RANAP RELOCATION INFORMATION message may contain the *Direct Transfer Information* IE and the *RAB Contexts* IE. If present, the *Direct Transfer Information* IE shall contain the *NAS-PDU* IE, the *SAPI* IE and the *CN Domain Indicator* IE. If present, the *RAB Contexts* IE shall contain for each addressed RAB the *RAB ID* IE and, if available, the *DL GTP-PDU Sequence Number* IE, the *UL GTP-PDU Sequence Number* IE, the *DL N-PDU Sequence Number* IE or the *UL N-PDU Sequence Number* IE.

Annex A (informative): RANAP guidelines

A.1 Rules for building RANAP messages

A.1.1 Rules for RANAP messages that shall contain the CN Domain Indicator IE

Based on the principles described in [3], following rules can be deduced:

- 1) Any RANAP message initiating a connection oriented signalling connection shall contain the *CN Domain Indicator* IE. For the time being, two such RANAP messages are known: INITIAL UE MESSAGE message and RELOCATION REQUEST message.
- 2) Any RANAP message belonging to class 1 procedures that uses connectionless signalling shall contain the *CN Domain Indicator* IE.
- 3) Following RANAP message belonging to class 2 procedures that uses connectionless signalling shall contain the *CN Domain Indicator* IE: PAGING message and ERROR INDICATION message, the OVERLOAD message in DL direction (see chapter 8.25.3.1) may contain the *CN Domain Indicator* IE.

A.2 Guidelines for Usage of the Criticality Diagnostics IE

A.2.1 EXAMPLE MESSAGE Layout

Assume the following message format:

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-----------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | | | YES | reject |
| A | M | | | | YES | reject |
| B | M | | | | YES | reject |
| >E | | 1..<maxE> | | | EACH | ignore |
| >>F | | 1..<maxF> | | | - | |
| >>>G | | 0..3, ... | | | EACH | ignore |
| >>H | | 1..<maxH> | | | EACH | ignore |
| >>>G | | 0..3, ... | | | EACH | ignore and notify |
| >>G | M | | | | YES | reject |
| >>J | | 1..<maxJ> | | | - | |
| >>>G | | 0..3, ... | | | EACH | reject |
| C | M | | | | YES | reject |
| >K | | 1..<maxK> | | | EACH | ignore and notify |
| >>L | | 1..<maxL> | | | - | |
| >>>M | O | | | | - | |
| D | M | | | | YES | reject |

Note 1. The IEs F, J, and L do not have assigned criticality. The IEs F, J, and L are consequently realised as the ASN.1 type SEQUENCE OF of "ordinary" ASN.1 type, e.g. INTEGER. On the other hand, the repeatable IEs with assigned criticality are realised as the ASN.1 type SEQUENCE OF of an IE object, e.g. ProtocolIE-Container.

For the corresponding ASN.1 layout, see subclause A.2.4.

A.2.2 Example on a Received EXAMPLE MESSAGE

Assume further more that a received message based on the above tabular format is according to the figure below.

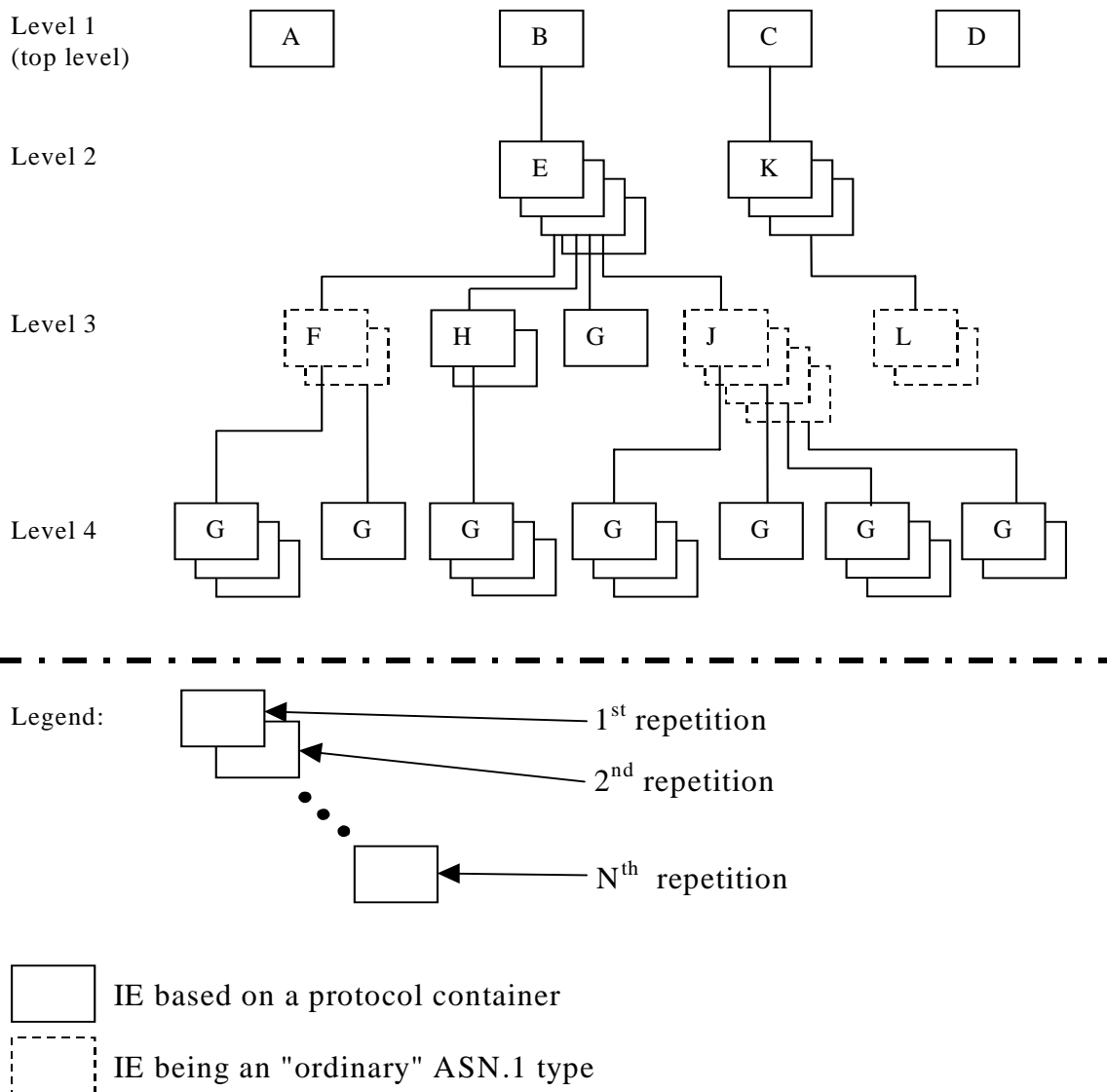


Figure A.1: Example of content of a received RANAP message based on the EXAMPLE MESSAGE

A.2.3 Content of Criticality Diagnostics

A.2.3.1 Example 1

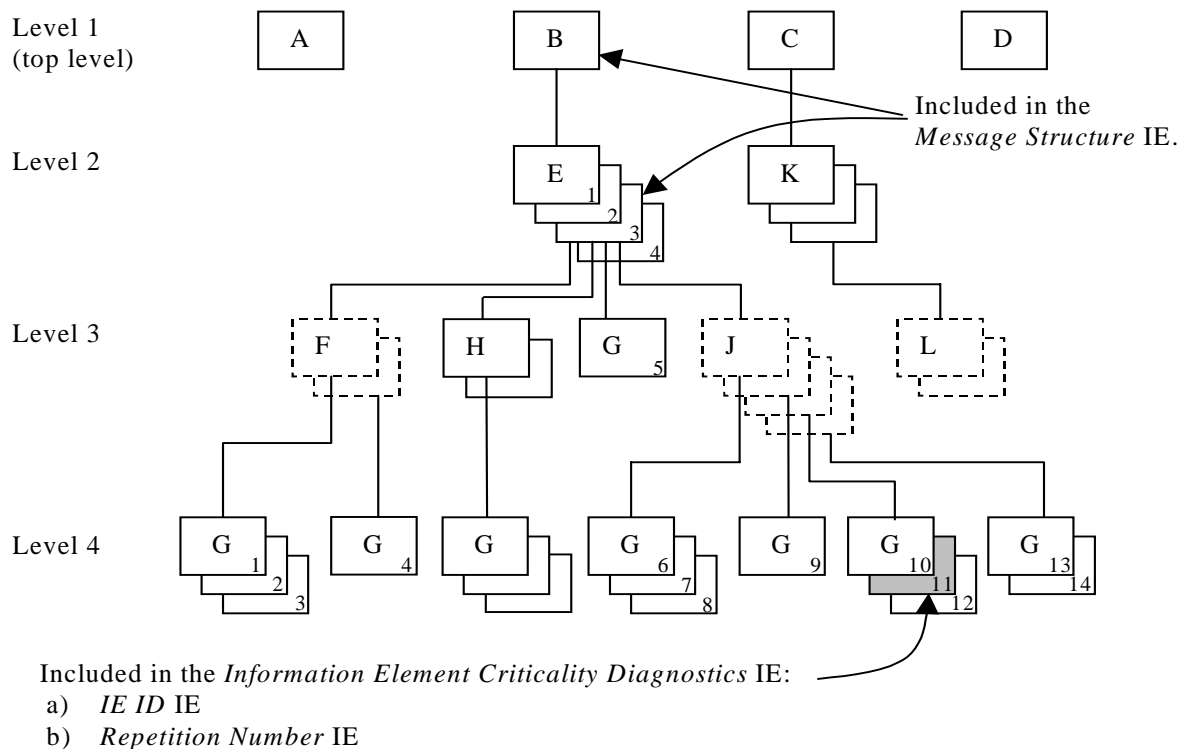


Figure A.2: Example of a received RANAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE J shown in the figure A.2 above, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IE* as follows:

| IE name | Value | Comment |
|---|----------------|---|
| IE Criticality | reject | Criticality for IE on the reported level, i.e. level 4. |
| IE ID | id-G | IE ID from the reported level, i.e. level 4. |
| Repetition Number | 11 | Repetition number on the reported level, i.e. level 4. (Since the IE E (level 2) is the lowest level included in the <i>Message Structure IE</i> this is the eleventh occurrence of IE G within the IE E (level 2). |
| Type of Error | not understood | |
| <i>Message Structure, first repetition</i> | | |
| >IE ID | id-B | IE ID from level 1. |
| <i>Message Structure, second repetition</i> | | |
| >IE ID | id-E | IE ID from the lowest level above the reported level, i.e. level 2. |
| >Repetition Number | 3 | Repetition number from the lowest level above the reported level, i.e. level 2. |

Note 2. The IE J on level 3 cannot be included in the *Message Structure IE* since they have no criticality of their own.

Note 3. The repetition number of the reported IE indicates the number of repetitions of IE G received up to the detected erroneous repetition, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.2.3.2 Example 2

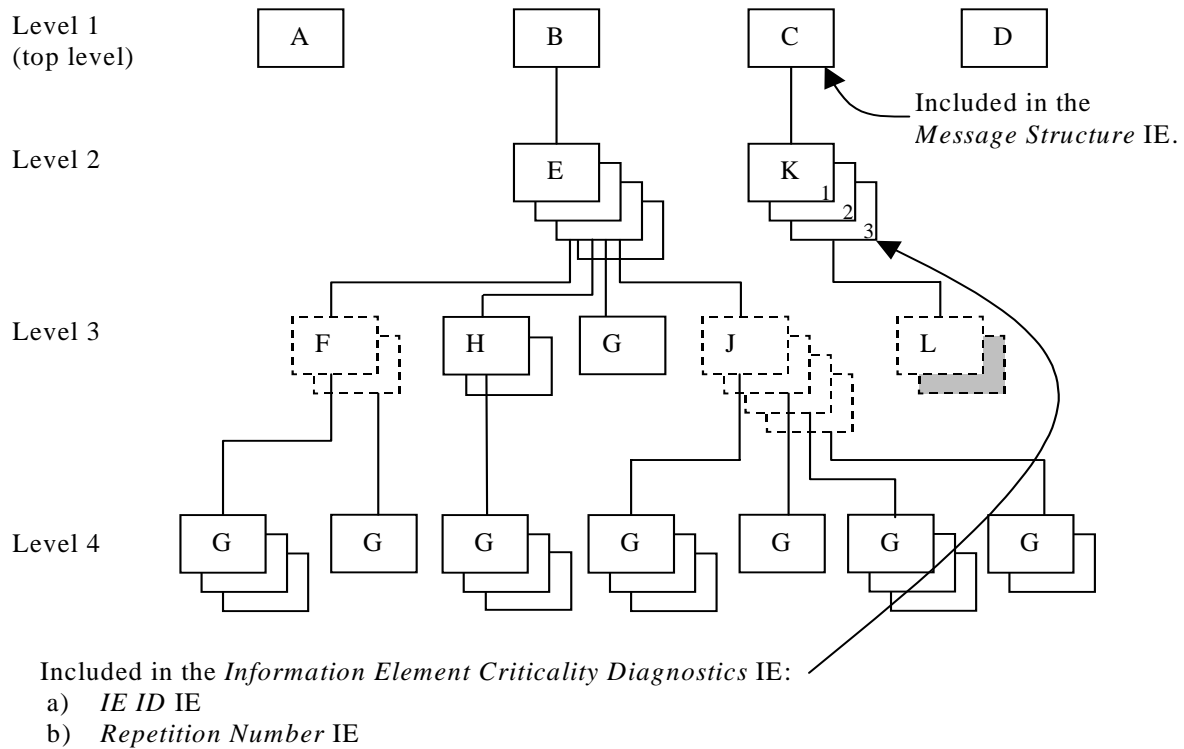


Figure A.3: Example of a received RANAP message containing a not comprehended IE

If there is an error within the second instance (marked as grey) in the sequence (IE L in the tabular format) on level 3 below IE K in the structure shown in the figure A.3 above, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IE as follows:

| IE name | Value | Comment |
|--|-------------------|---|
| IE Criticality | ignore and notify | Criticality for IE on the reported level, i.e. level 2. |
| IE ID | id-K | IE ID from the reported level, i.e. level 2. |
| Repetition Number | 3 | Repetition number on the reported level, i.e. level 2. |
| Type of Error | not understood | |
| <i>Message Structure, first repetition</i> | | |
| >IE ID | id-C | IE ID from the lowest level above the reported level, i.e. level 1. |

Note 4. The IE L on level 3 cannot be reported individually included in the *Message Structure* IE since it has no criticality of its own.

A.2.3.3 Example 3

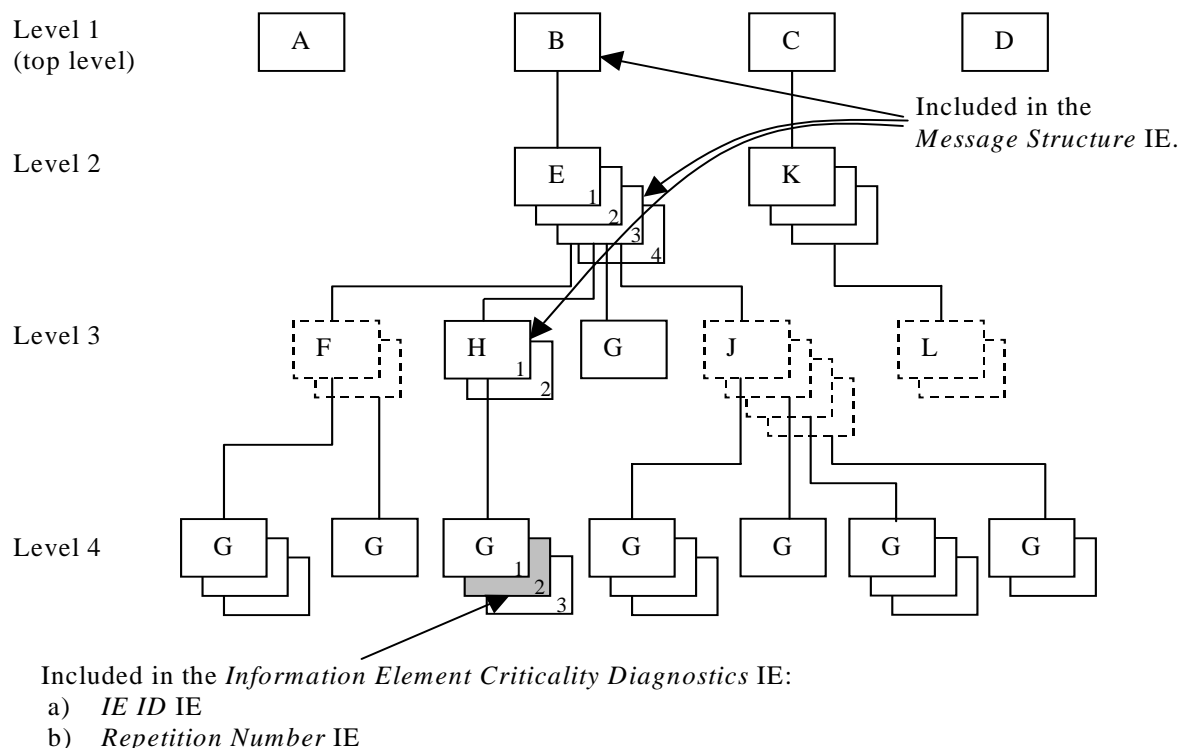


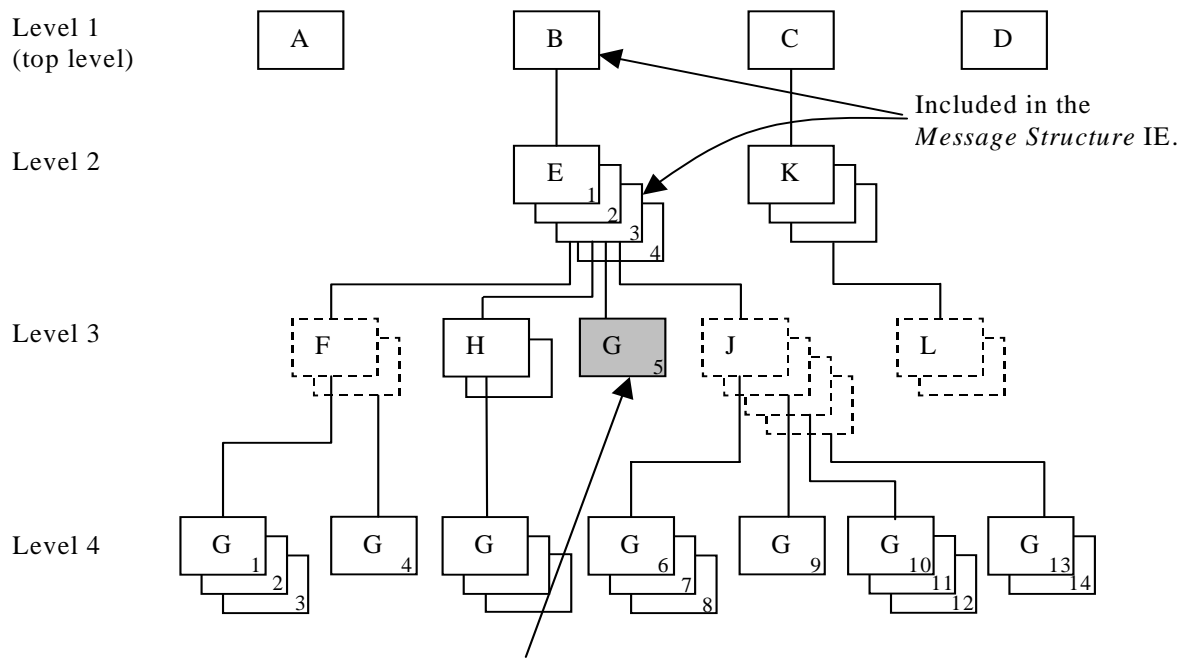
Figure A.4: Example of a received RANAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE H shown in the figure A.4 above, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IE* as follows:

| IE name | Value | Comment |
|---|-------------------|---|
| IE Criticality | ignore and notify | Criticality for IE on the reported level, i.e. level 4. |
| IE ID | id-G | IE ID from the reported level, i.e. level 4. |
| Repetition Number | 2 | Repetition number on the reported level, i.e. level 4. |
| Type of Error | not understood | |
| <i>Message Structure, first repetition</i> | | |
| >IE ID | id-B | IE ID from level 1. |
| <i>Message Structure, second repetition</i> | | |
| >IE ID | id-E | IE ID from level 2. |
| >Repetition Number | 3 | Repetition number from level 2. |
| <i>Message Structure, third repetition</i> | | |
| >IE ID | id-H | IE ID from the lowest level above the reported level, i.e. level 3. |
| >Repetition Number | 1 | Repetition number from the lowest level above the reported level, i.e. level 3. |

Note 5. The repetition number of level 4 indicates the number of repetitions of IE G received up to the detected erroneous repetition, counted below the same instance of the previous level with assigned criticality (instance 1 of IE H on level 3).

A.2.3.4 Example 4



Included in the *Information Element Criticality Diagnostics IE*:

- a) *IE ID IE*
- b) *Repetition Number IE*

Figure A.5: Example of a received RANAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE E shown in the figure A.5 above, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IE* as follows:

| IE name | Value | Comment |
|---|----------------|---|
| IE Criticality | reject | Criticality for IE on the reported level, i.e. level 3. |
| IE ID | id-G | IE ID from the reported level, i.e. level 3. |
| Repetition Number | 5 | Repetition number on the reported level, i.e. level 3. (Since the IE E (level 2) is the lowest level included in the <i>Message Structure IE</i> this is the fifth occurrence of IE G within the IE E (level 2). |
| Type of Error | not understood | |
| <i>Message Structure, first repetition</i> | | |
| >IE ID | id-B | IE ID from level 1. |
| <i>Message Structure, second repetition</i> | | |
| >IE ID | id-E | IE ID from the lowest level above the reported level, i.e. level 2. |
| >Repetition Number | 3 | Repetition number from the lowest level above the reported level, i.e. level 2. |

Note 6. The repetition number of the reported IE indicates the number of repetitions of IE G received up to the detected erroneous repetition, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.2.3.5 Example 5

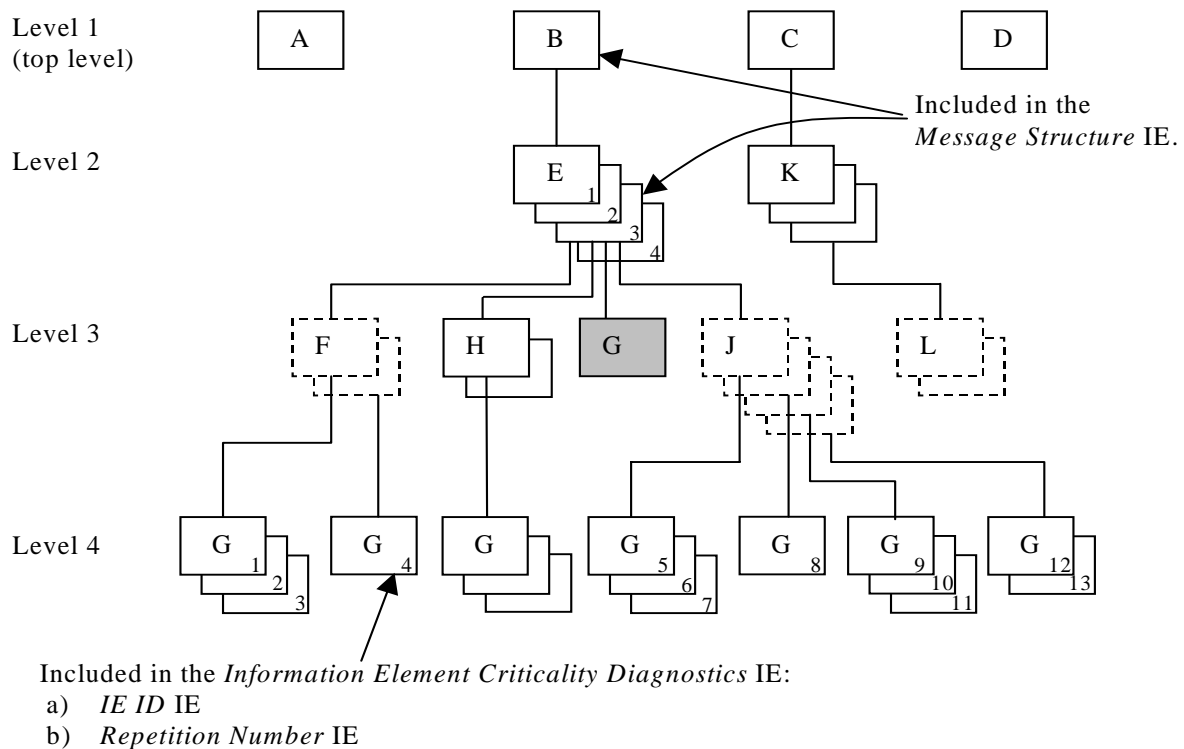


Figure A.6: Example of a received RANAP message with a missing IE

If the instance marked as grey in the IE G in the IE E shown in the figure A.6 above, is missing this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IE as follows:

| IE name | Value | Comment |
|---|---------|--|
| IE Criticality | reject | Criticality for IE on the reported level, i.e. level 3. |
| IE ID | id-G | IE ID from the reported level, i.e. level 3. |
| Repetition Number | 4 | Repetition number up to the missing IE on the reported level, i.e. level 3. (Since the IE E (level 2) is the lowest level included in the <i>Message Structure</i> IE there have been four occurrences of IE G within the IE E (level 2) up to the missing occurrence. |
| Type of Error | missing | |
| <i>Message Structure, first repetition</i> | | |
| >IE ID | id-B | IE ID from level 1. |
| <i>Message Structure, second repetition</i> | | |
| >IE ID | id-E | IE ID from the lowest level above the reported level, i.e. level 2. |
| >Repetition Number | 3 | Repetition number from the lowest level above the reported level, i.e. level 2. |

Note 7. The repetition number of the reported IE indicates the number of repetitions of IE G received up to but not including the missing occurrence, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.2.4 ASN.1 of EXAMPLE MESSAGE

```

ExampleMessage ::= SEQUENCE {
    ProtocolIEs          ProtocolIE-Container          {{ExampleMessage-IEs}},
    ProtocolExtensions  ProtocolExtensionContainer    {{ExampleMessage-Extensions}}  OPTIONAL,
    ...
}

ExampleMessage-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-A    CRITICALITY reject  TYPE A  PRESENCE mandatory} |
    { ID id-B    CRITICALITY reject  TYPE B  PRESENCE mandatory} |
    { ID id-C    CRITICALITY reject  TYPE C  PRESENCE mandatory} |
    { ID id-D    CRITICALITY reject  TYPE D  PRESENCE mandatory} ,
    ...
}

B ::= SEQUENCE {
    e                E-List,
    iE-Extensions   ProtocolExtensionContainer { {B-ExtIEs} }  OPTIONAL,
    ...
}

B-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

E-List ::= SEQUENCE (SIZE (1..maxE)) OF ProtocolIE-Container { {E-IEs} }

E-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-E    CRITICALITY ignore  TYPE E  PRESENCE mandatory } ,
    ...
}

E ::= SEQUENCE {
    f                F-List,
    h                H-List,
    g                G-List1,
    j                J-List,
    iE-Extensions   ProtocolExtensionContainer { {E-ExtIEs} }  OPTIONAL,
    ...
}

E-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

F-List ::= SEQUENCE (SIZE (1..maxF)) OF F

F ::= SEQUENCE {
    g                G-List2 OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { {F-ExtIEs} }  OPTIONAL,
    ...
}

F-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

G-List2 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Container { {G2-IEs} }

G2-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-G    CRITICALITY ignore  TYPE G  PRESENCE mandatory } ,
    ...
}

H-List ::= SEQUENCE (SIZE (1..maxH)) OF ProtocolIE-Container { {H-IEs} }

H-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-H    CRITICALITY ignore  TYPE H  PRESENCE mandatory } ,
    ...
}

H ::= SEQUENCE {
    g                G-List3 OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { {H-ExtIEs} }  OPTIONAL,
    ...
}

```

```

H-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

G-List3 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Container { {G3-IEs} }

G3-IEs RANAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY notify  TYPE G  PRESENCE mandatory },
  ...
}

G-List1 ::= ProtocolIE-Container { {G1-IEs} }

G1-IEs RANAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY reject  TYPE G  PRESENCE mandatory },
  ...
}

J-List ::= SEQUENCE (SIZE (1..maxJ)) OF J

J ::= SEQUENCE {
  g          G-List4 OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {J-ExtIEs} } OPTIONAL,
  ...
}

J-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

G-List4 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Container { {G4-IEs} }

G4-IEs RANAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY reject  TYPE G  PRESENCE mandatory },
  ...
}

C ::= SEQUENCE {
  k          K-List,
  iE-Extensions ProtocolExtensionContainer { {C-ExtIEs} } OPTIONAL,
  ...
}

C-ExtIEsA -PROTOCOL-EXTENSION ::= {
  ...
}

K-List ::= SEQUENCE (SIZE (1..maxK)) OF ProtocolIE-Container { {K-IEs} }

K-IEs RANAP-PROTOCOL-IES ::= {
  { ID id-K    CRITICALITY notify  TYPE K  PRESENCE mandatory },
  ...
}

K ::= SEQUENCE {
  l          L-List,
  iE-Extensions ProtocolExtensionContainer { {K-ExtIEs} } OPTIONAL,
  ...
}

K-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

L-List ::= SEQUENCE (SIZE (1..maxL)) OF L

L ::= SEQUENCE {
  m          M OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {L-ExtIEs} } OPTIONAL,
  ...
}

L-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

ExampleMessage-Extensions RANAP-PROTOCOL-EXTENSION ::= {

```

} ...

Annex B (informative): Change history

| Change history | | | | | |
|----------------|---------|---|------------------------|-------------|--|
| TSG RAN# | Version | CR | Tdoc RAN | New Version | Subject/Comment |
| RAN_06 | - | - | RP-99746 | 3.0.0 | Approved at TSG RAN #6 and placed under Change Control |
| RAN_07 | 3.0.0 | - | - | 3.1.0 | Approved at TSG RAN #7 |
| RAN_08 | 3.1.0 | - | - | 3.2.0 | Approved at TSG RAN #8 |
| RAN_09 | 3.2.0 | 124-136, 138, 168-171, 173, 174 | RP-000373 | 3.3.0 | Approved at TSG RAN #9 |
| RAN_09 | 3.2.0 | 175, 177-179, 181-184 | RP-000374 | 3.3.0 | Approved at TSG RAN #9 |
| RAN_10 | 3.3.0 | 185-191, 194-199, 201, 203-207, 210-214, 219, 221-232, 234, 235 | RP-000613 RP-000695 | 3.4.0 | Approved at TSG RAN #10 |
| RAN_11 | 3.4.0 | 236, 238, 240-243, 245-246, 248, 249, 253-258, 260, 261, 263, 266 | RP-010110 | 3.5.0 | Approved at TSG RAN #11 |
| RAN_11 | 3.4.0 | 268, 275 | RP-010111 | 3.5.0 | Approved at TSG RAN #11 |

| Change history | | | | | | | |
|----------------|-------|-----------|--|-----|--|-------|-------|
| Date | TSG # | TSG Doc. | CR | Rev | Subject/Comment | Old | New |
| March 01 | 11 | RP-010158 | 271 | | Approved at TSG RAN #11 and placed under Change Control | - | 4.0.0 |
| March 01 | 11 | RP-010189 | 265 | | Approved at TSG RAN #11 and placed under Change Control | - | 4.0.0 |
| March 01 | 11 | RP-010156 | 272, 273, 274 | | Approved at TSG RAN #11 and placed under Change Control | - | 4.0.0 |
| March 01 | 11 | RP-010155 | 252 | | Approved at TSG RAN #11 and placed under Change Control | - | 4.0.0 |
| March 01 | 11 | RP-010163 | 250 | | Approved at TSG RAN #11 and placed under Change Control | - | 4.0.0 |
| 06/2001 | 12 | RP-010454 | 277, 279, 281, 285, 287, 289, 291, 294, 296 299 | | Approved at TSG RAN #12 | 4.0.0 | 4.1.0 |
| 06/2001 | 12 | RP-010375 | 301, 315, 317, 319 323 | | Approved at TSG RAN #12 | 4.0.0 | 4.1.0 |
| 06/2001 | 12 | RP-010392 | 303, 320 | | Approved at TSG RAN #12 | 4.0.0 | 4.1.0 |
| 09/2001 | 13 | RP-010578 | 324 | 1 | Correction to the Error handling of the ERROR INDICATION message | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 326 | 1 | Alignment of Conditional Presence with RAN3 Specification Principles | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 328 | | NAS Synchronisation Indicator also at RAB Establishment | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 329 | 2 | Old BSS to New BSS IE optional in UMTS to GSM handover | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 330 | | Order of elements in bitstrings | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 337 | | Data Forwarding related IEs in RELOCATION COMMAND message | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 339 | 1 | Error handling of the Erroneously Present Conditional IEs | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 345 | 1 | Rapporteurs corrections in RANAP | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010578 | 347 | 3 | Inconsistency in definition of parameters used in INVOKE_TRACE message | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010579 | 359 | 1 | Clarification of chapter 10 | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010579 | 364 | 1 | Condition of SDU format information IE | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010579 | 368 | 1 | Relocation Requirement not to be used | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010594 | 297 | 2 | Clarification on User Plane Version Indication | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010594 | 302 | 7 | Release 4 additions in Iu to support new positioning methods | 4.1.0 | 4.2.0 |
| 09/2001 | 13 | RP-010698 | 244 | 7 | N-to-M relation between CN and UTRAN | 4.1.0 | 4.2.0 |
| 12/2001 | 14 | RP-010895 | 361 | 3 | CR on Priority range | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 365 | | Bitstrings ordering | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 369 | 2 | UP Versions not supported | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 371 | 1 | Location Report Area | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 378 | 1 | Reason for LOCATION REPORT message is not clear | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 380 | 1 | Corrections to RRC information containers | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 383 | | Procedure Code Criticality in Error Indication | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 386 | 2 | Addition of amendment to clarify the PER encoding of bitstrings | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 388 | 2 | Chosen Integrity Protection Algorithm IE over MAP/E interface | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010848 | 390 | | Rapporteurs corrections in RANAP (MCC/MNC) | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010849 | 394 | 1 | Clarification on Location Request not fulfilled | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010849 | 396 | 1 | Subflow SDU Size clarification | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010849 | 400 | | Correction the Clause 10 Error Handling | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010871 | 363 | 1 | Cause value for not accepted relocation request | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010871 | 367 | 1 | Correction to Release 4 additions in Iu to support new positioning methods | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010871 | 372 | | Chapter A.2.1 (EXAMPLE MESSAGE Layout) missing in version 4.2.0 | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010871 | 373 | 1 | N-to-M relation between CN and UTRAN impacts on CN initiated Reset Resource procedure | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010871 | 374 | | Stop Direct Report | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010871 | 384 | 1 | MCC implementation CR for corrections to Release 4 additions in Iu to support new positioning methods. | 4.2.0 | 4.3.0 |
| 12/2001 | 14 | RP-010871 | 397 | 1 | Correction to LCS Vertical Accuracy | 4.2.0 | 4.3.0 |
| 03/2002 | 15 | RP-020164 | 402 | | Question regarding SRNS Context Transfer and SRNS Data Forwarding Initiation | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020164 | 407 | | Intersystem Change and inter-system Handover corrections | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020164 | 418 | | RAB Modification Parameters | 4.3.0 | 4.4.0 |

| | | | | | | | |
|---------|----|-----------|-----|---|---|-------|-------|
| 03/2002 | 15 | RP-020164 | 422 | 1 | Delivery of erroneous SDUs | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020164 | 424 | 2 | Handling of Global RNC-ID in Reset and Reset resource | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020164 | 426 | 2 | RABs concerned by contexts transfer | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020164 | 432 | | Alignment of definition of Guaranteed Bitrate with 25.415 | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020262 | 435 | 4 | Inclusion of "Age of Location IE into LOCATION REPORT" | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020179 | 408 | | Requirements on user plane initialisation moved to 25.415 | 4.3.0 | 4.4.0 |
| 03/2002 | 15 | RP-020179 | 429 | 1 | Correction to LCS Vertical Accuracy Code IE | 4.3.0 | 4.4.0 |
| 06/2002 | 16 | RP-020401 | 413 | 3 | Criticality Information Decoding Failure Handling | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020401 | 416 | 4 | SDU Format Information Presence | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020401 | 439 | 2 | Erroneous Security Mode Control procedure | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020401 | 442 | | Correction of Target RNC-ID | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020417 | 447 | | Extension container for Last Known Service Area IE | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020401 | 450 | | 'EXTENSION INDICATION' PROPOSAL | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020417 | 452 | | Correction of wrong implementation of CR429 | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020401 | 461 | 1 | RNL-TNL coordination in RANAP | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020401 | 464 | 2 | Correction of RNC lu Coordinated relocation | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020401 | 468 | 1 | Clarification for the usage of the cause value | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020417 | 476 | | Transport Layer Address at RAB modification | 4.4.0 | 4.5.0 |
| 06/2002 | 16 | RP-020417 | 478 | 1 | Correction due to the wrong implementation of CR326&244 and error in the CR424 | 4.4.0 | 4.5.0 |
| 09/2002 | 17 | RP-020606 | 480 | | Erroneous criticality in DATA VOLUME REPORT REQUEST a.o. | 4.5.0 | 4.6.0 |
| 09/2002 | 17 | RP-020600 | 483 | 2 | Handling of security at relocation | 4.5.0 | 4.6.0 |
| 09/2002 | 17 | RP-020600 | 494 | 1 | Codec change during SRNS relocation | 4.5.0 | 4.6.0 |
| 09/2002 | 17 | RP-020600 | 508 | 1 | Correction to RANAP cause value range | 4.5.0 | 4.6.0 |
| 09/2002 | 17 | RP-020606 | 511 | | New cause value for RAB release request | 4.5.0 | 4.6.0 |
| 09/2002 | 17 | RP-020606 | 512 | | LCS alignment with stage 2 | 4.5.0 | 4.6.0 |
| 12/2002 | 18 | RP-020751 | 516 | | Correction to RANAP RESET procedure | 4.6.0 | 4.7.0 |
| 12/2002 | 18 | RP-020751 | 521 | 1 | Rel4 Common CR after RANAP review | 4.6.0 | 4.7.0 |
| 12/2002 | 18 | RP-020860 | 525 | 4 | Correction to enable Rel4 extensions in Location Reporting Control procedure. | 4.6.0 | 4.7.0 |
| 12/2002 | 18 | RP-020741 | 528 | 2 | Correction of RAB Subflows and SRBs mapping onto the transport channel identifiers of lur in the Source RNC to Target RNC transparent container | 4.6.0 | 4.7.0 |
| 12/2002 | 18 | RP-020741 | 531 | 1 | Correction of coding of GSM IEs | 4.6.0 | 4.7.0 |
| 12/2002 | 18 | RP-020751 | 534 | 1 | Encoding of information elements. | 4.6.0 | 4.7.0 |
| 03/2003 | 19 | RP-030067 | 549 | | Alignment of 'Uncertainty Ellipse' with RRC | 4.7.0 | 4.8.0 |
| 03/2003 | 19 | RP-030056 | 551 | 1 | Duplicated lu connection identifiers | 4.7.0 | 4.8.0 |
| 03/2003 | 19 | RP-030056 | 561 | | Essential correction of IMSI coding | 4.7.0 | 4.8.0 |
| 06/2003 | 20 | RP-030314 | 569 | 2 | Essential Correction of lu Release Issue | 4.8.0 | 4.9.0 |
| 06/2003 | 20 | RP-030326 | 571 | 1 | Correction of Failure message used for logical errors | 4.8.0 | 4.9.0 |
| 06/2003 | 20 | RP-030316 | 575 | 2 | lu UP Initialisation during RAB modification | 4.8.0 | 4.9.0 |

History

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| V4.1.0 | June 2001 | Publication |
| V4.2.0 | September 2001 | Publication |
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