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TECHNICAL SPECIFICATION

Universal Mobile Telecommunications System (UMTS); UTRAN Iurh interface Radio Network Subsystem Application Part (RNSAP) User Adaption (RNA) signalling (3GPP TS 25.471 version 16.0.0 Release 16)

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Contents

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1 Scope

The present document specifies the *RNSAP User Adaption* (RNA) supporting Iurh-connectivity between HNBs as specified in TS 25.467 [3] by adapting the services made available by the Iurh signalling transport layer to the needs of RNSAP. It provides transparent transport for RNSAP messages in connection-oriented and connectionless mode and an Iurh setup function.

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]   Void

[3]   3GPP TS 25.467: "UTRAN architecture for 3G Home NodeB"

[4]   3GPP TS 25.423: "UTRAN Iur interface Radio Network Subsystem Application Part (RNSAP) signalling"

[5]   3GPP TR 25.921 (version.7.0.0): "Guidelines and Principles for Protocol Description and Error Handling".

[6]   3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

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

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

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

[10]   Void

[11]   Void

[12]   3GPP TS 25.331: "Radio Resource Control (RRC) Protocol Specification".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [6] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [6].

Elementary Procedure: RNA consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between HNBs. These EPs 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.

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

- **Class 1:** Elementary Procedures with response (success or failure).

- **Class 2:** Elementary Procedures without response.

For Class 1 EPs, the types of responses can be as follows:

Successful

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful

- A signalling message explicitly indicates that the EP failed.

- On time supervision expiry (i.e. absence of expected response).

Class 2 EPs are considered always successful.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [6] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [6].

EP	Elementary Procedure
HNB	Home Node B
PDU	Protocol Data Unit
RNA	RNSAP User Adaption
RNS	Radio Network Subsystem
RNSAP	Radio Network Subsystem Application Part
SCTP	Stream Control Transmission Protocol

4 General

The protocol described in the present document is the protocol between Iurh-connected HNBs providing adaptation of services of the Iurh signalling transport layer to the needs of RNSAP and an Iurh setup function.

4.1 Procedure Specification Principles

The principle for specifying the procedure logic is to specify the functional behaviour of the HNBs 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. Direct Transfer 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. DIRECT TRANSFER 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)".

5 RNA Services

5.1 General

RNA provides the signalling service between Iurh-connected HNBs that is required to fulfil the RNA functions described in Clause 7.

5.2 Parallel Transactions

Unless explicitly indicated in the procedure description, at any instance in time one protocol peer shall have a maximum of one ongoing RNA procedure related to a specific connection-oriented signalling Context.

6 Services expected from the Transport layer

Following service is expected from the transport layer:

- Reliable and in sequence delivery of Signalling data.

7 Functions of RNA

The RNA has the following functions:

- Transparent transfer of RNSAP messages

- Setup of an Iurh connection

- 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 RNA elementary procedures described in the following clauses.

8 RNA Procedures

8.1 Elementary Procedures

In the following tables, all EPs are divided into Class 1 and Class 2 Procedures.

Table 1: Class 1

Elementary Procedure	Initiating Message	Successful Outcome Response message	Unsuccessful Outcome Response message
Iurh Setup	IURH SETUP REQUEST	IURH SETUP RESPONSE	IURH SETUP FAILURE

Table 2: Class 2

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

8.2 Iurh Setup

8.2.1 General

The purpose of the Iurh Setup procedure is to establish Iurh connectivity between two HNBs. This procedure resets the Iurh interface by removing all active Iurh signalling contexts.

8.2.2 Direct Iurh connection

8.2.2.1 Successful operation
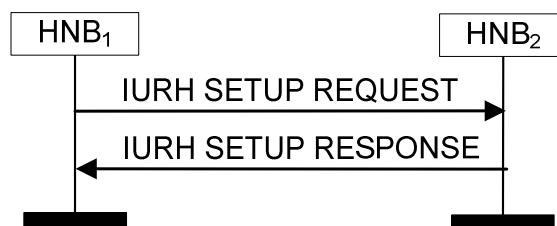
Figure 8.2.2.1.1: Setup Request Procedure: Iurh direct interface Successful Operation

HNB_1 initiates the procedure by sending the IURH SETUP REQUEST message to the candidate HNB_2. HNB_2 replies with the IURH SETUP RESPONSE message.

8.2.2.2 Unsuccessful operation
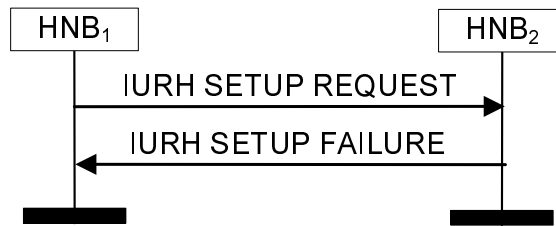
Figure 8.2.2.2.2: Setup Procedure: Direct Interface unsuccessful Operation

If the candidate HNB_2 cannot accept the setup it shall respond with an IURH SETUP FAILURE message with appropriate cause value.

If the IURH SETUP FAILURE message includes the *Backoff Timer* IE then HNB_1 shall wait at least for the indicated time before reinitiating the Iurh Setup procedure towards HNB_2.

8.2.2.3 Abnormal Conditions

If the first message received for a specific TNL association is not an IURH SETUP REQUEST, IURH SETUP RESPONSE, or IURH SETUP FAILURE message then this shall be treated as a logical error.

If HNB_1 does not receive either an IURH SETUP RESPONSE message or an IURH SETUP FAILURE message, HNB_1 may reinitiate the Iurh Setup procedure towards HNB_2, provided that the content of the new IURH SETUP REQUEST message is identical to the content of the previously unacknowledged IURH SETUP REQUEST message.

If the initiating HNB receives an IURH SETUP REQUEST message from the peer entity on the same Iurh interface then:

- in case HNB_1 answers with an IURH SETUP RESPONSE message and receives a subsequent IURH SETUP FAILURE message, HNB_1 shall consider the Iurh interface as non operational and the procedure as unsuccessfully terminated according to sub clause 8.2.2.2.

- in case HNB_1 answers with an IURH SETUP FAILURE message and receives a subsequent IURH SETUP RESPONSE message, HNB_1 shall ignore the IURH SETUP RESPONSE message and consider the Iurh interface as non operational.

8.2.3 Iurh connection via the HNB-GW

8.2.3.1 Successful Operation HNB Originated
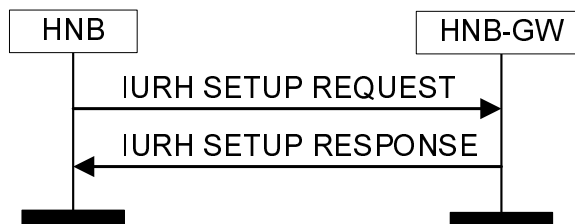
Figure 8.2.3.1.1: Iurh Setup procedure – Iurh connection via the HNB-GW – successful case.

The HNB initiates this procedure by sending the IURH SETUP REQUEST message to the HNB-GW. The HNB-GW shall setup an Iurh interface to the HNB indicated within the *Receivers HNB RNL Identity* IE and then reply with the IURH SETUP RESPONSE message.

8.2.3.2 Unsuccessful Operation HNB Originated
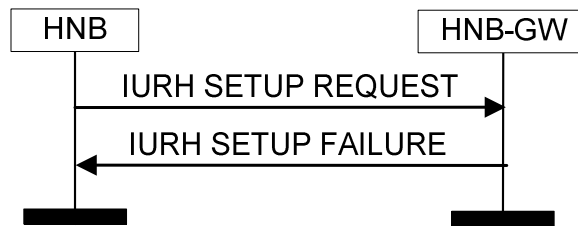
Figure 8.2.3.2.2: Iurh Setup procedure Iurh connection via the HNB-GW– unsuccessful case.

If the HNB-GW cannot accept the setup or is not able to setup an Iurh interface shall respond with an IURH SETUP FAILURE message with an appropriate cause value.

If the IURH SETUP FAILURE message includes the *Backoff Timer* IE, the HNB shall wait at least for the indicated time before reinitiating the Iurh Setup procedure towards the HNB-GW.

8.2.3.3 Abnormal Conditions – HNB originated

If the HNB receives neither an IURH SETUP RESPONSE message nor an IURH SETUP FAILURE message, the HNB may reinitiate the Iurh Setup procedure towards the same HNB-GW, provided that the content of the new IURH SETUP REQUEST message is identical to the content of the previously unacknowledged IURH SETUP REQUEST message.

8.2.3.4 Successful Operation HNB-GW Originated
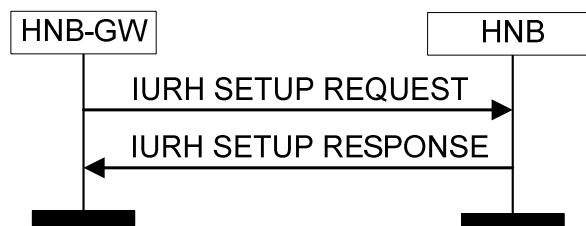
Figure 8.2.3.4.1: Iurh Setup procedure – Iurh connection via the HNB-GW – successful case.

The HNB-GW initiates this procedure by sending the IURH SETUP REQUEST message to the HNB. The HNB replies with the IURH SETUP RESPONSE message.

8.2.3.5 Unsuccessful Operation HNB-GW Originated
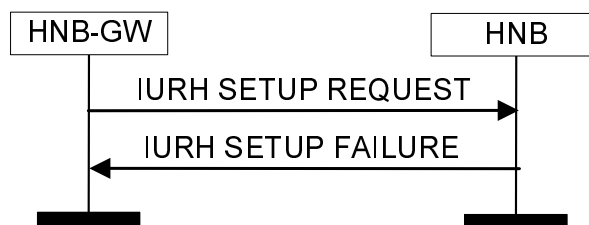
Figure 8.2.3.5.1: Iurh Setup procedure Iurh connection via the HNB-GW– unsuccessful case.

If the HNB cannot accept the setup it shall respond with an IURH SETUP FAILURE message with an appropriate cause value.

The IURH SETUP FAILURE message may include the *Backoff Timer* IE.

8.3 Connect

8.3.1 General

This procedure is used to establish signalling resources for a connection oriented data service and to carry the first RNSAP (TS 25.423 [4]) message between Iurh-connected HNBs, the initiating HNB acting as the Serving RNS, the peer HNB acting as the Drift RNS as defined in TS 25.423 [4]. If the HNBs are Iurh-connected via the HNB-GW, separate RNA resources are established between the initiating HNB and the HNB-GW, and the HNB-GW and the receiving HNB.

8.3.2 Successful Operation

8.3.2.1 HNB Originated – Direct Iurh connection
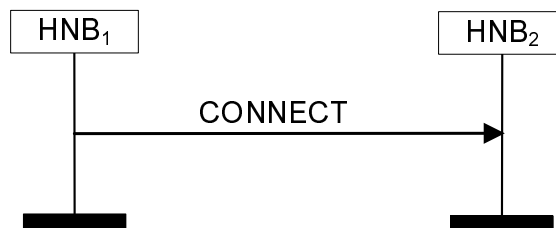
Figure 8.3.2.1.1: Connect procedure – direct Iurh connection.

This procedure is initiated by HNB_1 sending the CONNECT message to the HNB_2. The CONNECT message may carry the first RNSAP message within the *RNSAP Message* IE, e.g., the RADIO LINK SETUP REQUEST message defined in TS25.423 [4], from HNB_1 to HNB_2.

HNB_2 shall store the content of the *Iurh Signalling Context ID* IE and the *Senders HNB RNL Identity* IE and use both values to address the corresponding signalling resource at HNB_1 for the lifetime of the signalling connection.

8.3.2.2 HNB Originated – Iurh connection via the HNB-GW
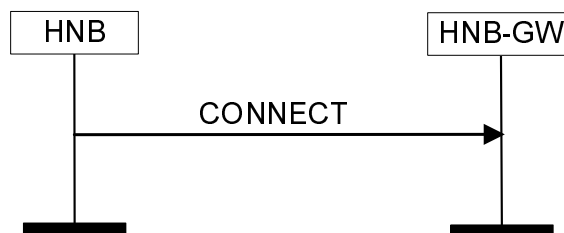
Figure 8.3.2.2.1: Connect procedure – HNB originated – Iurh connection via the HNB-GW.

This procedure is initiated by the HNB sending the CONNECT message to the HNB-GW. The CONNECT message may carry the first RNSAP message within the *RNSAP Message* IE, e.g., the RADIO LINK SETUP REQUEST message defined in TS 25.423 [4]. The HNB-GW shall establish RNA resources towards the HNB indicated within the *Receivers HNB RNL Identity* IE and pass the RNSAP message received from the sending HNB and the Iurh Signalling Context ID to that HNB.

8.3.2.3 HNB-GW Originated – Iurh connection via the HNB-GW

Figure 8.3.2.3.1: Connect procedure – HNB-GW originated – Iurh connection via the HNB-GW

This procedure is initiated by the HNB-GW by sending the CONNECT message to the HNB. The *Senders HNB RNL Identity* IE and the *Iurh Signalling Context ID* IE, contained in the CONNECT message indicate the originating HNB and the RNA resources established between the originating HNB and the HNB-GW.

The HNB shall store the content of the *Iurh Signalling Context ID* IE and the *Senders HNB RNL Identity* IE and use both values to address the corresponding signalling resource at the originating HNB for the lifetime of the signalling connection.

8.4 Direct Transfer

8.4.1 General

This procedure is used to transport an RNSAP (TS 25.423 [4]) message over an established connection oriented signalling connection between Iurh-connected HNBs. If the HNBs are Iurh-connected via the HNB-GW, the RNSAP message is transported over separate connection oriented signalling resources established between the initiating HNB and the HNB-GW, and the HNB-GW and the receiving HNB.

8.4.2 Successful Operation

8.4.2.1 HNB Originated – Direct Iurh connection
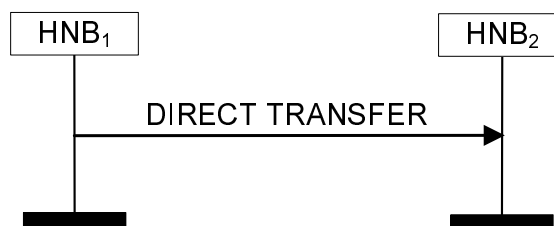
Figure 8.4.2.1.1: Direct Transfer procedure – HNB originated – direct Iurh connection.

HNB_1 initiates the procedure by sending the DIRECT TRANSFER message to the HNB_2.

8.4.2.2 HNB Originated – Iurh connection via the HNB-GW
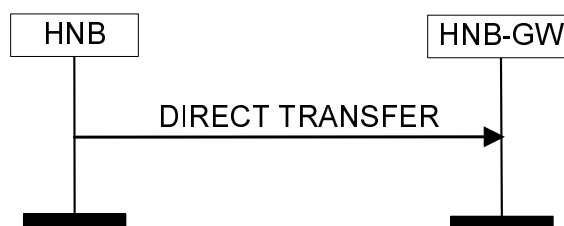
Figure 8.4.2.2.1: Direct Transfer procedure – HNB originated – Iurh connection via the HNB-GW.

The HNB initiates this procedure by sending the DIRECT TRANSFER message to the HNB-GW. The HNB-GW shall forward the RNSAP message contained in the DIRECT TRANSFER message to the connection oriented signalling connection identified by the *Receivers HNB RNL Identity* IE and the *Iurh Signalling Context ID* IE.

8.4.2.3 HNB-GW Originated – Iurh connection via the HNB-GW

Figure 8.4.2.3.1: Direct Transfer procedure – HNB-GW originated – Iurh connection via the HNB-GW

This procedure is initiated by the HNB-GW by sending the DIRECT TRANSFER message to the HNB.

8.5 Disconnect

8.5.1 General

This procedure is used to release an established connection oriented signalling connection and may convey an RNSAP (TS 25.423 [4]) message between Iurh-connected HNBs. If the HNBs are Iurh-connected via the HNB-GW, respective connection oriented signalling resources established between the initiating HNB and the HNB-GW, and the HNB-GW and the receiving HNB have to be released.

8.5.2 Successful Operation

8.5.2.1 HNB Originated – Direct Iurh connection
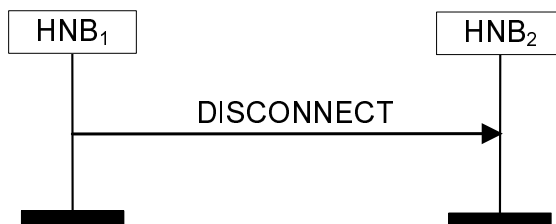
Figure 8.5.2.1.1: Disconnect procedure – direct Iurh connection.

This procedure is initiated by HNB_1 by sending the DISCONNECT message to the HNB_2. The DISCONNECT message may contain the *RNSAP Message* IE.

8.5.2.2 HNB Originated – Iurh connection via the HNB-GW
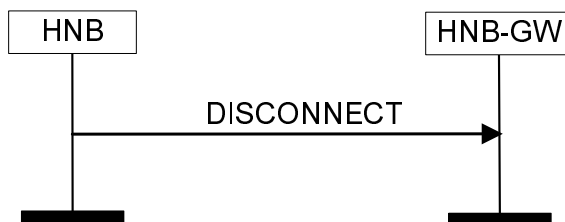
Figure 8.5.2.2.1: Disconnect procedure – HNB originated – Iurh connection via the HNB-GW.

This procedure is initiated by the HNB by sending the DISCONNECT message to the HNB-GW. The DISCONNECT message may contain the *RNSAP Message* IE.

The HNB shall include within the *Iurh Signalling Context ID* IE the value of the signalling resource over which the DISCONNECT message is sent to the HNB-GW.

The HNB-GW shall release the connection oriented signalling connection identified by the *Receivers HNB RNL Identity* IE and the *Iurh Signalling Context* ID IE.

8.5.2.3 HNB-GW Originated – Iurh connection via the HNB-GW
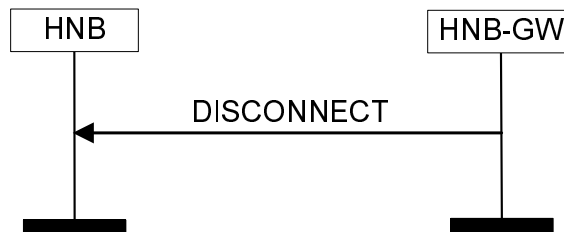
Figure 8.5.2.3.1: Disconnect procedure – HNB-GW originated – Iurh connection via the HNB-GW

This procedure is initiated by the HNB-GW by sending the DISCONNECT message to the HNB. The DISCONNECT message may contain the *RNSAP Message* IE.

8.6 Connectionless Transfer

8.6.1 General

This procedure is used to transport a connectionless RNSAP message over an established signalling connection between Iurh-connected HNBs.

8.6.2 Successful Operation

8.6.2.1 HNB Originated – Direct Iurh connection
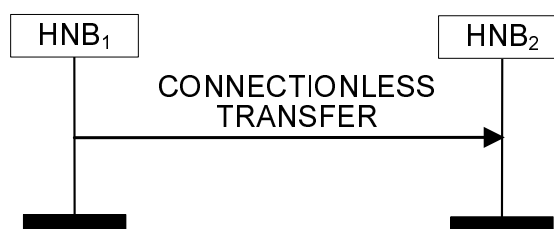
Figure 8.6.2.1.1: Connectionless Transfer procedure – HNB originated – direct Iurh connection.

This procedure is initiated by HNB_1 by sending the CONNECTIONLESS TRANSFER message to the HNB_2.

8.6.2.2 HNB Originated – Iurh connection via the HNB-GW
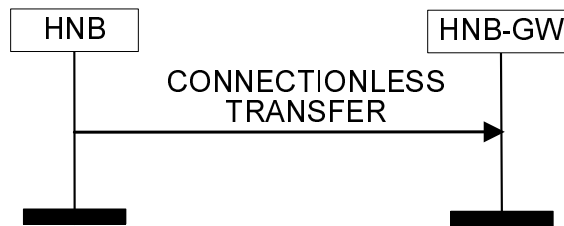
Figure 8.6.2.2.1: Connectionless Transfer procedure – HNB originated – Iurh connection via the HNB-GW.

This procedure is initiated by the HNB by sending the CONNECTIONLESS TRANSFER message to the HNB-GW. The HNB-GW shall forward the RNSAP message contained in the CONNECTIONLESS TRANSFER message to the HNB identified by the Receivers HNB RNL Identity.

8.6.2.3 HNB-GW Originated – Iurh connection via the HNB-GW

Figure 8.6.2.3.1: Connectionless Transfer procedure – HNB-GW originated – Iurh connection via the HNB-GW

This procedure is initiated by the HNB-GW by sending the CONNECTIONLESS TRANSFER message to the HNB.

8.7 Error Indication

8.7.1 General

The Error Indication procedure is initiated by a node to report detected errors in a received message, provided they cannot be reported by an appropriate failure message.

In case the Error Indication procedure is triggered over an established connection oriented signalling connection the ERROR INDICATION message shall contain the *Iurh Signalling Context ID* IE. If the Error Indication procedure is triggered because the value of the *Iurh Signalling Context ID* IE within an RNA message for connection oriented signalling is not correct, the cause shall be set to appropriate value e.g. "Unknown or already allocated Iurh Signalling Context ID".

8.7.2   Successful Operation

8.7.2.1   Direct Iurh Connection

Figure 8.7.2.1.1: Error Indication procedure – HNB originated – direct Iurh connection.

When the conditions defined in clause 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the node receiving an erroneous RNA message. This message shall use the same mode of the signalling bearer and the same signalling bearer connection (if connection oriented) as the message that has triggered the procedure.

8.7.2.2   Iurh Connection via the HNB-GW

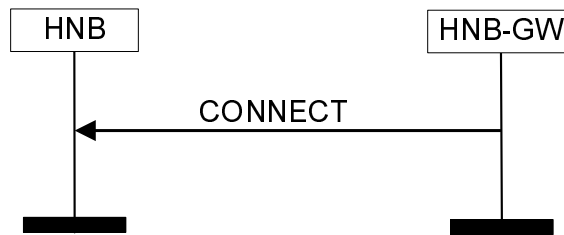**Figure 8.7.2.2.1: Error Indication procedure – HNB originated – Iurh connection via the HNB-GW.**
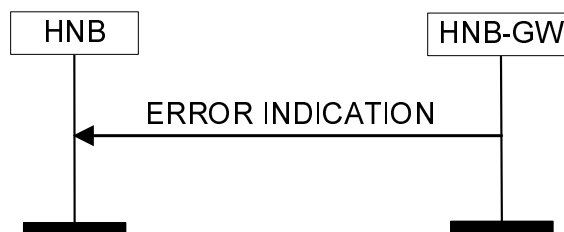
Figure 8.7.2.2.2: Error Indication procedure – HNB-GW originated – Iurh connection via the HNB-GW

When the conditions defined in clause 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the node receiving the erroneous RNA message. This message shall use the same mode of the signalling bearer and the same signalling bearer connection (if connection oriented) as the message that triggers the procedure. An ERROR INDICATION message received by the HNB-GW shall be forwarded by the HNB-GW to the sending node. For errors defined in clause 10 that are detected by the HNB-GW the ERROR INDICATION message shall be sent to the sending node, if the message has not been forwarded to the destination HNB.

9 Elements for RNA Communication

9.1 Message Functional Definition and Content

9.1.1 General

Section 9.1 presents the contents of RNA 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 [5].

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 3: Meaning of abbreviations used in RNA 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 4: 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   IURH SETUP REQUEST

This message is sent by a HNB or a HNB-GW to a HNB or a HNB-GW to transfer the initialization information for a TNL association.

Direction: HNB → HNB, HNB-GW → HNB and HNB → HNB-GW

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.1		YES	reject
Senders HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject

9.1.4   IURH SETUP RESPONSE

This message is sent by a HNB or a HNB-GW to a HNB or a HNB-GW to transfer the initialization information for a TNL association.

Direction: HNB → HNB, 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	reject
Senders HNB RNL Identity	M		HNB RNL Identity 9.2.9	.	YES	reject
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject

9.1.5   IURH SETUP FAILURE

This message is sent by the HNB to indicate Iurh Setup failure

Direction: HNB → HNB, 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	reject
Cause	M		9.2.2		YES	ignore
Backoff Timer	O		9.2.16		YES	ignore
Criticality Diagnostics	O		9.2.3		YES	ignore
Senders HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject

9.1.6   CONNECT

This message is sent by either an HNB to a directly Iurh-connected HNB or an HNB to the HNB-GW or the HNB-GW to an HNB to establish a connection oriented signalling connection and to carry an RNSAP message.

Direction: HNB → HNB and 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
Iurh Signalling Context ID	M		9.2.5		YES	reject
RNSAP Message	O		9.2.4		YES	reject
Senders HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject

9.1.7   DIRECT TRANSFER

This message is sent by either an HNB to a directly Iurh-connected HNB or an HNB to the HNB-GW or the HNB-GW to an HNB to transport a connection-oriented RNSAP message between the two nodes.

Direction: HNB → HNB and 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
Iurh Signalling Context ID	M		9.2.5		YES	reject
RNSAP Message	M		9.2.4		YES	reject
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject

9.1.8   DISCONNECT

This message is sent by either an HNB to a directly Iurh-connected HNB or an HNB to the HNB-GW or the HNB-GW to an HNB to close the signalling connection between the two nodes and may transport an RNSAP message.

Direction: HNB → HNB and 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
Iurh Signalling Context ID	M		9.2.5		YES	reject
Cause	M		9.2.2		YES	reject
RNSAP Message	O		9.2.4		YES	reject
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject

9.1.9 CONNECTIONLESS TRANSFER

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

Direction: HNB → HNB and 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
RNSAP Message	M		9.2.4		YES	reject
Senders HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	reject

9.1.10 ERROR INDICATION

This message is sent by either an HNB to another HNB or the HNB to the HNB-GW or the HNB-GW to the HNB to indicate that some error(s) have been detected.

Direction: HNB → HNB and 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
Cause	O		9.2.2		YES	ignore
Criticality Diagnostics	O		9.2.3		YES	ignore
Iurh Signalling Context ID	O		9.2.5		YES	ignore
Receivers HNB RNL Identity	M		HNB RNL Identity 9.2.9		YES	ignore

9.2 Information Element Definitions

9.2.0 General

Section 9.2 presents the RNA 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

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

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message Type				
>Procedure Code	M		INTEGER (0..255)	
>Type of Message	M		ENUMERATED (Initiating Message, Successful Outcome, Unsuccessful Outcome, Outcome)	

9.2.2   Cause

The purpose of the cause information element is to indicate the reason for a particular event for the whole protocol.

Table 20

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, Unknown or already allocated Iurh Context ID, Unspecified, ..., Peer RNC not available,)	
>*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. In general, "not supported" cause values indicate that the concerned capability is missing. On the other hand, "not available" cause values indicate that the concerned capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Normal	No error has occurred
Connect failed	Connect attempt failed
Network release	Connection released by network
Unknown or already allocated Iurh Context ID	The action failed because the Iurh Context ID is either unknown, or (in case of an initiating message) is known and already allocated to an existing context.
Unspecified	Sent when none of the above cause values applies but still the cause is Radio Network layer related.
Peer RNC not available	The Iur interface between the HNB-GW and the peer RNC is not available for HNB-RNC connectivity via the HNB-GW.

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" (see subclause 10.3)
Abstract Syntax Error (Ignore and Notify)	The received message included an abstract syntax error and the concerned criticality indicated "ignore and notify" (see subclause 10.3)
Abstract syntax error (falsely constructed message)	The received message contained IEs or IE groups in wrong order or with too many occurrences (see subclause 10.3)
Message not Compatible with Receiver State	The received message was not compatible with the receiver state (see subclause 10.4)
Semantic Error	The received message included a semantic error (see subclause 10.4)
Transfer Syntax Error	The received message included a transfer syntax error (see subclause 10.2)
Unspecified	Sent when none of the above cause values applies but still the cause is Protocol related

Miscellaneous cause	Meaning
Hardware Failure	HNB hardware failure
O&M Intervention	Operation and Maintenance intervention related to HNB equipment
Processing Overload	HNB processing overload
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.

9.2.3 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the HNB 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 was 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 <maxNr OfErrors >*		
>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.

9.2.4   RNSAP Message

This is a container for a RNSAP message as defined in TS 25.423 [4].

IE/GROUP NAME	PRESENCE	RANGE	IE Type and	Semantics Description
RNSAP message			OCTET STRING	

9.2.5   Iurh Signalling Context ID

The Iurh Signalling Context ID together with the respective HNB RNL IDs uniquely identifies a particular connection oriented signalling connection between two HNBs. It shall be the same as the Context ID used on the Iuh connection.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and	Semantics Description
Iurh Signalling Context ID			BIT STRING(24)	

9.2.6   PLMN-ID

The PLMN-ID identifies a Public Land Mobile Network.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN-ID			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).

9.2.7   Cell-ID

The Cell-ID identifies uniquely a cell within a PLMN, as defined in TS 25.331 [12].

Information Element/Group name	Presence	Range	Type and reference	Semantics description
Cell-ID			BIT STRING (SIZE (28))	This information element identifies a cell uniquely within a PLMN.

9.2.8   Backoff Timer

The *Backoff Timer* IE indicates in seconds the minimum duration for which the setup procedure shall not be retried.

Information Element/Group name	Presence	Range	IE Type and reference	Semantics description
Backoff Timer			INTEGER (0..3600)	Value "0" indicates no specified time.

9.2.9   HNB RNL Identity

The *HNB RNL Identity* IE globally identifies a HNB or an RNC.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Choice *HNB RNL Identity*	M				–	
>*Cell Identifier*						
>>HNB Cell Identifier	M		9.2.10		–	
>*Additional Node Identifier*						
>>Global RNC ID	M		9.2.11		YES	reject

9.2.10   HNB Cell Identifier

This IE identifies a HNB by its PLMN and cell it serves.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN-ID	M		9.2.6	
Cell-ID	M		9.2.7	

9.2.11 Global RNC ID

This IE identifies an RNC by its PLMN and the RNC ID.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN-ID	M		9.2.6	
RNC ID	M		INTEGER (0..65535)	Values greater than 4095 are extended (16bit) RNC Ids.

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

9.3.0 General

RNA ASN.1 definition conforms with ITU-T X.680 [8] and ITU-T X.681 [9].

The ASN.1 definition specifies the structure and content of RNA messages. RNA 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 RNA 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 RNA 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 protocol extension mechanism for non-standard use

The protocol extension 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 extension mechanism shall not be used for basic functionality. Such functionality shall be standardised.

9.3.2   Elementary Procedure Definitions

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

RNA-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) rna(7) version1 (1) rna-PDU-Descriptions (0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    ProcedureCode
FROM RNA-CommonDataTypes
    IurhSetupRequest,
    IurhSetupResponse,
    IurhSetupFailure,
    Connect,
    DirectTransfer,
    Disconnect,
    ConnectionlessTransfer,
    ErrorIndication,
    PrivateMessage

FROM RNA-PDU-Contents
    id-IurhSetup,
    id-Connect,
    id-DirectTransfer,
    id-Disconnect,
    id-ConnectionlessTransfer,
    id-ErrorIndication,
    id-privateMessage
FROM RNA-Constants;

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

```
RNA-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
--
-- *************************************************************

RNA-PDU ::= CHOICE {
    initiatingMessage       InitiatingMessage,
    successfulOutcome       SuccessfulOutcome,
    unsuccessfulOutcome     UnsuccessfulOutcome,
    ...
}


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

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

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

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

```
RNA-ELEMENTARY-PROCEDURES RNA-ELEMENTARY-PROCEDURE ::= {
    RNA-ELEMENTARY-PROCEDURES-CLASS-1   |
    RNA-ELEMENTARY-PROCEDURES-CLASS-2   ,
    ...
}

RNA-ELEMENTARY-PROCEDURES-CLASS-1 RNA-ELEMENTARY-PROCEDURE ::= {
    iurhsetup,
    ...
}


RNA-ELEMENTARY-PROCEDURES-CLASS-2 RNA-ELEMENTARY-PROCEDURE ::= {
    connect                      |
    directTransfer               |
    disconnect                   |
    connectionlessTransfer       |
    errorIndication              |
    privateMessage,
    ...
}

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

iurhsetup   RNA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      IurhSetupRequest
    SUCCESSFUL OUTCOME      IurhSetupResponse
    UNSUCCESSFUL OUTCOME    IurhSetupFailure
    PROCEDURE CODE          id-IurhSetup
    CRITICALITY             reject
}


connect RNA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      Connect
    PROCEDURE CODE          id-Connect
    CRITICALITY             ignore
}

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

disconnect RNA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      Disconnect
    PROCEDURE CODE          id-Disconnect
    CRITICALITY             ignore
}
```

```
connectionlessTransfer  RNA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ConnectionlessTransfer
    PROCEDURE CODE          id-ConnectionlessTransfer
    CRITICALITY             ignore
}



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

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

END
```

9.3.3   PDU Definitions

```
-- *************************************************************
--
-- PDU definitions for RNA.
--
-- *************************************************************

RNA-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) rna(7) version1 (1) rna-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Cause,
    CriticalityDiagnostics,
    RNSAP-Message,
    BackoffTimer,
    Iurh-Signalling-Context-ID,
    HNB-RNL-ID
```

```
FROM RNA-IEs


    ProtocolExtensionContainer{},
    ProtocolIE-ContainerList{},
    ProtocolIE-Container{},
    ProtocolIE-Single-Container{},
    PrivateIE-Container{},
    RNA-PRIVATE-IES,
    RNA-PROTOCOL-EXTENSION,
    RNA-PROTOCOL-IES
FROM RNA-Containers

    id-Cause,
    id-CriticalityDiagnostics,

    id-RNSAP-Message,
    id-BackoffTimer,

    id-Iurh-Signalling-Context-ID,
    id-Senders-HNB-RNL-ID,
    id-Receivers-HNB-RNL-ID,
    id-HNB-RNL-ID



FROM RNA-Constants;


-- *************************************************************
--
-- Iurh Setup REQUEST
--
-- *************************************************************

IurhSetupRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {IurhSetupRequestIEs} },
    protocolExtensions      ProtocolExtensionContainer { {IurhSetupRequestExtensions} }    OPTIONAL,
    ...
}

IurhSetupRequestIEs RNA-PROTOCOL-IES ::= {
    { ID id-Senders-HNB-RNL-ID        CRITICALITY reject  TYPE HNB-RNL-ID                       PRESENCE mandatory  } |
    { ID id-Receivers-HNB-RNL-ID      CRITICALITY reject  TYPE HNB-RNL-ID                       PRESENCE mandatory  },
    ...
}

IurhSetupRequestExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}

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

```
-- Iurh Setup RESPONSE
--
-- ************************************************************

IurhSetupResponse ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {IurhSetupResponseIEs} },
    protocolExtensions  ProtocolExtensionContainer { {IurhSetupResponseExtensions} }   OPTIONAL,
    ...
}

IurhSetupResponseIEs RNA-PROTOCOL-IES ::= {
    { ID id-Senders-HNB-RNL-ID      CRITICALITY reject  TYPE HNB-RNL-ID                   PRESENCE mandatory } |
    { ID id-Receivers-HNB-RNL-ID    CRITICALITY reject  TYPE HNB-RNL-ID                   PRESENCE mandatory },
    ...
}


IurhSetupResponseExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}


-- ************************************************************
--
-- Iurh Setup FAILURE
--
-- ************************************************************

IurhSetupFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {IurhSetupFailureIEs} },
    protocolExtensions  ProtocolExtensionContainer { {IurhSetupFailureExtensions} }    OPTIONAL,
    ...
}

IurhSetupFailureIEs RNA-PROTOCOL-IES ::= {
    { ID id-Cause                   CRITICALITY ignore  TYPE Cause                        PRESENCE mandatory }|
    { ID id-BackoffTimer            CRITICALITY ignore  TYPE BackoffTimer                 PRESENCE optional }|
    { ID id-CriticalityDiagnostics  CRITICALITY ignore  TYPE CriticalityDiagnostics       PRESENCE optional }|
    { ID id-Senders-HNB-RNL-ID      CRITICALITY reject  TYPE HNB-RNL-ID                   PRESENCE mandatory }|
    { ID id-Receivers-HNB-RNL-ID    CRITICALITY reject  TYPE HNB-RNL-ID                   PRESENCE mandatory },
    ...
}


IurhSetupFailureExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}




-- ************************************************************
--
-- Connect
```

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

Connect ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         { {ConnectIEs} },
    protocolExtensions      ProtocolExtensionContainer { {ConnectExtensions} }    OPTIONAL,
    ...
}

ConnectIEs RNA-PROTOCOL-IES ::= {
    { ID id-Iurh-Signalling-Context-ID     CRITICALITY reject  TYPE Iurh-Signalling-Context-ID     PRESENCE mandatory }|
    { ID id-RNSAP-Message                  CRITICALITY reject  TYPE RNSAP-Message                   PRESENCE optional }|
    { ID id-Senders-HNB-RNL-ID             CRITICALITY reject  TYPE HNB-RNL-ID                      PRESENCE mandatory }|
    { ID id-Receivers-HNB-RNL-ID           CRITICALITY reject  TYPE HNB-RNL-ID                      PRESENCE mandatory },
    ...
}

ConnectExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}


-- ************************************************************
--
-- Direct Transfer
--
-- ************************************************************

DirectTransfer ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         { {DirectTransferIEs} },
    protocolExtensions  ProtocolExtensionContainer { {DirectTransferExtensions} }  OPTIONAL,
    ...
}

DirectTransferIEs RNA-PROTOCOL-IES ::= {
    { ID id-Iurh-Signalling-Context-ID     CRITICALITY reject  TYPE Iurh-Signalling-Context-ID  PRESENCE mandatory } |
    { ID id-RNSAP-Message                  CRITICALITY reject  TYPE RNSAP-Message               PRESENCE mandatory } |
    { ID id-Receivers-HNB-RNL-ID           CRITICALITY reject  TYPE HNB-RNL-ID                  PRESENCE mandatory } ,
    ...
}

DirectTransferExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}


-- ************************************************************
--
-- Disconnect
--
-- ************************************************************

Disconnect ::= SEQUENCE {
```

```
    protocolIEs         ProtocolIE-Container        { {DisconnectIEs} },
    protocolExtensions  ProtocolExtensionContainer { {DisconnectExtensions} }  OPTIONAL,
    ...
}

DisconnectIEs RNA-PROTOCOL-IES ::= {
    { ID id-Iurh-Signalling-Context-ID     CRITICALITY reject  TYPE Iurh-Signalling-Context-ID     PRESENCE mandatory } |
    { ID id-Cause                          CRITICALITY reject  TYPE Cause                          PRESENCE mandatory } |
    { ID id-RNSAP-Message                  CRITICALITY reject  TYPE RNSAP-Message                  PRESENCE optional } |
    { ID id-Receivers-HNB-RNL-ID           CRITICALITY reject  TYPE HNB-RNL-ID                     PRESENCE mandatory },
    ...
}

DisconnectExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}

-- *************************************************************
--
-- Connectionless Transfer
--
-- *************************************************************

ConnectionlessTransfer ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container        { {ConnectionlessTransferIEs} },
    protocolExtensions  ProtocolExtensionContainer { {ConnectionlessTransferExtensions} }  OPTIONAL,
    ...
}

ConnectionlessTransferIEs RNA-PROTOCOL-IES ::= {
    { ID id-RNSAP-Message                  CRITICALITY reject  TYPE RNSAP-Message                  PRESENCE mandatory } |
    { ID id-Senders-HNB-RNL-ID             CRITICALITY reject  TYPE HNB-RNL-ID                     PRESENCE mandatory } |
    { ID id-Receivers-HNB-RNL-ID           CRITICALITY reject  TYPE HNB-RNL-ID                     PRESENCE mandatory },
    ...
}

ConnectionlessTransferExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}




-- *************************************************************
--
-- ERROR INDICATION
--
-- *************************************************************

ErrorIndication ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container        { {ErrorIndicationIEs} },
    protocolExtensions  ProtocolExtensionContainer { {ErrorIndicationExtensions} }    OPTIONAL,
    ...
}
```

```
ErrorIndicationIEs RNA-PROTOCOL-IES ::= {
    { ID id-Cause                         CRITICALITY ignore  TYPE Cause                      PRESENCE optional } |
    { ID id-CriticalityDiagnostics        CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional } |
    { ID id-Iurh-Signalling-Context-ID    CRITICALITY ignore  TYPE Iurh-Signalling-Context-ID PRESENCE optional } |
    { ID id-Receivers-HNB-RNL-ID          CRITICALITY ignore  TYPE HNB-RNL-ID                 PRESENCE mandatory } ,
    ...
}

ErrorIndicationExtensions RNA-PROTOCOL-EXTENSION ::= {
    ...
}

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

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

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

END
```

9.3.4   Information Element Definitions

```
-- ***************************************************************
--
-- Information Element Definitions
--
-- ***************************************************************

RNA-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) rna(7) version1 (1) rna-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    maxNrOfErrors,
    id-HNB-Cell-Identifier,
    id-GlobalRNC-ID
FROM RNA-Constants
```

```
        Criticality,
        ProcedureCode,
        ProtocolIE-ID,
        TriggeringMessage
FROM RNA-CommonDataTypes
        ProtocolExtensionContainer{},
        RNA-PROTOCOL-EXTENSION,
        RNA-PROTOCOL-IES,
        ProtocolIE-Single-Container{}
FROM RNA-Containers;


--A
--B
BackoffTimer ::= INTEGER(0..3600)

--C

-- ************************************************************
--
-- Cause IE
--
-- ************************************************************

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

CauseRadioNetwork ::= ENUMERATED {
        normal,
        connect-failed,
        network-release,
        unknown-or-already-allocated-Iurh-Context-ID,
        unspecified,
        ...,
        peer-RNC-not-available
}

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,
    ...
}

CellIdentity ::=        BIT STRING (SIZE (28))



-- **************************************************************
--
-- 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 RNA-PROTOCOL-EXTENSION ::= {
    ...
}

CriticalityDiagnostics-ExtIEs RNA-PROTOCOL-EXTENSION ::= {
    ...
}



--D
```

```
--E
--F

--G

--H


HNB-RNL-ID ::= CHOICE {
    hNB-Identity-as-Global-Cell-Identifier  HNB-Cell-Identifier,
    ...,
    extension-HNB-RNL-ID        Extension-HNB-RNL-ID
}

Extension-HNB-RNL-ID ::= ProtocolIE-Single-Container {{ Extension-HNB-RNL-ID-IE }}

Extension-HNB-RNL-ID-IE RNA-PROTOCOL-IES ::= {
    { ID id-GlobalRNC-ID    CRITICALITY reject  TYPE GlobalRNC-ID   PRESENCE mandatory },
    ...
}

HNB-Cell-Identifier ::= SEQUENCE {
    pLMN-ID    PLMN-ID,    cell-ID    CellIdentity,
    iE-Extensions           ProtocolExtensionContainer { { HNB-Cell-Identifier-ExtIEs } }       OPTIONAL,
    ...
}

HNB-Cell-Identifier-ExtIEs RNA-PROTOCOL-EXTENSION ::= {
    ...
}


--I

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

--J
--K

--L


--M
--N
--O
--P
PLMN-ID ::= OCTET STRING (SIZE(3))


--Q
--R

GlobalRNC-ID    ::= SEQUENCE {
```

```
    pLMN-ID          PLMN-ID,
    rnc-ID           INTEGER (0..65535),
    iE-Extensions    ProtocolExtensionContainer { { GlobalRNC-ID-ExtIEs } }      OPTIONAL,
    ...
}

GlobalRNC-ID-ExtIEs RNA-PROTOCOL-EXTENSION ::= {
    ...
}

RNSAP-Message    ::=          OCTET STRING


--S
--T

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



--V
--W
--X
--Y
--Z


END
```

9.3.5   Common Definitions


```
-- *************************************************************
--
-- Common definitions
--
-- *************************************************************

RNA-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) rna(7) version1 (1) rna-CommonDataTypes (3) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

```
-- Extension constants
--
-- *************************************************************

maxPrivateIEs                              INTEGER ::= 65535
maxProtocolExtensions                      INTEGER ::= 65535
maxProtocolIEs                             INTEGER ::= 65535


-- *************************************************************
--
-- Common Data Types
--
-- *************************************************************
Criticality     ::= ENUMERATED { reject, ignore, notify }

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

PrivateIE-ID    ::= CHOICE {
    local             INTEGER (0..65535),
    global            OBJECT IDENTIFIER
}


ProcedureCode       ::= INTEGER (0..255)


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


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

END
```

9.3.6   Constant Definitions

```
-- *************************************************************
--
-- Constant definitions
--
-- *************************************************************

RNA-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) rna(7) version1 (1) rna-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
```

```
    ProcedureCode,
    ProtocolIE-ID
FROM RNA-CommonDataTypes;


-- ***************************************************************
--
-- Elementary Procedures
--
-- ***************************************************************
id-IurhSetup                    ProcedureCode ::= 1
id-Connect                      ProcedureCode ::= 2
id-DirectTransfer               ProcedureCode ::= 3
id-Disconnect                   ProcedureCode ::= 4
id-ConnectionlessTransfer       ProcedureCode ::= 5
id-ErrorIndication              ProcedureCode ::= 6
id-privateMessage               ProcedureCode ::= 7


-- ***************************************************************
--
-- Lists
--
-- ***************************************************************
maxNrOfErrors                   INTEGER ::= 256



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

id-Cause                            ProtocolIE-ID ::= 1
id-CriticalityDiagnostics           ProtocolIE-ID ::= 2
id-RNSAP-Message                    ProtocolIE-ID ::= 3
id-BackoffTimer                     ProtocolIE-ID ::= 4
id-Senders-HNB-RNL-ID               ProtocolIE-ID ::= 5
id-Receivers-HNB-RNL-ID             ProtocolIE-ID ::= 6
id-Iurh-Signalling-Context-ID       ProtocolIE-ID ::= 7
id-HNB-RNL-ID                       ProtocolIE-ID ::= 8
id-HNB-Cell-Identifier              ProtocolIE-ID ::= 9
id-GlobalRNC-ID                     ProtocolIE-ID ::= 10



END
```

9.3.7   Container Definitions

```
-- *************************************************************
--
-- Container definitions
--
-- *************************************************************

RNA-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) rna(7) version1 (1) rna-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolIE-ID,
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs
FROM RNA-CommonDataTypes;

-- *************************************************************
--
-- Class Definition for Protocol IEs
--
-- *************************************************************

RNA-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
--
-- *************************************************************
```

```
RNA-PROTOCOL-EXTENSION ::= CLASS {
    &id                 ProtocolIE-ID UNIQUE,
    &criticality        Criticality,
    &Extension,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    EXTENSION           &Extension
    PRESENCE            &presence
}

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

RNA-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 {RNA-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
        ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Single-Container {RNA-PROTOCOL-IES : IEsSetParam} ::=
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field {RNA-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
    id                  RNA-PROTOCOL-IES.&id                 ({IEsSetParam}),
    criticality         RNA-PROTOCOL-IES.&criticality        ({IEsSetParam}{@id}),
    value               RNA-PROTOCOL-IES.&Value              ({IEsSetParam}{@id})
}

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

```
-- Container Lists for Protocol IE Containers
--
-- ***************************************************************

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


-- ***************************************************************
--
-- Container for Protocol Extensions
--
-- ***************************************************************

ProtocolExtensionContainer {RNA-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
    SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
        ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {RNA-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
    id              RNA-PROTOCOL-EXTENSION.&id              ({ExtensionSetParam}),
    criticality     RNA-PROTOCOL-EXTENSION.&criticality     ({ExtensionSetParam}{@id}),
    extensionValue  RNA-PROTOCOL-EXTENSION.&Extension       ({ExtensionSetParam}{@id})
}

-- ***************************************************************
--
-- Container for Private IEs
--
-- ***************************************************************

PrivateIE-Container {RNA-PRIVATE-IES : IEsSetParam } ::=
    SEQUENCE (SIZE (1.. maxPrivateIEs)) OF
        PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {RNA-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
    id              RNA-PRIVATE-IES.&id                     ({IEsSetParam}),
    criticality     RNA-PRIVATE-IES.&criticality            ({IEsSetParam}{@id}),
    value           RNA-PRIVATE-IES.&Value                  ({IEsSetParam}{@id})
}

END
```

9.4 Message Transfer Syntax

RNA shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ITU-T X.691 [7].
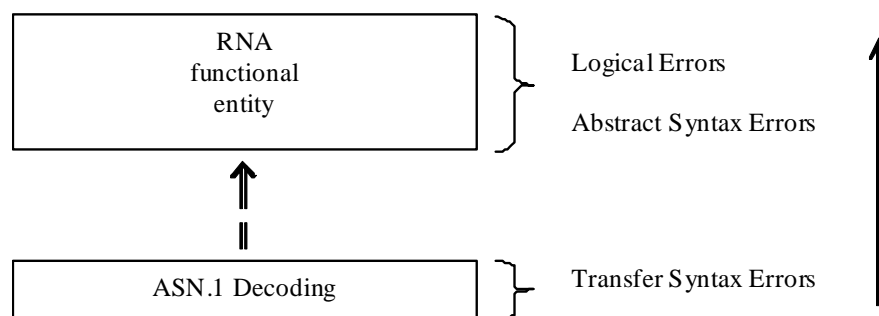
10 Handling of Unknown, Unforeseen or Erroneous Protocol Data

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 10.1.14: Protocol Errors in RNA

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 RNA 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 RNA 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, RNA specifies separately if the presence of these IEs/IE groups is optional or mandatory with respect to HNB application by means of the presence field of the concerning object of class RNA-PROTOCOL-IES, RNA-PROTOCOL-IES-PAIR, RNA-PROTOCOL-EXTENSION or RNA-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* IE marked with "Reject IE" which the receiving node does not comprehend, the receiving node shall reject the procedure using the Error Indication procedure.

Ignore IE and Notify Sender:

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

Ignore IE:

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

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

10.3.4.1A Type of Message

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

10.3.4.2 IEs other than the Procedure Code and Type of Message

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

Reject IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE 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 I*E*" 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. 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 A) 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 A) 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 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. 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 A) 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 A) 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 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

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
	50	RP-101295				0.0.1	2.0.0
	50	RP-101367				2.0.0	2.0.1
		R3-110310				2.0.1	2.1.0
		R3-110341				2.1.0	2.2.0
		R3-111051				2.2.0	2.3.0
03/2011	51	RP-110184			Approved and the version raised to v. 10.0.0	2.3.0	10.0.0
06/2011	52	RP-110684	0001	1	Correction of References	10.0.0	10.1.0
06/2011	52	RP-110691	0002	1	Review corrections	10.0.0	10.1.0
09/2011	53	RP-111194	0004	1	RNSAP message in RNA CONNECT message	10.1.0	10.2.0
09/2012					Creation of version 11.0.0 based on version 10.2.0	10.2.0	11.0.0
09/2012	57	RP-121136	0005	1	Introduction of connectivity between HNBs and RNCs via the HNB-GW for RNSAP signalling	10.2.0	11.0.0
12/2012	58	RP-121737	0006	-	Editorial and minor corrections	11.0.0	11.1.0
03/2013	59	RP-130211	0007	-	Corrections from ASN.1 Review	11.1.0	11.2.0
09/2014					Creation of version 12.0.0 based on version 11.2.0	11.2.0	12.0.0
12/2014	66	RP-142094	0008	4	RNA Rapporteur Update	12.0.0	12.1.0
12/2015	70				Creation of version 13.0.0 based on version 12.1.0	12.1.0	13.0.0
01/2016					Typo in the change history table corrected	13.0.0	13.0.1
03/2016	71	RP-160449	0010	-	RNA Rapporteur Update	13.0.1	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

History

Document history		
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