3GPP TS 25.468 V16.0.0 (2020-07)

Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Radio Access Network;

UTRAN Iuh Interface RANAP User Adaption (RUA) signalling

(Release 16)

 

The present document has been developed within the 3rd Generation Partnership Project (3GPP TM) and may be further elaborated for the purposes of 3GPP.  
The present document has not been subject to any approval process by the 3GPPOrganizational Partners and shall not be implemented.  
This Specification is provided for future development work within 3GPPonly. The Organizational Partners accept no liability for any use of this Specification.  
Specifications and reports for implementation of the 3GPP TM system should be obtained via the 3GPP Organizational Partners' Publications Offices.

.

Keywords

UMTS, radio

***3GPP***

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis

Valbonne - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

***Copyright Notification***

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© 2020, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).

All rights reserved.

UMTS™ is a Trade Mark of ETSI registered for the benefit of its members

3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners  
LTE™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners

GSM® and the GSM logo are registered and owned by the GSM Association

Contents

Foreword [5](#__RefHeading___Toc518315102)

1 Scope [6](#__RefHeading___Toc518315103)

2 References [6](#__RefHeading___Toc518315104)

3 Definitions and abbreviations [6](#__RefHeading___Toc518315105)

3.1 Definitions [6](#__RefHeading___Toc518315106)

3.2 Abbreviations [6](#__RefHeading___Toc518315107)

4 General [7](#__RefHeading___Toc518315108)

4.1 Procedure specification principles [7](#__RefHeading___Toc518315109)

4.2 Forwards and backwards compatibility [7](#__RefHeading___Toc518315110)

4.3 Specification notations [7](#__RefHeading___Toc518315111)

5 RUA services [8](#__RefHeading___Toc518315112)

6 Services expected from the transport layer [8](#__RefHeading___Toc518315113)

7 Functions of RUA [8](#__RefHeading___Toc518315114)

8 RUA procedures [8](#__RefHeading___Toc518315115)

8.1 Elementary Procedures [8](#__RefHeading___Toc518315116)

8.2 Connect [8](#__RefHeading___Toc518315117)

8.2.1 General [8](#__RefHeading___Toc518315118)

8.2.2 Successful Operation [9](#__RefHeading___Toc518315119)

8.2.2.1 HNB Originated [9](#__RefHeading___Toc518315120)

8.2.2.2 HNB-GW Originated [9](#__RefHeading___Toc518315121)

8.3 Direct Transfer [10](#__RefHeading___Toc518315122)

8.3.1 General [10](#__RefHeading___Toc518315123)

8.3.2 Successful Operation (HNB-GW Originated) [10](#__RefHeading___Toc518315124)

8.3.3 Successful Operation (HNB Originated) [10](#__RefHeading___Toc518315125)

8.3.4 Abnormal Conditions [10](#__RefHeading___Toc518315126)

8.4 Disconnect [10](#__RefHeading___Toc518315127)

8.4.1 General [10](#__RefHeading___Toc518315128)

8.4.2 Successful Operation (HNB Originated) [11](#__RefHeading___Toc518315129)

8.4.3 Successful Operation (HNB-GW Originated) [11](#__RefHeading___Toc518315130)

8.4.4 Abnormal Conditions [11](#__RefHeading___Toc518315131)

8.5 Connectionless Transfer [11](#__RefHeading___Toc518315132)

8.5.1 General [11](#__RefHeading___Toc518315133)

8.5.2 Successful Operation (HNB-GW Originated) [11](#__RefHeading___Toc518315134)

8.5.3 Successful Operation (HNB Originated) [12](#__RefHeading___Toc518315135)

8.5.4 Abnormal Conditions [12](#__RefHeading___Toc518315136)

8.6 Error Indication [12](#__RefHeading___Toc518315137)

8.6.1 General [12](#__RefHeading___Toc518315138)

8.6.2 Successful Operation [12](#__RefHeading___Toc518315139)

9 Elements for RUA communication [13](#__RefHeading___Toc518315140)

9.1 Message functional definition and content [13](#__RefHeading___Toc518315141)

9.1.1 General [13](#__RefHeading___Toc518315142)

9.1.2 Message contents [13](#__RefHeading___Toc518315143)

9.1.2.1 Presence [13](#__RefHeading___Toc518315144)

9.1.2.2 Criticality [13](#__RefHeading___Toc518315145)

9.1.2.3 Range [13](#__RefHeading___Toc518315146)

9.1.2.4 Assigned Criticality [13](#__RefHeading___Toc518315147)

9.1.3 CONNECT [14](#__RefHeading___Toc518315148)

9.1.4 DIRECT TRANSFER [14](#__RefHeading___Toc518315149)

9.1.5 DISCONNECT [14](#__RefHeading___Toc518315150)

9.1.6 CONNECTIONLESS TRANSFER [14](#__RefHeading___Toc518315151)

9.1.7 ERROR INDICATION [15](#__RefHeading___Toc518315152)

9.2 Information Element Definitions [15](#__RefHeading___Toc518315153)

9.2.0 General [15](#__RefHeading___Toc518315154)

9.2.1 Message Type [15](#__RefHeading___Toc518315155)

9.2.2 Context ID [15](#__RefHeading___Toc518315156)

9.2.3 Establishment Cause [16](#__RefHeading___Toc518315157)

9.2.4 Intra Domain NAS Node Selector [16](#__RefHeading___Toc518315158)

9.2.5 RANAP Message [18](#__RefHeading___Toc518315159)

9.2.6 CN Domain Indicator [18](#__RefHeading___Toc518315160)

9.2.7 Cause [18](#__RefHeading___Toc518315161)

9.2.8 Criticality Diagnostics [20](#__RefHeading___Toc518315162)

9.2.9 CSG Membership Status [21](#__RefHeading___Toc518315163)

9.3 Message and Information Element Abstract Syntax (with ASN.1) [22](#__RefHeading___Toc518315164)

9.3.0 General [22](#__RefHeading___Toc518315165)

9.3.1 Usage of private message mechanism for non-standard use [22](#__RefHeading___Toc518315166)

9.3.2 Elementary Procedure Definitions [22](#__RefHeading___Toc518315167)

9.3.3 PDU definitions [25](#__RefHeading___Toc518315168)

9.3.4 Information Element definitions [29](#__RefHeading___Toc518315169)

9.3.5 Common definitions [33](#__RefHeading___Toc518315170)

9.3.6 Constant definitions [34](#__RefHeading___Toc518315171)

9.3.7 Container definitions [35](#__RefHeading___Toc518315172)

9.4 Message transfer syntax [38](#__RefHeading___Toc518315173)

10 Handling of unknown, unforeseen, and erroneous protocol data [39](#__RefHeading___Toc518315174)

10.1 General [39](#__RefHeading___Toc518315175)

10.2 Transfer Syntax Error [39](#__RefHeading___Toc518315176)

10.3 Abstract Syntax Error [39](#__RefHeading___Toc518315177)

10.3.1 General [39](#__RefHeading___Toc518315178)

10.3.2 Criticality Information [40](#__RefHeading___Toc518315179)

10.3.3 Presence Information [40](#__RefHeading___Toc518315180)

10.3.4 Not comprehended IE/IE group [41](#__RefHeading___Toc518315181)

10.3.4.1 Procedure Code [41](#__RefHeading___Toc518315182)

10.3.4.1A Type of Message [41](#__RefHeading___Toc518315183)

10.3.4.2 IEs other than the Procedure Code and Type of Message [41](#__RefHeading___Toc518315184)

10.3.5 Missing IE or IE group [42](#__RefHeading___Toc518315185)

10.3.6 IEs or IE groups received in wrong order or with too many occurrences or erroneously present [43](#__RefHeading___Toc518315186)

10.4 Logical Error [44](#__RefHeading___Toc518315187)

10.5 Exceptions [44](#__RefHeading___Toc518315188)

Annex A (informative): Change History [45](#__RefHeading___Toc518315189)

# Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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

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

# 1 Scope

The present document specifies the *RANAP User Adaption* (RUA)between the Home Node B (HNB) and the Home Node B Gateway (HNB-GW). It fulfils the HNB- HNB-GW communication requirements specified in TS 25.467 [3] and is defined over the Iuh – reference point. It provides transparent transport for RANAP messages.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

 References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

 For a specific reference, subsequent revisions do not apply.

 For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] Void

[2] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[3] 3GPP TS 25.467: "UTRAN architecture for 3G Home NodeB; Stage 2".

[4] 3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error handling".

[5] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

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

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

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

[9] IETF RFC 4960 (2007-09): "Stream Control Transmission Protocol".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions below apply. Terms and definitions not defined below can be found in TR 21.905 [5].

**UE-associated Signalling Connection**: UE-associated Signalling Connection is a logical connection between HNB and HNB-GW associated to an Iu signalling connection for a particular UE over the single signalling connection between the HNB and HNB-GW*,* identified by the identities *Context ID* and *CN Domain ID.*

## 3.2 Abbreviations

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

CN Core Network

EP Elementary Procedure

HNB Home Node B

HNB-GW Home Node B Gateway

PDU Protocol Data Unit

RUA RANAP User Adaption

SCTP Stream Control Transmission Protocol

# 4 General

The protocol described in the present document is the protocol between HNB-GW and HNB.

## 4.1 Procedure specification principles

The principle for specifying the procedure logic is to specify the functional behaviour of the HNB & HNB-GW exactly and completely..

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

- The procedure text discriminates between:

1) Functionality which "shall" be executed:

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

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

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

- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included.

## 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. HNB Registration 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. CONNECT message.

IE When referring to an information element (IE) in the specification the *Information Element Name* is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. *HNB Identity* IE.

Value of an IE When referring to the value of an information element (IE) in the specification the "Value" is written as it is specified in subclause 9.2 enclosed by quotation marks, e.g. "Abstract Syntax Error (Reject)" or "Background ".

# 5 RUA services

RUA provides the signalling service between the HNB and the HNB-GW that is required to fulfil the RUA functions described in Clause 7.

# 6 Services expected from the transport layer

Following service is expected from the transport layer:

- reliable and in sequence delivery of Signalling data using SCTP (IETF RFC 4960 [9])

# 7 Functions of RUA

The RUA has the following functions:

- Transparent transfer of RANAP messages

- Error Handling. This function allows the reporting of general error situations, for which function specific error messages have not been defined.

These functions are implemented by one or several RUA elementary procedures described in the following clauses.

# 8 RUA procedures

## 8.1 Elementary Procedures

Table 1 summarizes the EPs.

Table 1; Elementary procedures

|  |  |
| --- | --- |
| Elementary Procedure | Message |
| Connect | CONNECT |
| Direct Transfer | DIRECT TRANSFER |
| Disconnect | DISCONNECT |
| Connectionless Transfer | CONNECTIONLESS TRANSFER |
| Error Indication | ERROR INDICATION |

## 8.2 Connect

### 8.2.1 General

The HNB or HNB-GW can initiate this procedure to establish an UE-associated Signalling Connection and carry a RANAP message.

### 8.2.2 Successful Operation

#### 8.2.2.1 HNB Originated



Figure 1: Connect to HNB-GW procedure

This procedure is used to carry the first RANAP message from the HNB to the HNB-GW.

Additional information is provided to enable the HNB-GW to handle the RANAP message without it being necessary to inspect the contents and trigger the establishment of a new UE-associated Signalling Connection between HNB and HNB-GW, which is directly mapped to the Iu Signalling Connection the RANAP message refers to.

If HNB receives the *Intra Domain NAS Node Selector* IE in the RRC message, the HNB shall, if supported, include the *Intra Domain NAS Node Selector* IE in the CONNECT message.

NOTE: The Context ID is used as the Iu Signalling Connection identifier in the corresponding RANAP messages.

#### 8.2.2.2 HNB-GW Originated



Figure 1A: Connect to HNB procedure

This procedure is used to carry the first RANAP message from the HNB-GW to an HNB for a particular UE, e.g. RANAP RELOCATION REQUEST. This shall trigger the establishment of a new UE-associated Signalling Connection between HNB-GW and HNB, which is directly mapped to the Iu Signalling Connection the RANAP message refers to.

The HNB-GW allocates the context id.

If the first RANAP message received by the HNB GW is a RELOCATION REQUEST message and the RELOCATION REQUEST does not contain the CSG ID of the target cell the RUA CONNECT message may contain the *CSG Membership Status* IE.

Additional information is provided by the HNB-GW to the HNB to assist the HNB in handling the RANAP message.

## 8.3 Direct Transfer

### 8.3.1 General

This procedure is initiated by either the HNB or HNB-GW to transport a RANAP message between the two nodes. The HNB-GW can initiate this procedure to establish an UE-associated Signalling Connection when carrying the second RANAP RELOCATION REQUEST message.

### 8.3.2 Successful Operation (HNB-GW Originated)



Figure 2: Direct Transfer to HNB

This procedure is used to carry any DL connection-oriented RANAP message defined in TS 25.413 [2] from the HNB-GW to the HNB.

This procedure can be used to carry the second RANAP RELOCATION REQUEST message from the HNB-GW to an HNB for a particular UE. This shall trigger the establishment of a second UE-associated Signalling Connection between HNB-GW and HNB, which is directly mapped to the Iu Signalling Connection the RANAP message refers to.

### 8.3.3 Successful Operation (HNB Originated)



Figure 3: Direct Transfer to HNB-GW

This procedure is used to carry any UL connection-oriented RANAP message defined in TS 25.413 [2], except those carried in CONNECT or DISCONNECT messages, from the HNB to the HNB-GW.

### 8.3.4 Abnormal Conditions

-

## 8.4 Disconnect

### 8.4.1 General

This procedure is initiated by either the HNB or the HNB-GW to terminate an UE-associated Signalling Connection between these nodes.

### 8.4.2 Successful Operation (HNB Originated)



Figure 4: Disconnect to HNB-GW

This procedure is used to carry the last RANAP (TS 25.413 [2]) UL connection-oriented message of a given Iu Signalling Connection to the HNB-GW over the Iuh interface. This procedure may also be used to indicate error conditions at the HNB.

### 8.4.3 Successful Operation (HNB-GW Originated)



Figure 5: Disconnect to HNB

This procedure is initiated by the HNB-GW to close a given Iu Signalling Connection either in case of error or in case of normal operation when an Iu Signalling Connection request towards the CN is refused.

### 8.4.4 Abnormal Conditions

-

## 8.5 Connectionless Transfer

### 8.5.1 General

This procedure is initiated by either the HNB or the HNB-GW to transfer connectionless RANAP messages between the HNB and HNB-GW.

### 8.5.2 Successful Operation (HNB-GW Originated)



Figure 6: Connectionless Transfer to HNB

This procedure is used to carry any DL connectionless RANAP message defined in TS 25.413 [2] from the HNB-GW to the HNB.

### 8.5.3 Successful Operation (HNB Originated)



Figure 7: Connectionless Transfer to HNB-GW

This procedure is used to carry any UL connectionless RANAP message defined in TS 25.413 [2] from the HNB to the HNB-GW.

### 8.5.4 Abnormal Conditions

-

## 8.6 Error Indication

### 8.6.1 General

The Error Indication procedure is initiated by either HNB or HNB-GW to report detected errors in one incoming message.

### 8.6.2 Successful Operation



Figure 8 Error Indication HNB Originated, Successful Operation



Figure 9 Error Indication HNB-GW Originated, Successful Operation

# 9 Elements for RUA communication

## 9.1 Message functional definition and content

### 9.1.1 General

Section 9.1 presents the contents of RUA messages in tabular format. The corresponding ASN.1 definition is presented in section 9.3. In case there is contradiction between the tabular format in section 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 TR 25.921 [4].

For each message there is, a table listing the signalling elements in their order of appearance in the transmitted message.

### 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 3

Table 2: Meaning of abbreviations used in RUA messages

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

#### 9.1.2.2 Criticality

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

Table 3: 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 CONNECT

This message is sent by either the HNB to the HNB-GW or the HNB-GW to the HNB to establish a signalling connection and carry a RANAP message.

Direction: HNB  HNB-GW and HNB-GW  HNB

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PARAMETER | PRESENCE | RANGE | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.1 |  | YES | ignore |
| CN Domain Indicator | M |  | 9.2.6 |  | YES | reject |
| Context ID | M |  | 9.2.2 |  | YES | reject |
| Intra Domain NAS Node Selector | O |  | 9.2.4 |  | YES | ignore |
| Establishment Cause | M |  | 9.2.3 |  | YES | reject |
| RANAP Message | M |  | 9.2.5 |  | YES | reject |
| CSG Membership Status | O |  | 9.2.9 |  | YES | ignore |

### 9.1.4 DIRECT TRANSFER

This message is sent by either the HNB to the HNB-GW or the HNB-GW to the HNB to transport a connection-oriented RANAP message between the two nodes.

Direction: HNB  HNB-GW and HNB-GW  HNB

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PARAMETER | PRESENCE | RANGE | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.1 |  | YES | ignore |
| CN Domain Indicator | M |  | 9.2.6 |  | YES | reject |
| Context ID | M |  | 9.2.2 |  | YES | reject |
| RANAP Message | M |  | 9.2.5 |  | YES | reject |

### 9.1.5 DISCONNECT

This message is sent by either the HNB to the HNB-GW or the HNB-GW to the HNB to close the signaling connection between the two nodes.

Direction: HNB  HNB-GW and HNB-GW  HNB

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PARAMETER | PRESENCE | RANGE | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.1 |  | YES | ignore |
| CN Domain Indicator | M |  | 9.2.6 |  | YES | reject |
| Context ID | M |  | 9.2.2 |  | YES | reject |
| Cause | M |  | 9.2.7 |  | YES | reject |
| RANAP Message | C - IfNormal |  | 9.2.5 |  | YES | reject |

|  |  |
| --- | --- |
| Condition | Explanation |
| IfNormal | This IE shall be present if the *Cause* IE is set to "Normal". |

### 9.1.6 CONNECTIONLESS TRANSFER

This message is sent by either the HNB to the HNB-GW or the HNB-GW to the HNB to transport a connectionless RANAP message between the two nodes.

Direction: HNB  HNB-GW and HNB-GW  HNB

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PARAMETER | PRESENCE | RANGE | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.1 |  | YES | ignore |
| RANAP Message | M |  | 9.2.5 |  | YES | reject |

### 9.1.7 ERROR INDICATION

This message is sent by either the HNB to HNB-GW or the HNB-GW to the HNB and is used to indicate that some errors have been detected.

Direction: HNB  HNB-GW, HNB-GW  HNB

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PARAMETER | PRESENCE | RANGE | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.1 |  | YES | ignore |
| Cause | M |  | 9.2.7 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.2.8 |  | YES | ignore |

## 9.2 Information Element Definitions

### 9.2.0 General

Section 9.2 presents the RUA IE definitions in tabular format. The corresponding ASN.1 definition is presented in section 9.3. In case there is contradiction between the tabular format in section 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 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 |  |  |  |  |
| >Procedure Code | M |  | INTEGER(0..255) |  |
| >Type of Message | M |  | ENUMERATED (Initiating Message, Successful Outcome, Unsuccessful Outcome, Outcome) |  |

### 9.2.2 Context ID

*Context ID* IE uniquely identifies a particular UE in the HNB and HNB-GW. This unique Context ID is used for both CS and PS domain.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/GROUP NAME | PRESENCE | RANGE | IE Type and Reference | Semantics Description |
| Context ID |  |  | BIT STRING(24) |  |

### 9.2.3 Establishment Cause

*Establishment Cause* IE identifies a the priority of call establishment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/GROUP NAME | PRESENCE | RANGE | IE Type and Reference | Semantics Description |
| Establishment Cause |  |  | ENUMERATED  (emergency call,  Normal,  …  ) |  |

### 9.2.4 Intra Domain NAS Node Selector

This IE carries information to be used to route the establishment of a signalling connection to a CN node within a CN domain.

| IE/GROUP NAME | Presence | RANGE | IE Type and reference | Semantics description |
| --- | --- | --- | --- | --- |
| CHOICE *version* | M |  |  |  |
| >R99 |  |  |  | This choice shall also be used by mobiles that are compliant to this version of the protocol |
| >>CHOICE *CN type* | M |  |  |  |
| >>>GSM-MAP |  |  |  |  |
| >>>>CHOICE *Routing basis* | M |  |  |  |
| >>>>>local (P)TMSI |  |  |  | TMSI allocated in the current LA or PTMSI allocated in the current RA |
| >>>>>>Routing parameter | M |  | Bit string (10) | The TMSI/ PTMSI consists of 4 octets (32bits). This can be represented by a string of bits numbered from b0 to b31, with bit b0 being the least significant  The "Routing parameter" bit string consists of bits b14 through b23 of the TMSI/ PTMSI. The first/leftmost/most significant bit of the bit string contains bit b23 of the TMSI/PTMSI. |
| >>>>>(P)TMSI of same PLMN, different (RA)LA |  |  |  | TMSI allocated in another LA of this PLMN or PTMSI allocated in another RA this PLMN |
| >>>>>>Routing parameter | M |  | Bit string (10) | The TMSI/ PTMSI consists of 4 octets (32bits). This can be represented by a string of bits numbered from b0 to b31, with bit b0 being the least significant  The "Routing parameter" bit string consists of bits b14 through b23 of the TMSI/ PTMSI. The first/leftmost/most significant bit of the bit string contains bit b23 of the TMSI/ PTMSI. |
| >>>>>(P)TMSI of different PLMN |  |  |  | TMSI or a PTMSI allocated in another PLMN |
| >>>>>>Routing parameter | M |  | Bit string (10) | The TMSI/ PTMSI consists of 4 octets (32bits). This can be represented by a string of bits numbered from b0 to b31, with bit b0 being the least significant.  The "Routing parameter" bit string consists of bits b14 through b23 of the TMSI/ PTMSI. The first/leftmost/most significant bit of the bit string contains bit b23 of the TMSI/ PTMSI. |
| >>>>>IMSI(response to IMSI paging) |  |  |  | NAS identity is IMSI |
| >>>>>>Routing parameter | M |  | Bit string (10) | The "Routing parameter" bit string consists of DecimalToBinary [(IMSI div 10) mod 1000]. The first/leftmost bit of the bit string contains the most significant bit of the result. |
| >>>>>IMSI(cause UE initiated event) |  |  |  | NAS identity is IMSI |
| >>>>>>Routing parameter | M |  | Bit string (10) | The "Routing parameter" bit string consists of DecimalToBinary [(IMSI div 10) mod 1000]. The first/leftmost bit of the bit string contains the most significant bit of the result. |
| >>>>>IMEI |  |  |  | NAS parameter is IMEI |
| >>>>>>Routing parameter | M |  | Bit string (10) | The "Routing parameter" bit string consists of DecimalToBinary [(IMEI div 10) mod 1000]. The first/leftmost bit of the bit string contains the most significant bit of the result. |
| >>>>>Spare 1 |  |  | Bit string (10) | This choice shall not be used in this version |
| >>>>>Spare 2 |  |  | Bit string (10) | This choice shall not be used in this version |
| >>>ANSI-41 |  |  | Bit string (14) | All bits shall be set to 0 |
| >Later |  |  | Bit string(15) | This bit string shall not be sent by mobiles that are compliant to this version of the protocol. |

### 9.2.5 RANAP Message

*RANAP Message* IE contains the transferred RANAP message.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/GROUP NAME | PRESENCE | RANGE | IE Type and Reference | Semantics Description |
| RANAP Message |  |  | OCTET STRING |  |

### 9.2.6 CN Domain Indicator

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

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

### 9.2.7 Cause

*Cause* IE indicates the reason for a particular error event for the RUA protocol.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| CHOICE *Cause Group* |  |  |  |  |
| *>Radio Network Layer* |  |  |  |  |
| >>Radio Network Layer Cause | M |  | ENUMERATED (  Normal,  Connect failed,  Network release,  Unspecified,  ...,  ) |  |
| *>Transport Layer* |  |  |  |  |
| >>Transport Layer Cause | M |  | ENUMERATED (Transport Resource Unavailable,  Unspecified,  ...) |  |
| *>Protocol* |  |  |  |  |
| >>Protocol Cause | M |  | ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State,  Semantic Error, Unspecified,  Abstract Syntax Error (Falsely Constructed Message),  ...) |  |
| *>Misc* |  |  |  |  |
| >>Misc Cause | M |  | ENUMERATED (Processing Overload, Hardware Failure, O&M Intervention, Unspecified,  ...) |  |

The meaning of the different cause values is described in the following table. Cause values for information 'not valid' indicates that the information is not valid in the context that it was received.

|  |  |
| --- | --- |
| Radio Network Layer cause | Meaning |
| Normal | No error has occurred |
| Connect failed | Connect attempt failed |
| Network release | Connection released by network |
| Unspecified | Sent when none of the above cause values applies but still the cause is Radio Network layer related. |

|  |  |
| --- | --- |
| **Transport Network Layer cause** | **Meaning** |
| Transport resource unavailable | The required transport resources are not available. |
| Unspecified | Sent when none of the above cause values applies but still the cause is Transport Network layer related. |

|  |  |
| --- | --- |
| **Protocol cause** | **Meaning** |
| Abstract Syntax Error (Reject) | The received message included an abstract syntax error and the concerned criticality indicated "reject". |
| Abstract Syntax Error (Ignore and Notify) | The received message included an abstract syntax error and the concerned criticality indicated "ignore and notify" . |
| Abstract syntax error (falsely constructed message) | The received message contained IEs 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. |
| Unspecified | Sent when none of the above cause values applies but still the cause is protocol related. |

|  |  |
| --- | --- |
| **Miscellaneous cause** | Meaning |
| Processing Overload | Control processing overload. |
| Hardware Failure | HNB hardware failure. |
| O&M Intervention | Operation and Maintenance intervention related to HNB. |
| Unspecified | Sent when none of the above cause values applies and the cause is not related to any of the categories Radio Network Layer, Transport Network Layer or Protocol. |

### 9.2.8 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 were not comprehended or were missing.

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

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

### 9.2.9 CSG Membership Status

This element indicates the Membership status of the UE to a particular CSG.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CSG Membership Status | M |  | ENUMERATED (member, non-member,…) |  |

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

### 9.3.0 General

RUA ASN.1 definition conforms with ITU-T Rec. X.680 [7] and ITU-T Rec. X.681 [8].

The ASN.1 definition specifies the structure and content of RUA messages. RUA 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 RUA 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 RUA 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.

### 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

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-PDU-Descriptions {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

umts-Access (20) modules (3) rua(5) version1 (1) rUA-PDU-Descriptions (0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- IE parameter types from other modules.

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

IMPORTS

Criticality,

ProcedureCode

FROM RUA-CommonDataTypes

Connect,

DirectTransfer,

Disconnect,

ConnectionlessTransfer,

ErrorIndication,

PrivateMessage

FROM RUA-PDU-Contents

id-Connect,

id-DirectTransfer,

id-Disconnect,

id-ConnectionlessTransfer,

id-ErrorIndication,

id-privateMessage

FROM RUA-Constants;

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Interface Elementary Procedure Class

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-ELEMENTARY-PROCEDURE ::= CLASS {

&InitiatingMessage ,

&SuccessfulOutcome OPTIONAL,

&UnsuccessfulOutcome OPTIONAL,

&procedureCode ProcedureCode UNIQUE,

&criticality Criticality DEFAULT ignore

}

WITH SYNTAX {

INITIATING MESSAGE &InitiatingMessage

[SUCCESSFUL OUTCOME &SuccessfulOutcome]

[UNSUCCESSFUL OUTCOME &UnsuccessfulOutcome]

PROCEDURE CODE &procedureCode

[CRITICALITY &criticality]

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Interface PDU definitions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-PDU ::= CHOICE {

initiatingMessage InitiatingMessage,

successfulOutcome SuccessfulOutcome,

unsuccessfulOutcome UnsuccessfulOutcome,

...

}

InitiatingMessage ::= SEQUENCE {

procedureCode RUA-ELEMENTARY-PROCEDURE.&procedureCode ({RUA-ELEMENTARY-PROCEDURES}),

criticality RUA-ELEMENTARY-PROCEDURE.&criticality ({RUA-ELEMENTARY-PROCEDURES}{@procedureCode}),

value RUA-ELEMENTARY-PROCEDURE.&InitiatingMessage ({RUA-ELEMENTARY-PROCEDURES}{@procedureCode})

}

SuccessfulOutcome ::= SEQUENCE {

procedureCode RUA-ELEMENTARY-PROCEDURE.&procedureCode ({RUA-ELEMENTARY-PROCEDURES}),

criticality RUA-ELEMENTARY-PROCEDURE.&criticality ({RUA-ELEMENTARY-PROCEDURES}{@procedureCode}),

value RUA-ELEMENTARY-PROCEDURE.&SuccessfulOutcome ({RUA-ELEMENTARY-PROCEDURES}{@procedureCode})

}

UnsuccessfulOutcome ::= SEQUENCE {

procedureCode RUA-ELEMENTARY-PROCEDURE.&procedureCode ({RUA-ELEMENTARY-PROCEDURES}),

criticality RUA-ELEMENTARY-PROCEDURE.&criticality ({RUA-ELEMENTARY-PROCEDURES}{@procedureCode}),

value RUA-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome ({RUA-ELEMENTARY-PROCEDURES}{@procedureCode})

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Interface Elementary Procedure List

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-ELEMENTARY-PROCEDURES RUA-ELEMENTARY-PROCEDURE ::= {

RUA-ELEMENTARY-PROCEDURES-CLASS-1 |

RUA-ELEMENTARY-PROCEDURES-CLASS-2 ,

...

}

RUA-ELEMENTARY-PROCEDURES-CLASS-1 RUA-ELEMENTARY-PROCEDURE ::= {

...

}

RUA-ELEMENTARY-PROCEDURES-CLASS-2 RUA-ELEMENTARY-PROCEDURE ::= {

connectionRequest |

directTransfer |

disconnectRequest |

connectionlessTransfer |

errorIndication |

privateMessage,

...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Interface Elementary Procedures

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

connectionRequest RUA-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE Connect

PROCEDURE CODE id-Connect

CRITICALITY ignore

}

directTransfer RUA-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE DirectTransfer

PROCEDURE CODE id-DirectTransfer

CRITICALITY ignore

}

disconnectRequest RUA-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE Disconnect

PROCEDURE CODE id-Disconnect

CRITICALITY ignore

}

connectionlessTransfer RUA-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE ConnectionlessTransfer

PROCEDURE CODE id-ConnectionlessTransfer

CRITICALITY ignore

}

errorIndication RUA-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE ErrorIndication

PROCEDURE CODE id-ErrorIndication

CRITICALITY ignore

}

privateMessage RUA-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE PrivateMessage

PROCEDURE CODE id-privateMessage

CRITICALITY ignore

}

END

### 9.3.3 PDU definitions

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- PDU definitions for RUA.

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-PDU-Contents {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

umts-Access (20) modules (3) rua(5) version1 (1) rUA-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- IE parameter types from other modules.

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

IMPORTS

Cause,

CriticalityDiagnostics,

Context-ID,

CN-DomainIndicator,

CSGMembershipStatus,

IntraDomainNasNodeSelector,

RANAP-Message,

Establishment-Cause

FROM RUA-IEs

ProtocolExtensionContainer{},

ProtocolIE-ContainerList{},

ProtocolIE-Container{},

ProtocolIE-Single-Container{},

PrivateIE-Container{},

RUA-PRIVATE-IES,

RUA-PROTOCOL-EXTENSION,

RUA-PROTOCOL-IES

FROM RUA-Containers

id-Cause,

id-CriticalityDiagnostics,

id-Context-ID,

id-CN-DomainIndicator,

id-CSGMembershipStatus,

id-RANAP-Message,

id-IntraDomainNasNodeSelector,

id-Establishment-Cause

FROM RUA-Constants;

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Connect

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Connect ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {ConnectIEs} },

protocolExtensions ProtocolExtensionContainer { {ConnectExtensions} } OPTIONAL,

...

}

ConnectIEs RUA-PROTOCOL-IES ::= {

{ ID id-CN-DomainIndicator CRITICALITY reject TYPE CN-DomainIndicator PRESENCE mandatory } |

{ ID id-Context-ID CRITICALITY reject TYPE Context-ID PRESENCE mandatory } |

{ ID id-IntraDomainNasNodeSelector CRITICALITY ignore TYPE IntraDomainNasNodeSelector PRESENCE optional } |

{ ID id-Establishment-Cause CRITICALITY reject TYPE Establishment-Cause PRESENCE mandatory } |

{ ID id-RANAP-Message CRITICALITY reject TYPE RANAP-Message PRESENCE mandatory },

...

}

ConnectExtensions RUA-PROTOCOL-EXTENSION ::= {

{ ID id-CSGMembershipStatus CRITICALITY ignore EXTENSION CSGMembershipStatus PRESENCE optional },

...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Direct Transfer

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

DirectTransfer ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {DirectTransferIEs} },

protocolExtensions ProtocolExtensionContainer { {DirectTransferExtensions} } OPTIONAL,

...

}

DirectTransferIEs RUA-PROTOCOL-IES ::= {

{ ID id-CN-DomainIndicator CRITICALITY reject TYPE CN-DomainIndicator PRESENCE mandatory } |

{ ID id-Context-ID CRITICALITY reject TYPE Context-ID PRESENCE mandatory } |

{ ID id-RANAP-Message CRITICALITY reject TYPE RANAP-Message PRESENCE mandatory },

...

}

DirectTransferExtensions RUA-PROTOCOL-EXTENSION ::= {

...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Disconnect

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Disconnect ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {DisconnectIEs} },

protocolExtensions ProtocolExtensionContainer { {DisconnectExtensions} } OPTIONAL,

...

}

DisconnectIEs RUA-PROTOCOL-IES ::= {

{ ID id-CN-DomainIndicator CRITICALITY reject TYPE CN-DomainIndicator PRESENCE mandatory } |

{ ID id-Context-ID CRITICALITY reject TYPE Context-ID PRESENCE mandatory } |

{ ID id-Cause CRITICALITY reject TYPE Cause PRESENCE mandatory } |

{ ID id-RANAP-Message CRITICALITY reject TYPE RANAP-Message PRESENCE conditional },

-- RANAP message shall be included if Cause value is "normal"

...

}

DisconnectExtensions RUA-PROTOCOL-EXTENSION ::= {

...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Connectionless Transfer

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ConnectionlessTransfer ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {ConnectionlessTransferIEs} },

protocolExtensions ProtocolExtensionContainer { {ConnectionlessTransferExtensions} } OPTIONAL,

...

}

ConnectionlessTransferIEs RUA-PROTOCOL-IES ::= {

{ ID id-RANAP-Message CRITICALITY reject TYPE RANAP-Message PRESENCE mandatory },

...

}

ConnectionlessTransferExtensions RUA-PROTOCOL-EXTENSION ::= {

...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- ERROR INDICATION

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ErrorIndication ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {ErrorIndicationIEs} },

protocolExtensions ProtocolExtensionContainer { {ErrorIndicationExtensions} } OPTIONAL,

...

}

ErrorIndicationIEs RUA-PROTOCOL-IES ::= {

{ ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory } |

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

ErrorIndicationExtensions RUA-PROTOCOL-EXTENSION ::= {

...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- PRIVATE MESSAGE

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

PrivateMessage ::= SEQUENCE {

privateIEs PrivateIE-Container {{PrivateMessage-IEs}},

...

}

PrivateMessage-IEs RUA-PRIVATE-IES ::= {

...

}

END

### 9.3.4 Information Element definitions

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Information Element Definitions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-IEs {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

umts-Access (20) modules (3) rua(5) version1 (1) rUA-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

maxNrOfErrors

FROM RUA-Constants

Criticality,

ProcedureCode,

ProtocolIE-ID,

TriggeringMessage

FROM RUA-CommonDataTypes

ProtocolExtensionContainer{},

RUA-PROTOCOL-EXTENSION

FROM RUA-Containers;

CN-DomainIndicator ::= ENUMERATED {

cs-domain,

ps-domain

}

CSGMembershipStatus ::= ENUMERATED {

member,

non-member,

...

}

Establishment-Cause ::= ENUMERATED {

emergency-call,

normal-call,

...

}

Context-ID ::= BIT STRING (SIZE(24))

IntraDomainNasNodeSelector ::= SEQUENCE {

version CHOICE {

release99 SEQUENCE {

cn-Type CHOICE {

gsm-Map-IDNNS Gsm-map-IDNNS,

ansi-41-IDNNS Ansi-41-IDNNS

}

},

later SEQUENCE {

futurecoding BIT STRING (SIZE (15))

}

}

}

Gsm-map-IDNNS ::= SEQUENCE {

routingbasis CHOICE {

localPTMSI SEQUENCE {

routingparameter RoutingParameter

},

tMSIofsamePLMN SEQUENCE {

routingparameter RoutingParameter

},

tMSIofdifferentPLMN SEQUENCE {

routingparameter RoutingParameter

},

iMSIresponsetopaging SEQUENCE {

routingparameter RoutingParameter

},

iMSIcauseUEinitiatedEvent SEQUENCE {

routingparameter RoutingParameter

},

iMEI SEQUENCE {

routingparameter RoutingParameter

},

spare2 SEQUENCE {

routingparameter RoutingParameter

},

spare1 SEQUENCE {

routingparameter RoutingParameter

}

},

-- dummy is not used in this version of the specification and

-- it should be ignored by the receiver.

dummy BOOLEAN

}

Ansi-41-IDNNS ::= BIT STRING (SIZE (14))

RANAP-Message ::= OCTET STRING

RoutingParameter ::= BIT STRING (SIZE (10))

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Cause IE

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Cause ::= CHOICE {

radioNetwork CauseRadioNetwork,

transport CauseTransport,

protocol CauseProtocol,

misc CauseMisc,

...

}

CauseRadioNetwork ::= ENUMERATED {

normal,

connect-failed,

network-release,

unspecified,

...

}

CauseTransport ::= ENUMERATED {

transport-resource-unavailable,

unspecified,

...

}

CauseProtocol ::= ENUMERATED {

transfer-syntax-error,

abstract-syntax-error-reject,

abstract-syntax-error-ignore-and-notify,

message-not-compatible-with-receiver-state,

semantic-error,

unspecified,

abstract-syntax-error-falsely-constructed-message,

...

}

CauseMisc ::= ENUMERATED {

processing-overload,

hardware-failure,

o-and-m-intervention,

unspecified,

...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- CriticalityDiagnostics

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CriticalityDiagnostics ::= SEQUENCE {

procedureCode ProcedureCode OPTIONAL,

triggeringMessage TriggeringMessage OPTIONAL,

procedureCriticality Criticality OPTIONAL,

iEsCriticalityDiagnostics CriticalityDiagnostics-IE-List OPTIONAL,

iE-Extensions ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,

...

}

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF

SEQUENCE {

iECriticality Criticality,

iE-ID ProtocolIE-ID,

typeOfError TypeOfError,

iE-Extensions ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,

...

}

CriticalityDiagnostics-IE-List-ExtIEs RUA-PROTOCOL-EXTENSION ::= {

...

}

CriticalityDiagnostics-ExtIEs RUA-PROTOCOL-EXTENSION ::= {

...

}

TypeOfError ::= ENUMERATED {

not-understood,

missing,

...

}

END

### 9.3.5 Common definitions

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Common definitions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-CommonDataTypes {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

umts-Access (20) modules (3) rua(5) version1 (1) rUA-CommonDataTypes (3) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Extension constants

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

maxPrivateIEs INTEGER ::= 65535

maxProtocolExtensions INTEGER ::= 65535

maxProtocolIEs INTEGER ::= 65535

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Common Data Types

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Criticality ::= ENUMERATED { reject, ignore, notify }

Presence ::= ENUMERATED { optional, conditional, mandatory }

ProcedureCode ::= INTEGER (0..255)

PrivateIE-ID ::= CHOICE {

local INTEGER (0..65535),

global OBJECT IDENTIFIER

}

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

TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome }

END

### 9.3.6 Constant definitions

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Constant definitions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-Constants {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

umts-Access (20) modules (3) rua(5) version1 (1) rUA-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

ProcedureCode,

ProtocolIE-ID

FROM RUA-CommonDataTypes;

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Elementary Procedures

--

id-Connect ProcedureCode ::= 1

id-DirectTransfer ProcedureCode ::= 2

id-Disconnect ProcedureCode ::= 3

id-ConnectionlessTransfer ProcedureCode ::= 4

id-ErrorIndication ProcedureCode ::= 5

id-privateMessage ProcedureCode ::= 6

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Lists

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

maxNrOfErrors INTEGER ::= 256

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- IEs

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

id-Cause ProtocolIE-ID ::= 1

id-CriticalityDiagnostics ProtocolIE-ID ::= 2

id-Context-ID ProtocolIE-ID ::= 3

id-RANAP-Message ProtocolIE-ID ::= 4

id-IntraDomainNasNodeSelector ProtocolIE-ID ::= 5

id-Establishment-Cause ProtocolIE-ID ::= 6

id-CN-DomainIndicator ProtocolIE-ID ::= 7

id-CSGMembershipStatus ProtocolIE-ID ::= 9

END

### 9.3.7 Container definitions

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Container definitions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-Containers {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

umts-Access (20) modules (3) rua(5) version1 (1) rUA-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- IE parameter types from other modules.

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

IMPORTS

Criticality,

Presence,

PrivateIE-ID,

ProtocolIE-ID,

maxPrivateIEs,

maxProtocolExtensions,

maxProtocolIEs

FROM RUA-CommonDataTypes;

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Class Definition for Private IEs

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-PRIVATE-IES ::= CLASS {

&id PrivateIE-ID,

&criticality Criticality,

&Value,

&presence Presence

}

WITH SYNTAX {

ID &id

CRITICALITY &criticality

TYPE &Value

PRESENCE &presence

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Class Definition for Protocol IEs

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-PROTOCOL-IES ::= CLASS {

&id ProtocolIE-ID UNIQUE,

&criticality Criticality,

&Value,

&presence Presence

}

WITH SYNTAX {

ID &id

CRITICALITY &criticality

TYPE &Value

PRESENCE &presence

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Class Definition for Protocol Extensions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

RUA-PROTOCOL-EXTENSION ::= CLASS {

&id ProtocolIE-ID UNIQUE,

&criticality Criticality,

&Extension,

&presence Presence

}

WITH SYNTAX {

ID &id

CRITICALITY &criticality

EXTENSION &Extension

PRESENCE &presence

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Container for Protocol IEs

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ProtocolIE-Container {RUA-PROTOCOL-IES : IEsSetParam} ::=

SEQUENCE (SIZE (0..maxProtocolIEs)) OF

ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Single-Container {RUA-PROTOCOL-IES : IEsSetParam} ::=

ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field {RUA-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {

id RUA-PROTOCOL-IES.&id ({IEsSetParam}),

criticality RUA-PROTOCOL-IES.&criticality ({IEsSetParam}{@id}),

value RUA-PROTOCOL-IES.&Value ({IEsSetParam}{@id})

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Container Lists for Protocol IE Containers

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, RUA-PROTOCOL-IES : IEsSetParam} ::=

SEQUENCE (SIZE (lowerBound..upperBound)) OF

ProtocolIE-Container {{IEsSetParam}}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Container for Protocol Extensions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ProtocolExtensionContainer {RUA-PROTOCOL-EXTENSION : ExtensionSetParam} ::=

SEQUENCE (SIZE (1..maxProtocolExtensions)) OF

ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {RUA-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {

id RUA-PROTOCOL-EXTENSION.&id ({ExtensionSetParam}),

criticality RUA-PROTOCOL-EXTENSION.&criticality ({ExtensionSetParam}{@id}),

extensionValue RUA-PROTOCOL-EXTENSION.&Extension ({ExtensionSetParam}{@id})

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Container for Private IEs

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

PrivateIE-Container {RUA-PRIVATE-IES : IEsSetParam } ::=

SEQUENCE (SIZE (1.. maxPrivateIEs)) OF

PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {RUA-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {

id RUA-PRIVATE-IES.&id ({IEsSetParam}),

criticality RUA-PRIVATE-IES.&criticality ({IEsSetParam}{@id}),

value RUA-PRIVATE-IES.&Value ({IEsSetParam}{@id})

}

END

## 9.4 Message transfer syntax

RUA shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ref. ITU-T Rec. X.691 [6].

# 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 10: Protocol errors in RUA

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.

## 10.3 Abstract Syntax Error

### 10.3.1 General

An Abstract Syntax Error occurs when the receiving functional RUA 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 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 RUA 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 the receiving entity (some may still remain unsupported).

2. EP: The comprehension of different EPs within a standard version or between different standard versions is not mandated. Any EP that is not supported may be considered not comprehended, even if another EP from that standard version is comprehended, and action based on criticality shall be applied.

### 10.3.3 Presence Information

For many IEs/IE groups which are optional according to the ASN.1 transfer syntax, RUA 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 RUA-PROTOCOL-IES, RUA-PROTOCOL-IES-PAIR, RUA-PROTOCOL-EXTENSION or RUA-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.

### 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* according to the following:

Reject IE:

- If a message is received with a *Procedure Code* 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* 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* marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the procedure.

When using the Error Indication procedure to reject a procedure or to report an ignored procedure it shall include the *Procedure Code* IE, the *Triggering Message* IE, and the *Procedure Criticality* IE in the *Criticality Diagnostics* IE.

#### 10.3.4.1A Type of Message

When the receiving node cannot decode the *Type of Message* IE, the Error Indication procedure shall be initiated with an appropriate cause value.

#### 10.3.4.2 IEs other than the Procedure Code and Type of Message

The receiving node shall treat the different types of received criticality information of an IE/IE group other than the *Procedure Code* IE and *Type of Message* IE according to the following:

**Reject IE:**

- If a message *initiating* a procedure is received containing one or more IEs/IE groups 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 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 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*" which the receiving node does no 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 IE/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 only the understood IEs/IE groups.

- If a *response* message is received containing one or more IEs/IE groups marked with "*Ignore* *IE*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.

When reporting not comprehended IEs/IE groups marked with "*Reject IE*" or "*Ignore IE and Notify Sender*" using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

When reporting not comprehended IEs/IE groups marked with "*Reject IE*" or "*Ignore IE and Notify Sender*" using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

### 10.3.5 Missing IE or IE group

The receiving node shall treat the missing IE/IE group according to the criticality information for the missing IE/IE group in the received message specified in the version of the present document 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.

When reporting missing IEs/IE groups with specified criticality "*Reject IE*" or "*Ignore IE and Notify Sender*" using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

### 10.3.6 IEs or IE groups received in wrong order or with too many occurrences or erroneously present

If a message with IEs or IE groups in wrong order or with too many occurrences is received or if IEs or IE groups with a conditional presence are present when the condition is not met (i.e. erroneously present), the receiving node shall behave according to the following:

- If a message *initiating* a procedure is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the cause value "Abstract Syntax Error (Falsely Constructed Message)" using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall terminate the procedure and initiate the Error Indication procedure, and use cause value "Abstract Syntax Error (Falsely Constructed Message)".

- If a *response* message is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

When determining the correct order only the IEs specified in the specification version used by the receiver shall be considered.

## 10.4 Logical Error

Logical error situations occur when a message is comprehended correctly, but the information contained within the message is not valid (i.e. semantic error), or describes a procedure which is not compatible with the state of the receiver. In these conditions, the following behaviour shall be performed (unless otherwise specified) as defined by the class of the elementary procedure, irrespective of the criticality information of the IE's/IE groups containing the erroneous values.

**Class 1:**

Where the logical error occurs in a request message of a class 1 procedure, and the procedure has a message to report this unsuccessful outcome, this message shall be sent with an appropriate cause value. Typical cause values are:

- Semantic Error;

- Message not compatible with receiver state.

Where the logical error is contained in a request message of a class 1 procedure, and the procedure does not have a message to report this unsuccessful outcome, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The *Procedure Code* IE and the *Triggering Message* IE within the *Criticality Diagnostics* IE shall then be included in order to identify the message containing the logical error.

Where the logical error exists in a response message of a class 1 procedure, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.

**Class 2:**

Where the logical error occurs in a message of a class 2 procedure, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The *Procedure Code* IE and the *Triggering Message* IE within the *Criticality Diagnostics* IE shall then be included in order to identify the message containing the logical error.

## 10.5 Exceptions

The error handling for all the cases described hereafter shall take precedence over any other error handling described in the other subclauses of clause 10.

- If any type of error (Transfer Syntax Error, Abstract Syntax Error or Logical Error) is detected in the ERROR INDICATION message, it shall not trigger the Error Indication procedure in the receiving Node but local error handling.

- In case a response message or Error Indication message needs to be returned, but the information necessary to determine the receiver of that message is missing, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.

- If an error that terminates a procedure occurs, the returned cause value shall reflect the error that caused the termination of the procedure even if one or more abstract syntax errors with criticality "ignore and notify" have earlier occurred within the same procedure.

Annex A (informative):  
Change History

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **New** |
| 2008-12 | RP-080833 |  |  | Approved at TSG-RAN#42 and placed under change control | 8.0.0 |
| 2009-01 |  |  |  | Editorial corrections, including spec number shown on cover | 8.0.1 |
| 43 | RP-090244 | 0001 |  | Add Object Identifier for RUA ASN.1 | 8.1.0 |
| 43 | RP-090081 | 0004 | 1 | Clarification on Uniqueness of Context ID | 8.1.0 |
| 43 | RP-090082 | 0007 | 2 | Adding the definitaion of Iuh Signalling Connection | 8.1.0 |
| 43 | RP-090244 | 0008 |  | Correction of IE presence in ASN.1 | 8.1.0 |
| 43 | RP-090244 | 0009 |  | Clarification of operation of RUA disconnect | 8.1.0 |
| 46 |  |  |  | Raised to version 9.0.0 | 9.0.0 |
| 46 | RP-091191 | 0020 | 1 | RUA enhancement to handle inbound Mobility | 9.0.0 |
| 46 | RP-091191 | 0021 | 2 | CSG Membership signalling during UE implicit registration | 9.0.0 |
| 47 | RP-100230 | 0023 | 1 | Minor corrections for RUA | 9.1.0 |
| 48 | RP-100595 | 0029 | 1 | Some Clarifications on RUA Direct Transfer | 9.2.0 |
| 49 | RP-100909 | 0030 | 1 | Add missing cause value descriptions | 9.3.0 |
| 03/2011 |  |  |  | Raised to version 10.0.0 | 10.0.0 |
| SP-49 | SP-100629 |  |  | Clarification on the use of References (TS 21.801 CR#0030) | 10.0.0 |
| 51 | RP-110231 | 0033 | 1 | RUA Connect Message for Enhanced H2H Mobility | 10.0.0 |
| 52 | RP-110684 | 0034 | 1 | Correction of References | 10.1.0 |
| 52 | RP-110689 | 0035 | 1 | IDNNS usage in the CONNECT message | 10.1.0 |
| 52 | RP-110689 | 0036 | 2 | Clarification of usage of RUA DISCONNECT | 10.1.0 |
| 53 | RP-111192 | 0040 | 1 | Remaining UE Context Issue during Mobility | 10.2.0 |
| 09/2012 |  |  |  | Update to Rel-11 version (MCC) | 11.0.0 |
| 58 | RP-121737 | 0041 |  | Editorial and minor corrections | 11.1.0 |
| 59 | RP-130211 | 0042 |  | Corrections from ASN.1 Review | 11.2.0 |
| 09/2014 |  |  |  | Update to Rel-12 version (MCC) | 12.0.0 |
| 66 | RP-142093 | 0047 |  | Update of reference | 12.1.0 |
| 12/2015 |  |  |  | Update to Rel-13 version (MCC) | 13.0.0 |
| 71 | RP-160419 | 0049 |  | Correction of tabular for Procedure Code in the Message Type IE | 13.1.0 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2017-03 | SA#75 |  |  |  |  | Promotion to Release 14 without technical change | 14.0.0 |
| 2018-07 | SA#80 | - | - | - | - | Promotion to Release 15 without technical change | 15.0.0 |
| 2020-07 | SA#88-e | - | - | - | - | Update to Rel-16 version (MCC) | 16.0.0 |