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Technical Specification

3rd Generation Partnership Project (3GPP);
Technical Specification Group (TSG) RAN
UTRAN Iu Interface: Service Area Broadcast Protocol SABP

[UMTS 25.419]

3GPP

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Contents

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Foreword

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]Version x.y.z

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x the first digit:

1 presented to TSG for information;

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

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

1Scope

This Technical Specification (TS) specifies the *Service Area Broadcast Protocol (SABP)* between the Cell Broadcast Centre (CBC) and the Radio Network Controller (RNC). It fulfils the CBC - RNC communication requirements specified in [7] and is defined over the IuIu-BC – reference point.

2References

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.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] UMTS 23.930, Iu Principles

[2] UMTS 25.410, UTRAN Iu Interface; General Aspects and Principles

[3] UMTS 25.401, UTRAN Overall Description

[4] UMTS 25.931, UTRAN Functions, Examples on Signalling Procedures

[5] UMTS 25.412, UTRAN Iu Interface Signalling Transport

[6] UMTS 25.415, Iu Interface CN-UTRAN User Plane Protocol

[7] UMTS 23.041, “Technical realization of Cell Broadcast Service (CBS)"

[8] UMTS 25.414, UTRAN Iu Interface Data Transport and Transport Signalling

[9] X.680, (12/94): "Information Technology - Abstract Syntax Notation One (ASN.1):Specification of basic notation"

[10] X.681, (12/94): "Information Technology - Abstract Syntax Notation One (ASN.1): Information object specification"

[11] X.691 (12/94): "Information Technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER)"

[12] UMTS 25.921 Guidelines and Principles for Protocol Description and Error Handling

3Definitions, Symbols and Abbreviations

3.1Definitions

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

Elementary Procedure: The SABP consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the CN (CBC) and the RNC. 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.

Message Reference: This is defined as consisting of the following parameters: Message Identifier, Serial Number, and SAI (Service Area Identifier).

3.2Symbols

No special symbols are defined in this document.

3.3Abbreviations

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

CBC – Cell Broadcast Centre

CBS – Cell Broadcast Service
CN – Core Network
EP – Elementary Procedure
FP – Frame Protocol
PDU – Protocol Data Unit
RNC – Radio Network Controller
SA – Service Area
SABP – Service Area Broadcast Protocol

4General

The protocol described in this specification is the protocol between CN (CBC) and RNC needed for the CBC Application. The CBC Application is described in [7].

5Services provided by SABP

- During normal operation the CN (CBC) initiates all message transfer and query operations. The RNC responds to the message transfer and query operations initiated by the CBC.
- The RNC will open the connection only in case an error (Failure Indication) or recovery (RestartIndication) is to be reported.
- The initiator of a connection is responsible for the termination of the connection.

6Services expected from the Transport layer

Following service is expected from the transport layer:-

- in sequence delivery of FP PDU.

7Functions of SABP

The SABP has the following functions:

- Message Handling. This function is responsible for the broadcast of new messages, amend existing broadcasted messages and to stop the broadcasting of specific messages.
- Load Handling. This function is responsible for determining the loading of the broadcast channels at any particular point in time.
- Reset. This function permits the CBC to end broadcasting in one or more Service Areas.
- 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 SABP elementary procedures described in the following section.

8SABP Procedures

8.1Elementary Procedures

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

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
Write-Replace	WRITE-REPLACE	WRITE-REPLACE COMPLETE	WRITE-REPLACE FAILURE
Kill	KILL	KILL COMPLETE	KILL FAILURE
Status Load Enquiry	LOAD QUERY	LOAD QUERY COMPLETE	LOAD QUERY FAILURE
Status Message Query	MESSAGE QUERY	MESSAGE QUERY COMPLETE	MESSAGE QUERY FAILURE
Reset	RESET	RESET COMPLETE	RESET FAILURE

Table 1. Class 1

Elementary Procedure	Message
Restart Indication	RESTART
Failure Indication	FAILURE
Error Indication	ERROR INDICATION

Table 2. Class 2

8.2Write-Replace

8.2.1General

The purpose of thisWrite-Replace procedure is to broadcast new information or replace a message already broadcast to a chosen Service Area(s).

8.2.2 Successful Operation

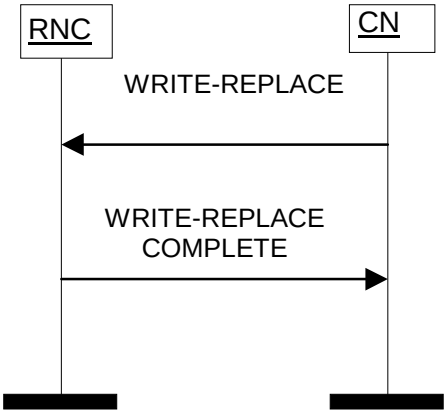

Figure 1. Write-Replace Procedure: Successful Operation

The CN shall initiate the procedure by sending a WRITE-REPLACE message to the RNC.

The presence of a New-Serial-Number will indicate that this is a new broadcast. The presence of both the Old-Serial-Number and the New-Serial-Number will indicate that this is message is a replacement of an existing broadcast. The RNC will initiate broadcasting of a new message or replace a message already broadcast as requested.

Upon receipt of the WRITE-REPLACE message the RNC shall respond using the WRITE-REPLACE COMPLETE message containing a New-Serial-Number indicating that resources are available as requested for the Service Area(s) specified.

8.2.3Unsuccessful Operation

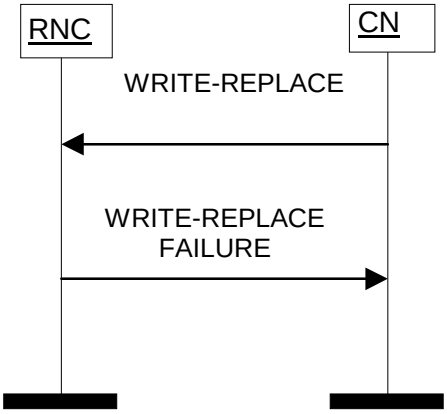

Figure 2. Write-Replace Procedure: Un-Successful Operation

If the RNC cannot allocate all the resources requested for the Service AreasArea(s) specified in the WRITE-REPLACE message, then the RNC shall return a WRITE-REPACE FAILURE message to the CN. A list of Service Area(s) where the requested resources are unavailable will be provided in this WRITE-REPLACE FAILURE message in the Failure-List IE.

This WRITE-REPLACE FAILURE message may also include those Service AreasArea(s) where the requested resources were available and will indicate in the Number-of-Broadcasts-Completed IE those Service AreasArea(s) which completed the request.

8.2.4Abnormal Conditions

8.3Kill

8.3.1General

The purpose of the Kill procedure is to stop the broadcast of the indicated message.

8.3.2Successful Operation

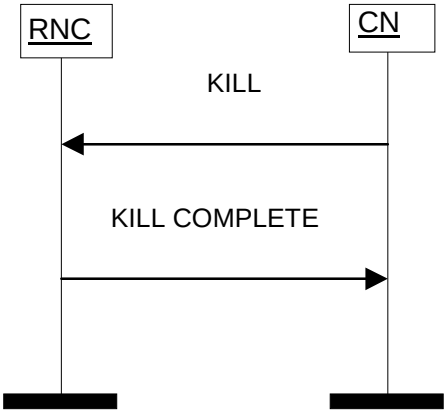

Figure 3. Kill Procedure: Successful Operation

The CN shall initiate the procedure by sending a KILL message to the RNC.

Upon receipt of the KILL message the RNC shall stop broadcasting the indicated message in the indicated Service Area(s). The RNC shall respond using the KILL COMPLETE message, containing the Old-Serial number.

8.3.3Unsuccessful Operation

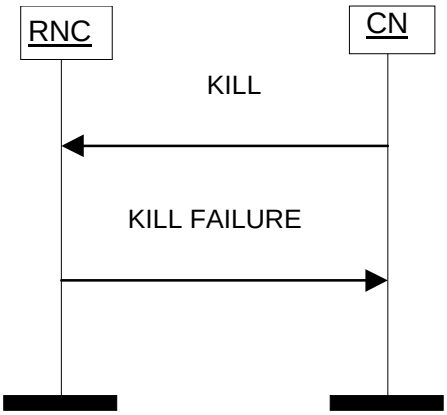

Figure 4. Kill Procedure: Un-Successful Operation

A Failure-List IE indicating the list of Service ~~Areas~~Area(s) where the message reference is not valid will be provided in a KILL FAILURE message. This response message may also – if applicable - indicate in the Number-of-Broadcasts-Completed-List IE those Service Area(s) which completed the request where the KILL message was successful.

8.3.4Abnormal Conditions

8.4Load Status Enquiry

8.4.1General

The purpose of this Load Status Enquiry procedure is to obtain the current permissible bandwidth available for broadcast within particular Service ~~Areas~~Area(s).

8.4.2Successful Operation

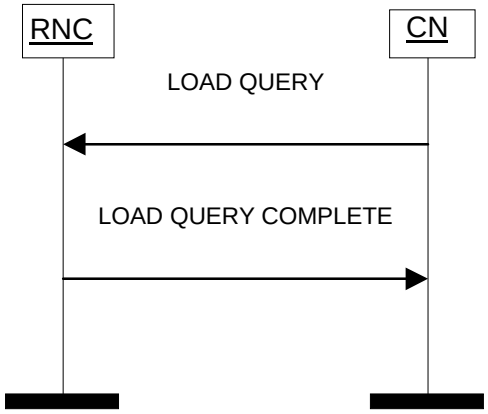

Figure 5: Load Status Enquiry Procedure: Successful Operation.

The CN shall initiate the procedure by sending a LOAD QUERY message to the RNC. The message shall include a Service Area List. Upon reception of the LOAD QUERY message the RNC shall respond with LOAD QUERY COMPLETE.

8.4.3Unsuccessful Operation

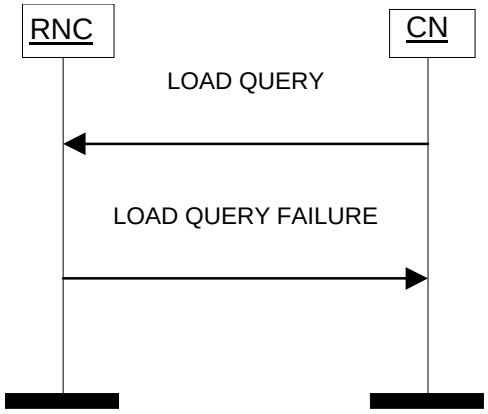

Figure 6: Load Status Enquiry Procedure: Un-Successful Operation.

If the RNC contains Service Area(s) for which the RNC was not able to respond to, it shall respond with a LOAD QUERY FAILURE message which includes the Failure-List IE.

The LOAD QUERY FAILURE Message may – if applicable - also contain a Radio-Resource-Loading-List IE for which the LOAD STATUS QUERY reporting was successful.

8.4.4Abnormal Conditions

8.5Message Status Query

8.5.1General

The Message Status Query procedure is used by the CN to obtain the message status of a broadcast message.

8.5.2Successful Operation

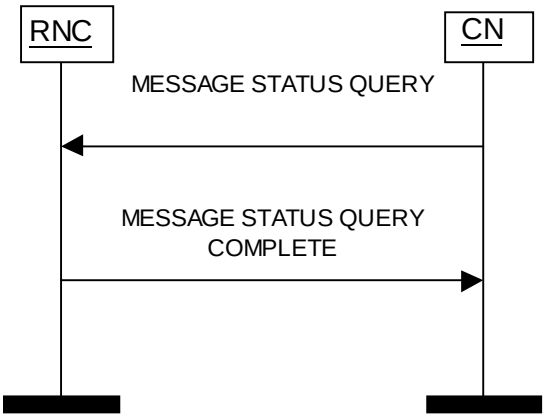

Figure 7: Message Status Enquiry Procedure: Successful Operation.

The CN shall initiate the procedure by sending a MESSAGE STATUS QUERY message to the RNC. The message will contain the Old-Serial-Number IE along with the appropriate Service Area List.
Upon receipt of the MESSAGE STATUS QUERY message the RNC shall respond using the MESSAGE STATUS QUERY COMPLETE message.
Within this message the No-of-Broadcasts-Completed-List contains each Service Area which successfully performed the requested operation and for each of these Service Area(s), the number of times this broadcast message has been sent to this particular Service Area(s) for broadcast.

8.5.3Unsuccessful Operation

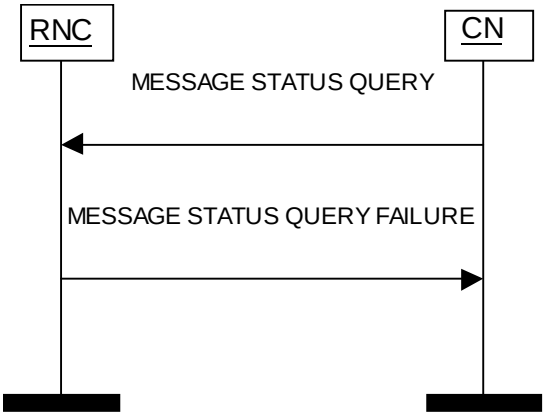

Figure 8: Message Status Enquiry Procedure: Un-Successful Operation.

If the requested operation fails (e.g. because the Message Identifier is unknown, or when the RNC cannot send the status for a known Message Identifier) the RNC shall send a MESSAGE STATUS QUERY FAILURE to the CN containing a Failure-List IE for Service Area(s) for which the requested operation failed.

The MESSAGE STATUS QUERY FAILURE message may – if applicable - also include the No-of-Broadcasts-Completed-List IE indicating those Service Area(s) for which the Message Status Enquiry was successful.

8.5.4Abnormal Conditions

8.6Reset

8.6.1General

The purpose of the Reset procedure is to end broadcasting in one or more Service Areas in the RNC.

8.6.2Successful Operation

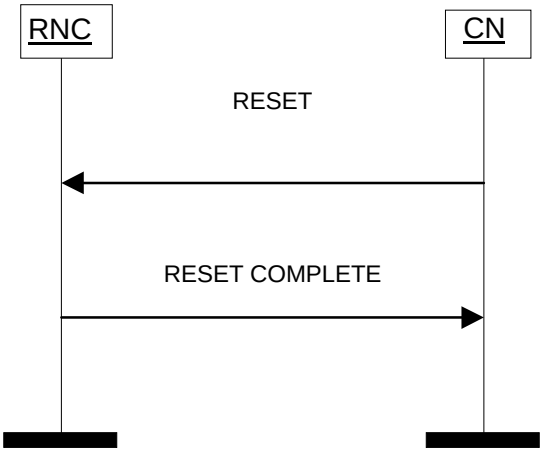

Figure 9: Reset Procedure: Successful Operation.

The CN shall initiate the procedure by sending a RESET message to the RNC, in order to end broadcasting in one or more Service Areas of the RNC.

It may also be used by the CN to inquire about the Service Area broadcasting operational state of Service Area(s) who had earlier indicated as having failed.

Upon receipt of this message the RNC shall end broadcasting in indicated Service Area(s) and shall respond using a RESET COMPLETE message.

8.6.3Unsuccessful Operation

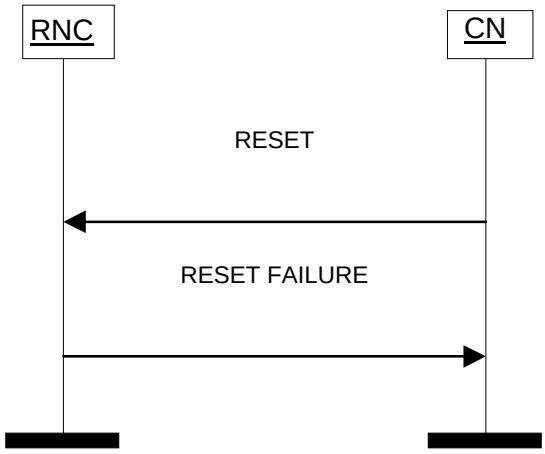

Figure 10: Reset Procedure: Un-Successful Operation.

If upon receipt of this message the RNC can not end broadcasting in the indicated Service Area(s), it shall respond using a RESET FAILURE message containing the Service Area List IE indicating the relevant Service Area(s).

The RESET FAILURE message may – if applicable - also include those Service Area(s) for which the RESET message was successful.

8.6.4Abnormal Conditions

8.7Restart Indication

8.7.1General

The purpose of the Restart message is for the RNC to indicate to the CN that a ~~SAB~~ Service Area broadcasting related restart situation has occurred in one or more of its Service Areas e.g. when a Service Area becomes operational or when the RNC is initialised.

8.7.2Successful Operation

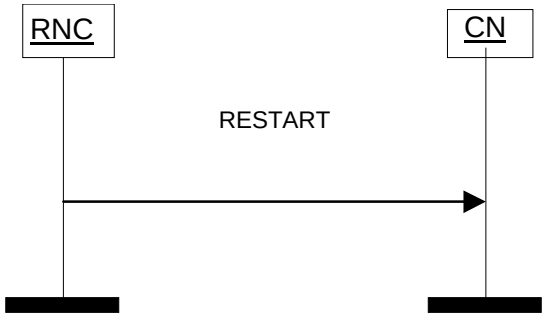

Figure 11: Restart Procedure: Successful Operation.

The RNC shall initiate the procedure by sending a RESTART message to the CN. This message shall contain a Service Area List IE for reference and may also include an indication as to whether the previously sent

information needs to be re-loaded.

8.7.3Abnormal Conditions

8.8Failure Indication

8.8.1General

The purpose of the Failure Indication message is to indicate to the CN from the RNC that a Service Area broadcasting related problem is ocurring in one or more of its Service Areas.

8.8.2Successful Operation

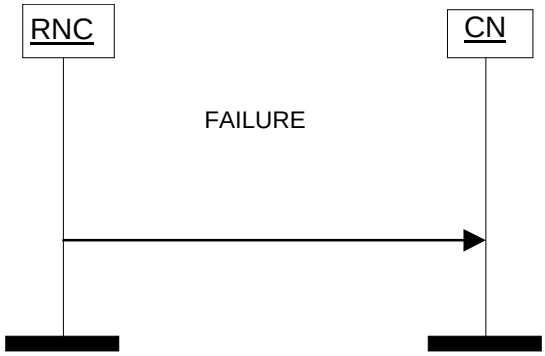

Figure 12: Failure Procedure: Successful Operation.

The RNC shall initiate the procedure by sending a FAILURE message to the CN.

Upon receipt of this FAILURE indication, the CN will not generate further WRITE or REPLACE messages for these Service ~~Areas~~Area(s) until the CN is informed by a RESTART message that the Service Area can resume normal Service Area broadcasting operation.

8.8.3Abnormal Conditions

8.9Error Indication

8.9.1General

The Error Indication procedure is used by the RNC to indicate to the CN that a message is not understood, provided it cannot be reported by an appropriate failure message.

8.9.2Successful Operation

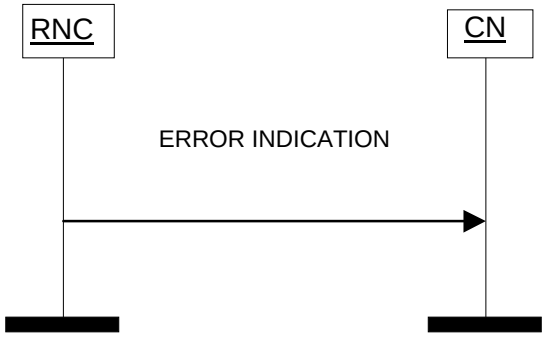

Figure 13: Error Indication Procedure: Successful Operation.

The RNC shall initiate the procedure by sending an ERROR INDICATION message to the CN in response to any message that is not understood e.g. invalid parameter or parameter value. This message shall contain information necessary for the CN to be able to identify which initial message this is in response to, and additional information e.g. Cause Value.

8.9.3Abnormal Conditions

9Elements for SABP Communication

9.1Message Contents

Note: The messages have been defined in accordance to the guidelines specified in [12]UMTS 25.921

For each message there is, a table listing the signalling elements in their order of appearance in the transmitted message.
All the SABP messages are listed in the following table:

Message name	Reference
WRITE-REPLACE	9.1.1
WRITE-REPLACE COMPLETE	9.1.2
WRITE-REPLACE FAILURE	9.1.3
KILL	9.1.4
KILL COMPLETE	9.1.5
KILL FAILURE	9.1.6
LOAD QUERY	9.1.7
LOAD QUERY COMPLETE	9.1.8
LOAD QUERY FAILURE	9.1.9
MESSAGE STATUS QUERY	9.1.10
MESSAGE STATUS QUERY COMPLETE	9.1.11
MESSAGE STATUS QUERY FAILURE	9.1.12
RESET	9.1.13
RESET COMPLETE	9.1.14
RESET FAILURE	9.1.15
RESTART	9.1.16
FAILURE	9.1.17
ERROR INDICATION	9.1.18

Table 3. List of SABP Messages

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

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.

Table 4: Meaning of abbreviations used in SABP messages.

9.1.1WRITE-REPLACE

This message is sent by the CN to the RNC.

Direction: CN → RNC

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
New-Serial-Number	M		9.2.5	
Old-Serial-Number	O		9.2.4	
Service-Areas-List	M		9.2.6	
Category	O		9.2.7	
Repetition-Period	O		9.2.8	
No-of-Broadcasts-Requested	M		9.2.9	
Data Coding Scheme	M		9.2.15	
Broadcast-Message-Content	M		9.2.2	

9.1.2WRITE-REPLACE COMPLETE

This message will be sent by the RNC to the CN in a successful response to a WRITE-REPLACE message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
New-Serial-Number	M		9.2.53	
No-of-Broadcasts-Completed-List	M		9.2.9	
Criticality Diagnostics	O		9.2.17	

9.1.3WRITE-REPLACE FAILURE

This message will be sent by the RNC to the CN as an unsuccessful response to a WRITE-REPLACE message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
New-Serial-Number	M		9.2.53	
Failure-List	M		9.2.12	
No-of-Broadcasts-Completed-List	O		9.2.10	
Criticality Diagnostics	O		9.2.17	

9.1.4KILL

This message is sent by the CN to the RNC to stop broadcasting of a specific message.

Direction: CN → RNC

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
Old-Serial-Number	M		9.2.4	
Service-Areas-List	M		9.2.6	

9.1.5KILL COMPLETE

This message is sent by the RNC to the CN as a successful response to a KILL message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
Old-Serial-Number	M		9.2.4	
No-of-Broadcasts-Completed-List	M		9.2.9	
Criticality Diagnostics	O		9.2.17	

9.1.6KILL FAILURE

This message is sent by the RNC to the CN as unsuccessful response to a KILL message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
Old-Serial-Number	M		9.2.4	
Failure-List	M		9.2.12	
No-of-Broadcasts-Completed-List	O		9.2.10	
Criticality Diagnostics	O		9.2.17	

9.1.7LOAD QUERY

This message is sent by the CN to the RNC to gain an indication of broadcast resources available.

Direction: CN → RNC

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Service-Areas-List	M		9.2.6	

9.1.8LOAD QUERY COMPLETE

This message will be sent by the RNC as a successful response to the LOAD QUERY message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Radio-Resource-Loading-List	M		9.2.13	
Criticality Diagnostics	O		9.2.17	

9.1.9LOAD QUERY FAILURE

This message is sent by the RNC to the CN as an unsuccesful response to a LOAD QUERY message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Failure-List	M		9.2.12	
Radio-Resource-Loading-List	O		9.2.13	
Criticality Diagnostics	O		9.2.17	

9.1.10MESSAGE STATUS QUERY

This message is sent by the CN to the RNC to obtain the current status of a ~~SAB~~ Service Area broadcasting message.

Direction: CN → RNC

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
Old-Serial-Number	M		9.2.4	
Service-Areas-List	M		9.2.6	

9.1.11MESSAGE STATUS QUERY COMPLETE

This message is sent by the RNC to the CN as a successful response to a MESSAGE QUERY message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
Old-Serial-Number	M		9.2.4	
No-of-Broadcasts-Completed-List	M		9.2.10	
Criticality Diagnostics	O		9.2.17	

9.1.12MESSAGE STATUS QUERY FAILURE

This message is sent by the RNC to the CN in an unsucessful response to a MESSAGE QUERY message.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
Failure-List	M		9.2.12	
Old-Serial-Number	M		9.2.4	
No-of-Broadcasts-Completed-List	O		9.2.10	
Criticality Diagnostics	O		9.2.17	

9.1.13RESET

The message is sent by the CN to the RNC to request that the RNC end broadcasting in one or more Service Areas.

Direction: CN → RNC

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Service-Areas-List	M		9.2.6	

9.1.14RESET COMPLETE

This message is sent from the RNC to the CN as a successful response to a RESET message where indicated Service-Area(s) are now not broadcasting any messages.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Service-Areas-List	M		9.2.6	
Criticality Diagnostics	O		9.2.17	

9.1.15RESET FAILURE

This message is sent from the RNC to the CN as an unsuccessful response to a RESET message to indicate that a Service Area broadcasting related problem exists in one or more of its Service Areas.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Failure-List	M		9.2.12	
Service-Areas-List	O		9.2.6	
Criticality Diagnostics	O		9.2.17	

9.1.16RESTART

This message is sent from the RNC to the CN to indicate a SABService Area broadcasting -related restart situation in one or more of its Service-Areas.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Service-Areas-List	M		9.2.6	
Recovery Indication	O		9.2.16	

9.1.17FAILURE

This message is sent from the RNC to the CN to indicate that a Service Area broadcastingSAB -related problem exists in one or more of its Service-Areas.

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Service-Areas-List	M		9.2.6	

9.1.18ERROR INDICATION

This message is sent by the RNC to the CN in response to any message which is not understood (e.g. invalid parameter or parameter value).

Direction: RNC → CN

PARAMETER	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	M		9.2.1	
Serial Number	O		9.2.3	
Cause	O		9.2.14	
Criticality Diagnostics	O		9.2.17	

9.2Information Element Definitions

9.2.1Message-Identifier

This parameter identifies the source/type of a CN message and is passed transparently from the CN to the UE.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Message-Identifier	O		OCTET STRING (2)	

9.2.2Broadcast-Message-Content

This IE is sent from the CN to the	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Broadcast-Message-Content	M		OCTET STRING (1246)	

9.2.3Serial-Number

This parameter is a 16-bit integer which identifies a particular message from the source and type indicated by the Message Identifier and is altered every time the message with a given Message Identifier is changed.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Serial-Number	O		INTEGER (16)	

9.2.4Old-Serial-Number

This IE enables identification of an existing message to be identified. The format of this IE is defined in 9.2.3.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Old-Serial-Number	M		9.2.3	

9.2.5New-Serial-Number

This IE enables identification of a new message for broadcast to be identified, and is altered every time the message is changes. The format of this IE is defined in 9.2.3.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
New-Serial Number	O		9.2.3	

9.2.6Service-Areas-List

Service-Area-List is an IE sent from the CN to the RNC. It indicates the group of Service-Area(s) that the message will be broadcast to. The Service-Area-List must include at least one Service-Area.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Service Areas List		1 to <maxno of SAI>		
>Service-Area-Identifier	M		9.2.11	

Range bound	Explanation
MaxnoofSAI	Maximum no. of SAI in Service-Areas-List. Value is 65535

9.2.7Category

This parameter is sent from the CN to the RNC, and is used to indicate the priority of the message.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Category	O		Enumerated (High Priority, Background, Normal, or Default)	This IE contains the broadcast priority of the message.

9.2.8Repetition-Period

This IE is sent from the CN to the RNC and indicates the periodicity of message broadcasts.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Repetition-Period	M		INTEGER 1…4096	Range is 1 to 4096 where each unit will represent a repetition of one second to a maximum of once per ~1 hour

9.2.9No-of-Broadcasts-Requested

This IE is sent from the CN to the RNC and indicates the number of times a message is to be broadcast.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
No-of-Broadcasts-Requested	M	0 to 65535	INTEGER 0…. 65535	This specifies the number of times the message is to be broadcast.

9.2.10No-of-Broadcasts-Completed-List

This IE is sent from the RNC to the CN, and indicates the number of times that a CN message (all pages) has been sent to each Service-Area in the Service-Area-List for broadcast over the radio interface.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
No-of-Broadcasts-Completed-List		1 to <maxnoof SAI>		
>Service-Area-Identifier	M		OCTET STRING (7)	
>No-of-Broadcasts-Completed	M		INTEGER (0.. 65535	
>No-of-Broadcasts-Compl-Info	O		ENUMERATED (overflow, unknown)	

Range bound	Explanation
MaxnoofSAI	Maximum no. of SAI in Service-Area-List. Value is 65535

9.2.11Service-Area-Identifier

This IE is sent from the Service Area Identifier (SAI) is used to uniquely identify an area consisting of one or more cells belonging to the same Location Area. Such an area is called a Service Area and can be used for indicating the location of a UE to the CN.

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

9.2.12Failure-List

This identifies the list of Service-~~Areas~~Area(s) for which the RNC could not complete as requested.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Failure-List		1 to <maxnoof SAI>		
>Service-Area-Identifier	M		9.2.11	
>Cause	M		9.2.14	

Range bound	Explanation
MaxnoofSAI	Maximum no. of SAI in Service-Area-List. Value is 65535

9.2.13Radio-Resource-Loading-List

This Information Element presents the available bandwidth available for Broadcast purposes of a specific Service Area.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Radio-Resource-Loading-List		1 to <maxnoof SAI>		
>Service-Area-Identifier	M		9.2.11	
>Available-Bandwidth	M		9.2.18	

Range bound	Explanation
MaxnoofSAI	Maximum no. of SAI in Service-Area-List. Value is 65535

9.2.14Cause

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

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
	M		**ENUMERATED**	
>Cause	O		Parameter-not-recognized	Sent when the recipient (CN or RNC) was unable to act upon the message received due to an unrecognized parameter. A message should not be rejected only because a parameter is not recognized as this would prevent extensions to the service
			Parameter-value-invalid	Sent when a failure occurred due to the value of a parameter being invalid, e.g. out of range, or in Write-Replace, the parameter "no of pages" does not equal the number of pages received
			Valid-CN-message-not- identified	Sent when the RNC does not recognize the CN message reference
			Service-Area-identity-not-valid	Sent when the RNC does not recognize a Service-Area Identity
			Unrecognized-message	Sent when the RNC did not recognize the message at all
			Missing-mandatory-element	Sent when a mandatory element is missing from the message
			RNC-capacity-exceeded	Sent when a write-replace fails because the RNC cannot meet the requested repetition period or when the set-drx parameters cannot be applied because of the cell loading
			RNC-memory-exceeded	Sent when the RNC is unable to store a CBS message as the RNC memory has been exceeded.
			Service-Area-broadcast-not-supported	Sent when the SABCH/CN related Radio Resource is not configured for a Service-Area
				Sent when the SABCH/CN related radio resource is not available because of

			Service-Area-broadcast-not-operational Message-reference already-used Unspecified-error	error conditions or due to maintenance activities Sent when the recipient was unable to act upon the Write-Replace message received due to a previous Write-Replace received with the same message_reference. Sent when none of the above cause values apply.

9.2.15 Data Coding Scheme

This IE is sent from the RNC to the CN and identifies the alphabet or coding employed for the message characters and message handling at the UE (it is passed transparently from the CN to the UE).

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Data Coding Scheme	M		INTEGER (0..255)	

9.2.16 Recovery-Indication

This IE is used to indicate whether the CN related data was lost or is still available.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Recovery-Indication	O		ENUMERATED (Available, Lost)	

9.2.17Criticality-Diagnostics

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 operation that caused the error
>Triggering Message	O		ENUMERATED(initiating message, successful outcome, unsuccessful outcome, outcome)	The Triggering Message is used only if the Criticality diagnostics is part of Error Indication procedure except when the procedure code is not understood.
>Criticality Response	O		ENUMERATED(reject, ignore, notify)	This Criticality response IE is used for reporting the Criticality of the Triggering message
Information Element Criticality Diagnostics		0 to <maxnoof errors>		
>Criticality Response	M		ENUMERATED(reject, ignore, notify)	The Criticality response IE 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 IE

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

9.2.18Available-Bandwidth

This IE is used to indicatate the Bandwidth available for the broadcast of messages.

IE/GROUP NAME	PRESENCE	RANGE	IE Type and Reference	Semantics Description
Available-Bandwidth	O		INTEGER (0...20480)	The unit is: bit/second

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

9.3.1Usage 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.

9.3.2Elementary Procedure Definitions

In THIS version, CURRENTLY incorrect it is to be used as a STARTING POINT, and will be obviously be amended accordingly as the specification is finalised.

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

SABP-PDU-Descriptions -- { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
      Criticality,
      ProcedureCode
FROM SABP-CommonDataTypes

      Error-Indication,
      Failure,
      Kill,
      Kill-Complete,
      Kill-Failure,
      Load-Query,
      Load-Query-Complete,
      Load-Query-Failure,
      Reset,
      Reset-Complete,
      Reset-Failure,
      Restart,
      Message-Status-Query,
      Message-Status-Query-Complete,
      Message-Status-Query-Failure,
      Write-Replace,
      Write-Replace-Complete,
      Write-Replace-Failure
FROM SABP-PDU-Contents

      id-Error-Indication,
      id-Failure-Indication,
      id-Kill,
      id-Reset,
      id-Restart-Indication,
      id-Status-Load-Enquiry,
```

```
      id-Status-Message-Query,
      id-Write-Replace
FROM SABP-Constants;

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

SABP-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 Definition
--
-- **************************************************************

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

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

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

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

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

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

SABP-ELEMENTARY-PROCEDURES-CLASS-1 SABP-ELEMENTARY-PROCEDURE ::= {
      write-Replace     |
      kill              |
      status-Load-Enquiry  |
      status-Message-Query |
      reset             ,
      ...
}
```

```
SABP-ELEMENTARY-PROCEDURES-CLASS-2 SABP-ELEMENTARY-PROCEDURE ::= {
      restart-Indication   |
      failure-Indication   |
      error-Indication  ,
      ...
}

write-Replace SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Write-Replace
      SUCCESSFUL OUTCOME   Write-Replace-Complete
      UNSUCCESSFUL OUTCOME Write-Replace-Failure
      PROCEDURE CODE    id-Write-Replace
}

kill SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Kill
      SUCCESSFUL OUTCOME   Kill-Complete
      UNSUCCESSFUL OUTCOME Kill-Failure
      PROCEDURE CODE       id-Kill
}

status-Load-Enquiry SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Load-Query
      SUCCESSFUL OUTCOME   Load-Query-Complete
      UNSUCCESSFUL OUTCOME Load-Query-Failure
      PROCEDURE CODE       id-Status-Load-Enquiry
}

status-Message-Query SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Message-Status-Query
      SUCCESSFUL OUTCOME   Message-Status-Query-Complete
      UNSUCCESSFUL OUTCOME Message-Status-Query-Failure
      PROCEDURE CODE       id-Status-Message-Query
}

reset SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Reset
      SUCCESSFUL OUTCOME   Reset-Complete
      UNSUCCESSFUL OUTCOME Reset-Failure
      PROCEDURE CODE       id-Reset
}

restart-Indication SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Restart
      PROCEDURE CODE       id-Restart-Indication
}

failure-Indication SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Failure
      PROCEDURE CODE       id-Failure-Indication
}

error-Indication SABP-ELEMENTARY-PROCEDURE ::= {
      INITIATING MESSAGE   Error-Indication
      PROCEDURE CODE       id-Error-Indication
}

END
```

PDU Definitions

```
-- **************************************************************
--
-- PDU definitions for SABP.
--
-- **************************************************************

SABP-PDU-Contents -- { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
      Broadcast-Message-Content,
      Category,
      Cause,
        Criticality-Diagnostics,
      Data-Coding-Scheme,
      Failure-List,
      Message-Identifier,
      New-Serial-Number,
      No-of-Broadcasts-Completed-List,
      No-of-Broadcasts-Requested,
      Old-Serial-Number,
      Radio-Resource-Loading-List,
      Recovery-Indication,
      Repetition-Period,
      Serial-Number ,
      Service-Areas-List
FROM SABP-IEs

      ProtocolExtensionContainer{},
      ProtocolIE-Container{},
      SABP-PROTOCOL-EXTENSION,
      SABP-PROTOCOL-IES
FROM SABP-Containers

      id-Broadcast-Message-Content,
      id-Category,
      id-Criticality-Diagnostics,
      id-Cause,
      id-Data-Coding-Scheme,
      id-Failure-List,
      id-Message-Identifier,
      id-New-Serial-Number,
```

```
      id-No-of-Broadcasts-Completed-List,
      id-No-of-Broadcasts-Requested,
      id-Old-Serial-Number,
      id-Radio-Resource-Loading-List,
      id-Recovery-Indication,
      id-Repetition-Period,
      id-Serial-Number,
      id-Service-Areas-List
FROM SABP-Constants;

-- **************************************************************
--
-- Write-Replace
--
-- **************************************************************

Write-Replace ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       { {Write-Replace-IEs} },
      protocolExtensions      ProtocolExtensionContainer { {Write-Replace-Extensions} } OPTIONAL,
      ...
}

Write-Replace-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Message-Identifier CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
      { ID id-New-Serial-Number  CRITICALITY ignore   TYPE NewSerial-Number      PRESENCE mandatory } |
      { ID id-Old-Serial-Number  CRITICALITY ignore   TYPE Old-Serial-Number     PRESENCE optional } |
      { ID id-Service-Areas-List CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } |
      { ID id-Category        CRITICALITY ignore   TYPE Category        PRESENCE optional  } |
      { ID id-Repetition-Period  CRITICALITY ignore   TYPE Repetition-Period     PRESENCE optional  } |
      { ID id-No-of-Broadcasts-Requested
                  CRITICALITY ignore   TYPE No-of-Broadcasts-Requested  PRESENCE mandatory } |
      { ID id-Data-Coding-Scheme CRITICALITY ignore   TYPE Data-Coding-Scheme    PRESENCE mandatory } |
      { ID id-Broadcast-Message-Content
                  CRITICALITY ignore   TYPE Broadcast-Message-Content   PRESENCE mandatory } ,
      ...
}

Write-Replace-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Write-Replace-Complete
--
-- **************************************************************

Write-Replace-Complete ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       { {Write-Replace-Complete-IEs} },
      protocolExtensions      ProtocolExtensionContainer { {Write-Replace-Complete-Extensions} } OPTIONAL,
      ...
}

Write-Replace-Complete-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Message-Identifier CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
      { ID id-New-Serial-Number  CRITICALITY ignore   TYPE New-Serial-Number     PRESENCE mandatory } |
      { ID id-No-of-Broadcasts-Completed-List
                  CRITICALITY ignore   TYPE No-of-Broadcasts-Completed-List
                                          PRESENCE mandatory  }|
```

```
        { ID id-Criticality-Diagnostics
                                        CRITICALITY ignore  TYPE Criticality-Diagnostics  PRESENCE optional },
        ...
}

Write-Replace-Complete-Extensions SABP-PROTOCOL-EXTENSION ::= {
        ...
}

-- **************************************************************
--
-- Write-Replace-Failure
--
-- **************************************************************

Write-Replace-Failure ::= SEQUENCE {
        protocolIEs         ProtocolIE-Container         { {Write-Replace-Failure-IEs} },
        protocolExtensions      ProtocolExtensionContainer { {Write-Replace-Failure-Extensions} } OPTIONAL,
        ...
}

Write-Replace-Failure-IEs SABP-PROTOCOL-IES ::= {
        { ID id-Message-Identifier CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
        { ID id-New-Serial-Number  CRITICALITY ignore   TYPE New-Serial-Number     PRESENCE mandatory } |
        { ID id-Failure-List       CRITICALITY ignore   TYPE Failure-List       PRESENCE mandatory } |
        { ID id-No-of-Broadcasts-Completed-List
                    CRITICALITY ignore   TYPE No-of-Broadcasts-Completed-List
                                         PRESENCE optional  } |
        { ID id-Criticality-Diagnostics
                                       CRITICALITY ignore TYPE Criticality-Diagnostics     PRESENCE optional },
        ...
}
Write-Replace-Failure-Extensions SABP-PROTOCOL-EXTENSION ::= {
        ...
}

-- **************************************************************
--
-- Kill
--
-- **************************************************************

Kill ::= SEQUENCE {
        protocolIEs         ProtocolIE-Container         {{Kill-IEs}},
        protocolExtensions      ProtocolExtensionContainer {{Kill-Extensions}}     OPTIONAL,
        ...
}

Kill-IEs SABP-PROTOCOL-IES ::= {
        { ID id-Message-Identifier    CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
        { ID id-Old-Serial-Number  CRITICALITY ignore   TYPE Old-Serial-Number     PRESENCE mandatory } |
        { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } ,
        ...
}

Kill-Extensions SABP-PROTOCOL-EXTENSION ::= {
        ...
}
```

```
-- **************************************************************
--
-- Kill-Complete
--
-- **************************************************************

Kill-Complete ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       {{Kill-Complete-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Kill-Complete-Extensions}}     OPTIONAL,
      ...
}

Kill-Complete-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Message-Identifier    CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
      { ID id-Old-Serial-Number  CRITICALITY ignore   TYPE Old-Serial-Number     PRESENCE mandatory } |
      { ID id-No-of-Broadcasts-Completed-List
                  CRITICALITY ignore      TYPE No-of-Broadcasts-Completed-List
                                          PRESENCE mandatory }|
       { ID id-Criticality-Diagnostics
                                    CRITICALITY ignore TYPE Criticality-Diagnostics     PRESENCE optional },
      ...
}

Kill-Complete-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Kill-Failure
--
-- **************************************************************

Kill-Failure ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       {{Kill-Failure-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Kill-Failure-Extensions}}     OPTIONAL,
      ...
}

Kill-Failure-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Message-Identifier CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
      { ID id-Old-Serial-Number  CRITICALITY ignore   TYPE Old-Serial-Number     PRESENCE mandatory } |
      { ID id-Failure-List       CRITICALITY ignore   TYPE Failure-List       PRESENCE mandatory } |
      { ID id-No-of-Broadcasts-Completed-List
                     CRITICALITY ignore   TYPE No-of-Broadcasts-Completed-List
                                          PRESENCE optional } |
       { ID id-Criticality-Diagnostics
                                       CRITICALITY ignore  TYPE Criticality-Diagnostics     PRESENCE optional },
      ...
}

Kill-Failure-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Load-Query
--
```

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

Load-Query ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       {{Load-Query-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Load-Query-Extensions}} OPTIONAL,
      ...
}

Load-Query-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } ,
      ...
}

Load-Query-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Load-Query-Complete
--
-- **************************************************************

Load-Query-Complete ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       {{Load-Query-Complete-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Load-Query-Complete-Extensions}} OPTIONAL,
      ...
}

Load-Query-Complete-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Radio-Resource-Loading-List
                  CRITICALITY ignore   TYPE Radio-Resource-Loading-List
                                       PRESENCE mandatory }  |
       { ID id-Criticality-Diagnostics
                                    CRITICALITY ignore  TYPE Criticality-Diagnostics     PRESENCE optional },
      ...
}

Load-Query-Complete-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Load-Query-Failure
--
-- **************************************************************

Load-Query-Failure ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       {{Load-Query-Failure-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Load-Query-Failure-Extensions}} OPTIONAL,
      ...
}

Load-Query-Failure-IEs SABP-PROTOCOL-IES ::= {

      { ID id-Service-Areas-List CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } |
      { ID id-Failure-List       CRITICALITY ignore   TYPE Failure-List       PRESENCE mandatory } |
      { ID id-Radio-Resource-Loading-List
```

```
                    CRITICALITY ignore   TYPE Radio-Resource-Loading-List
                                      PRESENCE optional  } |
       { ID id-Criticality-Diagnostics
                                          CRITICALITY ignore  TYPE Criticality-Diagnostics     PRESENCE optional },
      ...
}

Load-Query-Failure-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Message-Status-Query
--
-- **************************************************************

Message-Status-Query ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       {{Message-Status-Query-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Message-Status-Query-Extensions}} OPTIONAL,
      ...
}

Message-Status-Query-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Message-Identifier    CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
      { ID id-Old-Serial-Number  CRITICALITY ignore   TYPE Old-Serial-Number     PRESENCE mandatory } |
      { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } ,
      ...
}

Message-Status-Query-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Message-Status-Query-Complete
--
-- **************************************************************

Message-Status-Query-Complete ::= SEQUENCE {
      protocolIEs          ProtocolIE-Container       {{Message-Status-Query-Complete-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Message-Status-Query-Complete-Extensions}} OPTIONAL,
      ...
}

Message-Status-Query-Complete-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Message-Identifier    CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
      { ID id-Old-Serial-Number  CRITICALITY ignore   TYPE Old-Serial-Number     PRESENCE mandatory } |
      { ID id-No-of-Broadcasts-Completed-List
                    CRITICALITY ignore   TYPE No-of-Broadcasts-Completed-List
                                      PRESENCE mandatory } |
       { ID id-Criticality-Diagnostics
                                          CRITICALITY ignore  TYPE Criticality-Diagnostics     PRESENCE optional },
      ...
}

Message-Status-Query-Complete-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
```

```
}

-- **************************************************************
--
-- Message-Status-Query-Failure
--
-- **************************************************************

Message-Status-Query-Failure ::= SEQUENCE {
      protocolIEs          ProtocolIE-Container       {{Message-Status-Query-Failure-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Message-Status-Query-Failure-Extensions}} OPTIONAL,
      ...
}

Message-Status-Query-Failure-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Message-Identifier CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
      { ID id-Failure-List       CRITICALITY ignore   TYPE Failure-List       PRESENCE mandatory } |
      { ID id-Old-Serial-Number  CRITICALITY ignore   TYPE Old-Serial-Number     PRESENCE mandatory } |

      { ID id-No-of-Broadcasts-Completed-List
                  CRITICALITY ignore   TYPE No-of-Broadcasts-Completed-List
                                              PRESENCE optional  } |
        { ID id-Criticality-Diagnostics
                                        CRITICALITY ignore TYPE Criticality-Diagnostics     PRESENCE optional },
      ...
}

Message-Status-Query-Failure-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Reset
--
-- **************************************************************

Reset ::= SEQUENCE {
      protocolIEs       ProtocolIE-Container       {{Reset-IEs}},
      protocolExtensions      ProtocolExtensionContainer {{Reset-Extensions}}    OPTIONAL,
      ...
}

Reset-IEs SABP-PROTOCOL-IES ::= {
      { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List       PRESENCE mandatory } ,
      ...
}

Reset-Extensions SABP-PROTOCOL-EXTENSION ::= {
      ...
}

-- **************************************************************
--
-- Reset-Complete
--
-- **************************************************************

Reset-Complete ::= SEQUENCE {
```

```
    protocolIEs       ProtocolIE-Container       {{Reset-Complete-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Reset-Complete-Extensions}}    OPTIONAL,
    ...
}

Reset-Complete-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } |
     { ID id-Criticality-Diagnostics
                                  CRITICALITY ignore TYPE Criticality-Diagnostics     PRESENCE optional },
    ...
}

Reset-Complete-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Reset-Failure
--
-- **************************************************************

Reset-Failure ::= SEQUENCE {
    protocolIEs       ProtocolIE-Container       {{Reset-Failure-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Reset-Failure-Extensions}} OPTIONAL,
    ...
}

Reset-Failure-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Failure-List       CRITICALITY ignore   TYPE Failure-List       PRESENCE mandatory } |
    { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE optional  } |
     { ID id-Criticality-Diagnostics
                                       CRITICALITY ignore  TYPE Criticality-Diagnostics  PRESENCE optional } ,
    ...
}

Reset-Failure-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Restart
--
-- **************************************************************

Restart ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container       {{Restart-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Restart-Extensions}} OPTIONAL,
    ...
}

Restart-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } |
    { ID id-Recovery-Indication   CRITICALITY ignore   TYPE Recovery-Indication   PRESENCE optional  } ,
    ...
}

Restart-Extensions SABP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

-- **************************************************************
--
-- Failure
--
-- **************************************************************

Failure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       {{Failure-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Failure-Extensions}} OPTIONAL,
    ...
}

Failure-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Service-Areas-List    CRITICALITY ignore   TYPE Service-Areas-List    PRESENCE mandatory } ,
    ...
}

Failure-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Error-Indication
--
-- **************************************************************

Error-Indication ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       {{Error-Indication-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Error-Indication-Extensions}}    OPTIONAL,
    ...
}

Error-Indication-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Message-Identifier    CRITICALITY ignore   TYPE Message-Identifier    PRESENCE mandatory } |
    { ID id-Serial-Number      CRITICALITY ignore   TYPE Serial-Number      PRESENCE optional  } |
    { ID id-Cause        CRITICALITY ignore   TYPE Cause          PRESENCE optional  } |
      { ID id-Criticality-Diagnostics
                                    CRITICALITY ignore  TYPE Criticality-Diagnostics  PRESENCE optional },
    ...
}

Error-Indication-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

END
```

Information Element Definitions

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

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


SABP-IEs -- { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
      maxRadio-Resource-Loading-List,
      maxFailure-List,
      maxNo-of-Broadcasts-Completed-List,
      maxNrOfErrors,
      maxService-Areas-List
FROM SABP-Constants

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

      ProtocolExtensionContainer{},-

      SABP-PROTOCOL-EXTENSION
FROM SABP-Containers;


-- A

Available-Bandwidth        ::= INTEGER (0..20480)
-- bits/sec

-- B

Broadcast-Message-Content ::= OCTET STRING (SIZE (1246))
-- This IE is sent from the CN to the RNC containing user information i.e.
-- the message.

-- C

Category ::= ENUMERATED {
      high-priority,
      background-priority,
      normal-priority,
      default-priority,
      ...
}

Cause                ::= INTEGER {
      parameter-not-recognised      (0),
      parameter-value-invalid       (1),
      valid-CN-message-not-identified  (2),
      service-area-identity-not-valid  (3),
      unrecognised-message          (4),
      missing-mandatory-element     (5),
```

```
      bss-capacity-exceeded         (6),

      rNC-memory-exceeded           (7),
      service-area-broadcast-not-supported   (8),
      service-area-broadcast-not-operational    (9),
      incompatible-DRX-parameter        (10),

      message-reference-already-used      (11),
      unspecifed-error          (12)} (0..255)

Criticality-Diagnostics          ::= SEQUENCE {
    procedureCode           ProcedureCode           OPTIONAL,
    triggeringMessage       TriggeringMessage       OPTIONAL,
    criticalityResponse     Criticality         OPTIONAL,
    iEsCriticalityResponses       CriticalityDiagnostics-IE-List   OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,
    ...
}

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

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
        criticalityResponse    Criticality,
        iE-ID             ProtocolIE-ID,
        iE-Extensions           ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
    }

CriticalityDiagnostics-IE-List-ExtIEs SABP-PROTOCOL-EXTENSION ::= {
    ...
}


-- D

Data-Coding-Scheme         ::= INTEGER (0..255)

-- E

-- F

Failure-List ::= SEQUENCE (SIZE (1..maxFailure-List)) OF Failure-List-Item

Failure-List-Item ::= SEQUENCE {
      service-area-identifier    Service-Area-Identifier,
      cause              Cause,
        iE-Extensions       ProtocolExtensionContainer { {FailureListItemIE-ExtIEs} } OPTIONAL,
        ...
}
```

```
FailureListItemIE-ExtIEs SABP-PROTOCOL-EXTENSION ::= {
        ...
}

-- G

-- H

-- I

-- J

-- K

-- L

-- M

Message-Identifier ::= OCTET STRING (SIZE (2))
-- This IE identifies the source/type of a CN message and is passed
-- transparently from the CN to the UE.

-- N

New-Serial-Number          ::= Serial-Number

No-of-Broadcasts-Completed-List ::= SEQUENCE (SIZE (1..maxNo-of-Broadcasts-Completed-List)) OF
      No-of-Broadcasts-Completed-List-Item

No-of-Broadcasts-Completed-List-Item ::= SEQUENCE {
      service-area-identifier    Service-Area-Identifier,
      no-of-broadcasts-compl     INTEGER (0..65535),
      no-of-broadcasts-compl-info   No-Of-Broadcasts-Compl-Info        OPTIONAL,
   iE-Extensions    ProtocolExtensionContainer { {NoOfBroadcastsCompletedListItemIE-ExtIEs} } OPTIONAL,
        ...
}

NoOfBroadcastsCompletedListItemIE-ExtIEs SABP-PROTOCOL-EXTENSION ::= {
        ...
}

No-Of-Broadcasts-Compl-Info      ::= ENUMERATED {
      overflow,
      unknown,
      ...
}

No-of-Broadcasts-Requested    ::= INTEGER {
      broadcast-indefinitely (0)
} (0..65535)

-- O

Old-Serial-Number          ::= Serial-Number

-- P

-- Q
```

```
-- R

Radio-Resource-Loading-List ::= SEQUENCE (SIZE (1..maxRadio-Resource-Loading-List)) OF
      Radio-Resource-Loading-List-Item

Radio-Resource-Loading-List-Item ::= SEQUENCE {
      service-area-identifier    Service-Area-Identifier,
      available-bandwidth     Available-Bandwidth,
   iE-Extensions    ProtocolExtensionContainer { {RadioResourceLoadingListItemIE-ExtIEs} } OPTIONAL,
        ...
}

RadioResourceLoadingListItemIE-ExtIEs SABP-PROTOCOL-EXTENSION ::= {
       ...
}

Recovery-Indication ::= ENUMERATED {
      data-lost,
      data-available
}

Repetition-Period       ::= INTEGER (1..4096)
-- Each unit represents a repetition of one second to a maximum of
-- once per 4096 seconds (~1 hour).


-- S

Serial-Number           ::= INTEGER (0..65535)


Service-Area-Identifier ::= SEQUENCE {
      plmn-id           OCTET STRING (SIZE (3))
                  -- Digits 0 to 9, two digits per octet.          --
                  -- Each octet encoded 0000 to 1001.              --
                  -- 1111 used as filler                          --
                  -- Bit 4 to 1 of octet n encoding digit 2n-1.    --
                  -- Bit 8 to 5 of octet n encoding digit 2n.      --
                  -- The PLMN-ID consists of 3 digits from MCC     --
                  -- followed by either a filler plus 2 digits     --
                  -- from MNC (in case of 2 digit MNC) or 3 digits --
                  -- from MNC (in case of 3 digit MNC).            -- ,
      lac             OCTET STRING (SIZE (2))
                  -- 0000 and FFFE not allowed                     -- ,
      sac             OCTET STRING (SIZE (2))
}

-- **TODO** The IE type for these parameters is not known as yet
Service-Areas-List ::= SEQUENCE (SIZE (1..maxService-Areas-List)) OF Service-Area-Identifier



-- T

-- U

-- V

-- W
```

```
-- X

-- Y

END
```

Common Definitions

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

SABP-CommonDataTypes -- { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

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

ProcedureCode     ::= INTEGER (0..255)

ProtocolExtensionID  ::= INTEGER (0..65535)

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

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

END
```

Constant Definitions

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

SABP-Constants -- { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

id-Write-Replace        INTEGER ::= 0
```

```
id-Kill                 INTEGER ::= 1
id-Status-Load-Enquiry          INTEGER ::= 2
id-Status-Message-Query         INTEGER ::= 3
id-Restart-Indication           INTEGER ::= 4
id-Reset                INTEGER ::= 5
id-Failure-Indication           INTEGER ::= 6
id-Error-Indication         INTEGER ::= 7

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

id-Broadcast-Message-Content     INTEGER ::= 0
id-Category                INTEGER ::= 1
id-Cause                INTEGER ::= 2
id-Criticality-Diagnostics INTEGER ::=3
id-Data-Coding-Scheme           INTEGER ::= 4
id-Failure-List           INTEGER ::= 5
id-Message-Identifier           INTEGER ::= 6
id-New-Serial-Number        INTEGER ::= 7
id-No-of-Broadcasts-Completed-List  INTEGER ::= 8
id-No-of-Broadcasts-Requested       INTEGER ::= 9
id-Old-Serial-Number            INTEGER ::= 10
id-Radio-Resource-Loading-List      INTEGER ::= 11
id-Recovery-Indication          INTEGER ::= 12
id-Repetition-Period            INTEGER ::= 13
id-Serial-Number          INTEGER ::= 14
id-Service-Areas-List           INTEGER ::= 15

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

-- **************************************************************
--
-- Lists
--
-- **************************************************************

maxRadio-Resource-Loading-List   INTEGER ::= 65535
maxFailure-List             INTEGER ::= 65535
maxNo-of-Broadcasts-Completed-List  INTEGER ::= 65535
maxNrOfErrors             INTEGER ::= 256
maxService-Areas-List           INTEGER ::= 65535

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

END
```

Container Definitions

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

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

SABP-Containers -- { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
      Criticality,
      Presence,
      ProtocolExtensionID,
      ProtocolIE-ID
FROM SABP-CommonDataTypes

      maxProtocolExtensions,
      maxProtocolIEs
FROM SABP-Constants;

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

SABP-PROTOCOL-IES ::= CLASS {
      &id             ProtocolIE-ID     UNIQUE,
      &criticality         Criticality    DEFAULT ignore,
      &Value,
      &presence         Presence
}
WITH SYNTAX {
      ID          &id
      CRITICALITY       &criticality
      TYPE            &Value
      PRESENCE        &presence
}

-- **************************************************************
--
-- Class Definition for Protocol Extensions
--
-- **************************************************************

SABP-PROTOCOL-EXTENSION ::= CLASS {
      &id             ProtocolExtensionID  UNIQUE,
      &criticality         Criticality    DEFAULT ignore,
      &Extension
}
WITH SYNTAX {
      ID          &id
```

```
      CRITICALITY       &criticality
      EXTENSION         &Extension
}

-- **************************************************************
--
-- Container for Protocol IEs
--
-- **************************************************************

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

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

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

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

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

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

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


END



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

--

-- Elementary Procedure definitions

--
```

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

SABP-PDU-Descriptions -- { object identifier to be allocated }--

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    ProcedureCode
FROM SABP-CommonDataTypes

    Capacity-Indication,
    Capacity-Reservation,
    Capacity-Reservation-Resp,
    Failure-Ind,
    Kill,
    Reject,
    Report,
    Reset,
    Restart-Ind,
```

```
    Set-DRX,
    Set-DRX-Resp,
    Status-CBCH,
    Status-CBCH-Resp,
    Status-Mess-Resp,
    Status-Message,
    Write-Replace
FROM SABP-PDU-Contents

    id-Capacity-Ind,
    id-Capacity-Reservation,
    id-Failure-Ind,
    id-Kill,
    id-Reset,
    id-Restart-Ind,
    id-Set-DRX,
    id-Status-CBCH-Query,
    id-Status-Message-Query,
    id-Write-Replace
FROM SABP-Constants;

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

```
-- **TODO** Does this model SABP PDUs correctly?
SABP-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]
    CODE            &procedureCode
    [CRITICALITY        &criticality]
}

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

SABP-PDU ::= CHOICE {
    initiatingMessage InitiatingMessage,
    successfulOutcome SuccessfulOutcome,
    unsuccessfulOutcome   UnsuccessfulOutcome,
    ...
```

```
}

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

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

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

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

SABP-ELEMENTARY-PROCEDURES SABP-ELEMENTARY-PROCEDURE ::= {
```

```
    SABP-ELEMENTARY-PROCEDURES-CLASS-1|
    SABP-ELEMENTARY-PROCEDURES-CLASS-2,
    ...
}

SABP-ELEMENTARY-PROCEDURES-CLASS-1 SABP-ELEMENTARY-PROCEDURE ::= {
    write-Replace    |
    kill             |
    status-CBCH-Query |
    status-Message-Query |
    set-DRX          ,
    ...
}

SABP-ELEMENTARY-PROCEDURES-CLASS-2 SABP-ELEMENTARY-PROCEDURE ::= {
    restart-Ind      |
    reset            |
    failure-Ind      ,
    ...
}

-- **TODO** Specify procedure class for capacity Reservation and capacity ind.

-- **TODO** Check unsuccessful outcome specifications. Now by default
-- **TODO** for each procedure Reject has been specified as a message
-- **TODO** for unsuccessful outcome. One common error message makes
-- **TODO** it easier to interpret e.g. unrecognised procedures.
```

```
write-Replace SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Write-Replace
    SUCCESSFUL OUTCOME Report
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Write-Replace
}

kill SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Kill
    SUCCESSFUL OUTCOME Report
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Kill
}

--**TODO** Is this class 1 procedure or class 3? Status-DBCH-Resp
--**TODO** contains also Failure-List IE.
status-CBCH-Query SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Status-CBCH
    SUCCESSFUL OUTCOME Status-CBCH-Resp
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Status-CBCH-Query
}

--**TODO** Is this class 1 procedure or class 3? Status-Mess-Resp
--**TODO** contains also Failure-List IE.
status-Message-Query SABP-ELEMENTARY-PROCEDURE ::= {
```

```
    INITIATING MESSAGE Status-Message
    SUCCESSFUL OUTCOME Status-Mess-Resp
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Status-Message-Query
}

restart-Ind SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Restart-Ind
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Restart-Ind
}

reset SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Reset
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Reset
}

failure-Ind SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Failure-Ind
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Failure-Ind
}

set-DRX SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Set-DRX
    SUCCESSFUL OUTCOME Set-DRX-Resp
```

```
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Set-DRX
}

capacity-Reservation SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Capacity-Reservation
    SUCCESSFUL OUTCOME Capacity-Reservation-Resp
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Capacity-Reservation
}

capacity-Ind SABP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE Capacity-Indication
    UNSUCCESSFUL OUTCOME Reject
    CODE        id-Capacity-Ind
}

END
```

9.3.3 PDU Definitions

```
-- **************************************************************
--
-- PDU definitions for SABP.
--
```

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

SABP-PDU-Contents -- { object identifier to be allocated }--

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Category,
    Cbch-Loading-List,
    Cell-List-from-CBC,
    Cell-List-to-CBC,
    Channel,
    Data-Coding-Scheme,
    Diagnostic-Info,
    Failure-List,
    Failure-Reason,
    Message-Identifier,
    No-of-Broadcasts-Compl-List,
    No-of-Broadcast-Req,
    No-of-Pages,
```

```
    Page-Inf-List,
    Recovery-Indication,
    Repetition-Period,
    Reserved-Slots,
    Schedule-Period,
    Serial-Number
FROM SABP-IEs

    ProtocolExtensionContainer{},
    ProtocolIE-Container{},
    SABP-PROTOCOL-EXTENSION,
    SABP-PROTOCOL-IES
FROM SABP-Containers

    id-Category,
    id-Cause,
    id-Cbch-Loading-List,
    id-Cbs-Page-Inf,
    id-Cell-List-from-CBC,
    id-Cell-List-to-CBC,
    id-Channel-Indicator,
    id-Data-Coding-Scheme,
    id-Diagnostic,
    id-Failure-List,
    id-Message-Identifier,
    id-New-Serial-Number,
    id-No-of-Broadcast-Req,
```

```
    id-No-of-Broadcasts-Compl-List,
    id-No-of-Pages,
    id-Old-Serial-Number,
    id-Recovery-Indication,
    id-Repetition-Period,
    id-Reserved-Slots,
    id-Schedule-Period,
    id-Serial-Number
FROM SABP-Constants;

-- **************************************************************
--
-- Write-Replace
--
-- **************************************************************

Write-Replace ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         { {Write-Replace-IEs} },
    protocolExtensions    ProtocolExtensionContainer { {Write-Replace-Extensions} } OPTIONAL,
    ...
}

Write-Replace-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Message-Identifier CRITICALITY ignore TYPE Message-Identifier    PRESENCE mandatory } |
    { ID id-Old-Serial-Number  CRITICALITY ignore TYPE Serial-Number        PRESENCE optional  } |
    { ID id-New-Serial-Number  CRITICALITY ignore TYPE Serial-Number    PRESENCE mandatory } |
    { ID id-Cell-List-from-CBC CRITICALITY ignore TYPE Cell-List-from-CBC    PRESENCE mandatory } |
```

```
    { ID id-Channel-Indicator  CRITICALITY ignore TYPE Channel        PRESENCE optional
    -- GSM only --                                                    } |
    { ID id-Category       CRITICALITY ignore TYPE Category       PRESENCE optional  } |
    { ID id-Repetition-Period  CRITICALITY ignore TYPE Repetition-Period     PRESENCE mandatory } |
    { ID id-No-of-Broadcast-Req  CRITICALITY ignore TYPE No-of-Broadcast-Req  PRESENCE mandatory } |
    { ID id-No-of-Pages      CRITICALITY ignore TYPE No-of-Pages      PRESENCE mandatory } |
    { ID id-Data-Coding-Scheme CRITICALITY ignore TYPE Data-Coding-Scheme    PRESENCE mandatory } |
    { ID id-Cbs-Page-Inf     CRITICALITY ignore TYPE Page-Inf-List    PRESENCE mandatory } ,
    ...
}

Write-Replace-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Kill
--
-- **************************************************************

Kill ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Kill-IEs}},
    protocolExtensions    ProtocolExtensionContainer {{Kill-Extensions}}    OPTIONAL,
    ...
}
```

```
Kill-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Message-Identifier    CRITICALITY ignore TYPE Message-Identifier    PRESENCE mandatory } |
    { ID id-Old-Serial-Number CRITICALITY ignore TYPE Serial-Number      PRESENCE mandatory } |
    { ID id-Cell-List-from-CBC    CRITICALITY ignore TYPE Cell-List-from-CBC    PRESENCE mandatory } |
    { ID id-Channel-Indicator CRITICALITY ignore TYPE Channel       PRESENCE optional
    -- GSM only --                                                  } ,
    ...
}

Kill-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Report
--
-- **************************************************************

Report ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Report-IEs}},
    protocolExtensions    ProtocolExtensionContainer {{Report-Extensions}}  OPTIONAL,
    ...
}

Report-IEs SABP-PROTOCOL-IES ::= {
```

```
    { ID id-Message-Identifier    CRITICALITY ignore TYPE Message-Identifier    PRESENCE mandatory } |
    { ID id-Serial-Number         CRITICALITY ignore TYPE Serial-Number         PRESENCE mandatory } |
    { ID id-Channel-Indicator     CRITICALITY ignore TYPE Channel               PRESENCE optional
    -- GSM only --                                                              } |
    { ID id-No-of-Broadcasts-Compl-List
                  CRITICALITY ignore TYPE No-of-Broadcasts-Compl-List PRESENCE optional } |
    { ID id-Failure-List          CRITICALITY ignore TYPE Failure-List     PRESENCE optional  } ,
    ...

}

Report-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Status-CBCH
--
-- **************************************************************

Status-CBCH ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Status-CBCH-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Status-CBCH-Extensions}}  OPTIONAL,
    ...
}
```

```
Status-CBCH-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cell-List-from-CBC    CRITICALITY ignore TYPE Cell-List-from-CBC    PRESENCE mandatory } |
    { ID id-Channel-Indicator  CRITICALITY ignore TYPE Channel        PRESENCE optional
    -- GSM only -------------------------------------------------------- } ,
    ...
}

Status-CBCH-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Status-CBCH-Resp
--
-- **************************************************************

Status-CBCH-Resp ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Status-CBCH-Resp-IEs}},
    protocolExtensions    ProtocolExtensionContainer {{Status-CBCH-Resp-Extensions}} OPTIONAL,
    ...
}

Status-CBCH-Resp-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cbch-Loading-List  CRITICALITY ignore TYPE Cbch-Loading-List     PRESENCE optional } |
    { ID id-Failure-List        CRITICALITY ignore TYPE Failure-List        PRESENCE optional } |
    { ID id-Channel-Indicator  CRITICALITY ignore TYPE Channel        PRESENCE optional
```

```
    -- GSM only --                                                  } ,
    ...
}

Status-CBCH-Resp-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ********************************************************************
--
-- Status-Message
--
-- ********************************************************************

Status-Message ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Status-Message-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Status-Message-Extensions}} OPTIONAL,
    ...
}

Status-Message-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Message-Identifier    CRITICALITY ignore TYPE Message-Identifier    PRESENCE mandatory } |
    { ID id-Old-Serial-Number CRITICALITY ignore TYPE Serial-Number      PRESENCE mandatory } |
    { ID id-Cell-List-from-CBC    CRITICALITY ignore TYPE Cell-List-from-CBC    PRESENCE mandatory } |
    { ID id-Channel-Indicator CRITICALITY ignore TYPE Channel        PRESENCE optional
    -- GSM only --                                                  } ,
    ...
```

```
}

Status-Message-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Status Mess Resp
--
-- **************************************************************

Status-Mess-Resp ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container        {{Status-Mess-Resp-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Status-Mess-Resp-Extensions}} OPTIONAL,
    ...
}

Status-Mess-Resp-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Message-Identifier    CRITICALITY ignore TYPE Message-Identifier    PRESENCE mandatory } |
    { ID id-Old-Serial-Number CRITICALITY ignore TYPE Serial-Number      PRESENCE mandatory } |
    { ID id-No-of-Broadcasts-Compl-List
                CRITICALITY ignore TYPE No-of-Broadcasts-Compl-List PRESENCE optional } |
    { ID id-Failure-List        CRITICALITY ignore TYPE Failure-List    PRESENCE optional  } |
    { ID id-Channel-Indicator CRITICALITY ignore TYPE Channel        PRESENCE optional  } ,
    ...
}
```

```
Status-Mess-Resp-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Reject
--
-- **************************************************************

Reject ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Reject-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Reject-Extensions}}  OPTIONAL,
    ...
}

Reject-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cause           CRITICALITY ignore TYPE Failure-Reason      PRESENCE mandatory } |
    { ID id-Diagnostic      CRITICALITY ignore TYPE Diagnostic-Info     PRESENCE optional  } |
    { ID id-Message-Identifier   CRITICALITY ignore TYPE Message-Identifier    PRESENCE optional  } |
    { ID id-Serial-Number       CRITICALITY ignore TYPE Serial-Number       PRESENCE optional  } ,
    ...
}

Reject-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
```

```
}

-- **************************************************************
--
-- Restart-Ind
--
-- **************************************************************

Restart-Ind ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Restart-Ind-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Restart-Ind-Extensions}}   OPTIONAL,
    ...
}

Restart-Ind-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cell-List-from-CBC    CRITICALITY ignore TYPE Cell-List-from-CBC    PRESENCE mandatory } |
    { ID id-Recovery-Indication   CRITICALITY ignore TYPE Recovery-Indication   PRESENCE optional } ,

    ...
}

Restart-Ind-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

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

```
-- Reset
--
-- **************************************************************

Reset ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Reset-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Reset-Extensions}}   OPTIONAL,
    ...
}

Reset-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cell-List-from-CBC   CRITICALITY ignore TYPE Cell-List-from-CBC   PRESENCE mandatory } ,
    ...
}

Reset-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Failure Ind
--
-- **************************************************************

Failure-Ind ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Failure-Ind-IEs}},
```

```
    protocolExtensions      ProtocolExtensionContainer {{Failure-Ind-Extensions}}   OPTIONAL,
    ...
}

Failure-Ind-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cell-List-from-CBC    CRITICALITY ignore TYPE Cell-List-from-CBC    PRESENCE mandatory } ,
    ...
}

Failure-Ind-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Set-DRX
--
-- **************************************************************

Set-DRX ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Set-DRX-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Set-DRX-Extensions}}    OPTIONAL,
    ...
}

Set-DRX-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cell-List-from-CBC    CRITICALITY ignore TYPE Cell-List-from-CBC    PRESENCE mandatory } |
```

```
    { ID id-Schedule-Period    CRITICALITY ignore TYPE Schedule-Period    PRESENCE optional  } |
    { ID id-Reserved-Slots     CRITICALITY ignore TYPE Reserved-Slots     PRESENCE optional  } |
    { ID id-Channel-Indicator  CRITICALITY ignore TYPE Channel            PRESENCE optional
    -- GSM only --                                                       } ,
    ...
}

Set-DRX-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Set-DRX-Resp
--
-- **************************************************************

Set-DRX-Resp ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container         {{Set-DRX-Resp-IEs}},
    protocolExtensions      ProtocolExtensionContainer {{Set-DRX-Resp-Extensions}} OPTIONAL,
    ...
}

Set-DRX-Resp-IEs SABP-PROTOCOL-IES ::= {
    { ID id-Cell-List-to-CBC   CRITICALITY ignore TYPE Cell-List-to-CBC      PRESENCE optional } |
    { ID id-Failure-List       CRITICALITY ignore TYPE Failure-List         PRESENCE optional } |
    { ID id-Channel-Indicator  CRITICALITY ignore TYPE Channel              PRESENCE optional
```

```
    -- GSM only --                                                  } ,
    ...
}

Set-DRX-Resp-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

-- ********************************************************************
--
-- Capacity-Reservation
--
-- ********************************************************************

Capacity-Reservation ::= SEQUENCE {
    protocolIEs                 ProtocolIE-Container        {{Capacity-Reservation-IEs}},
    protocolExtensions          ProtocolExtensionContainer  {{Capacity-Reservation-Extensions}}          OPTIONAL,
    ...
}

-- **TODO** IEs to be specified
Capacity-Reservation-IEs SABP-PROTOCOL-IES ::= {
    ...
}

Capacity-Reservation-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
```

```
}

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

--

-- Capacity-Reservation-Resp

--

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

Capacity-Reservation-Resp ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container        {{Capacity-Reservation-Resp-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{Capacity-Reservation-Resp-Extensions}}     OPTIONAL,
    ...
}

-- **TODO** IEs to be specified
Capacity-Reservation-Resp-IEs SABP-PROTOCOL-IES ::= {
    ...
}

Capacity-Reservation-Resp-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

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

--

-- Capacity-Indication

--
```

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

Capacity-Indication ::= SEQUENCE {
    protocolIEs                 ProtocolIE-Container        {{Capacity-Indication-IEs}},
    protocolExtensions          ProtocolExtensionContainer  {{Capacity-Indication-Extensions}}      OPTIONAL,
    ...
}

-- **TODO** IEs to be specified
Capacity-Indication-IEs SABP-PROTOCOL-IES ::= {
    ...
}

Capacity-Indication-Extensions SABP-PROTOCOL-EXTENSION ::= {
    ...
}

END
```

9.3.4 Information Element Definitions

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

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

SABP-IEs -- { object identifier to be allocated }--

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
   maxCbch-Loading-List,
   maxCell-Id-List,
   maxCell-List-to-CBC,
   maxFailure-List,
   maxNo-of-Broadcasts-Compl-List,
   maxPage-Inf-List
FROM SABP-Constants;

-- **TODO** Check list definitions. Now every list (i.e. sequence-of type
-- **TODO** has lower and upper bounds specified. The bound values must
-- **TODO** be checked.

-- A

-- B

-- C

Category ::= INTEGER {
```

```
    high-priority(0),
    normal-priority (1),
    background (2),
    spare    (3)
} (0..3)

Cbch-Loading-List ::= SEQUENCE (SIZE (1..maxCbch-Loading-List)) OF Cbch-Loading-List-Item

Cbch-Loading-List-Item ::= SEQUENCE {
    cell-id          Cell,
    cbch-loading       Cbch-Loading
}

Cbch-Loading          ::= INTEGER {
    min    (0),
    max    (100)
} (0..100)
-- Indicates the predicted short term load, expressed as a percentage

Cell ::= SEQUENCE {
    disc          Cell-Id-Disc,
    id          Cell-Id
}

Cell-Id ::= OCTET STRING (SIZE (4))
-- Note:
-- If Cell-Id-Disc equals ciOnly then only the last 2 octets of
```

```
-- Cell-ID are to be considered
-- If Cell-Id-Disc equals lacOnly then only the first 2 octets of
-- Cell-ID are to be considered. The unused octets are filler octets
-- If Cell-Id-Disc equals allCells, Cell-ID only contains filler octets

Cell-Id-Disc ::= OCTET STRING (SIZE (1))
-- values from the following list
-- Note: In GSM 03.49 values were specified using only one digit, e.g. '1'H.
-- The following values are the same except the trailing zero digit is explicit.
lacAndCi   Cell-Id-Disc ::= '10'H -- GSM 08.08, 2 octet lac, followed by 2 Octet Cell Id
ciOnly     Cell-Id-Disc ::= '20'H -- GSM 08.08, Cell Id only
lacOnly    Cell-Id-Disc ::= '50'H -- GSM 03.49, 2 octet lac only, all cells in this LAC
allCells   Cell-Id-Disc ::= '60'H -- GSM 03.49, all cells in this BSC/RNC
uc-id      Cell-Id-Disc ::= 'FF'H -- 3G TS 25.401
-- **TODO** Check uc-id value

Cell-Id-List ::= SEQUENCE (SIZE (1..maxCell-Id-List)) OF Cell-Id

Cell-List-from-CBC ::= SEQUENCE {
   disc Cell-Id-Disc,
   list Cell-Id-List
}

Cell-List-to-CBC ::= SEQUENCE (SIZE (1..maxCell-List-to-CBC)) OF Cell

Channel ::= ENUMERATED {
   basic-channel,
```

```
    extended-channel
}
-- GSM only

-- D

Data-Coding-Scheme      ::= INTEGER (0..255)
-- 3G TS 23.038

Diagnostic-Info         ::= OCTET STRING (SIZE (1..20))

-- E

-- F

Failure-List-Item ::= SEQUENCE {
    cell-id             Cell,
    cause               Failure-Reason,
    diagnostic          Diagnostic-Info    OPTIONAL
}

Failure-List ::= SEQUENCE (SIZE (1..maxFailure-List)) OF Failure-List-Item

Failure-Reason          ::= INTEGER {
    parameter-not-recognised        (0),
    unused-failure-reason-1         (1), -- not used
    parameter-value-invalid         (2),
```

```
    valid-CBS-message-not-identified  (3),
    cell-identity-not-valid           (4),
    unrecognised-primitive            (5),
    missing-mandatory-element         (6),
    bss-capacity-exceeded             (7),
    cell-memory-exceeded              (8), -- GSM only
    bss-memory-exceeded               (9),
    unspecifed-error                  (10),
    incompatible-DRX-parameter        (11),
    unused-failure-reason-12          (12), -- not used
    cell-broadcast-not-supported      (13),
    cell-broadcast-not-operational    (14),
    extended-channel-not-supported    (15), -- GSM only
    message-reference-already-used    (16)
} (0..255)

-- G

-- H

-- I

-- J

-- K

-- L
```

```
-- M

Message-Identifier        ::= INTEGER {
   min-plmn-operator-association-allocated(0),
   max-plmn-operator-association-allocated(999),
   e-otd-assistance-data-message      (1000),
   gps-assistance-data-message      (1001),
   min-gsm-03-41-reserved-1      (1002),
   max-gsm-03-41-reserved-1      (4095),
   min-clear           (4096),
   max-clear           (4351),
   min-gsm-03-41-reserved-2      (4352),
   max-gsm-03-41-reserved-2      (40959),
   min-plmn-operator-specific    (40960),
   max-plmn-operator-specific    (45055),
   min-plmn-operator-specific-reserved  (45056),
   max-plmn-operator-specific-reserved  (65534),
   reserved            (65535)
} (0..65535)
-- 'min-xxx' and 'max-xxx' denote the lower and upper bounds for a
-- range that is reserved for a certain purpose.

Message-Info-Page         ::= OCTET STRING (SIZE (82))

Message-Info-Useful-Octets    ::= INTEGER (0..82)
```

```
-- N

No-of-Broadcasts-Compl-Info-Type::= ENUMERATED {
   unknown,
   overflow
}

No-of-Broadcasts-Compl-List ::= SEQUENCE (SIZE (1..maxNo-of-Broadcasts-Compl-List)) OF
   No-of-Broadcasts-Compl-List-Item

No-of-Broadcasts-Compl-List-Item ::= SEQUENCE {
   cell-id          Cell,
   no-of-broadcasts-compl     INTEGER,
   no-of-broadcasts-compl-info  No-of-Broadcasts-Compl-Info-Type OPTIONAL
}
-- **TODO** Check whether the above definition is really what is wanted
-- **TODO** or whether the following definition better describes IE structure.
-- No-of-Broadcasts-Compl-List-Item ::= SEQUENCE {
-- cell-id          Cell,
-- no-of-broadcasts-compl     CHOICE {
--    unknown          NULL,
--    overflow         INTEGER,
--    broadcast-count      INTEGER
-- }
-- }

No-of-Broadcast-Req        ::= INTEGER {
```

```
    broadcast-indefinitely (0)
} (0..65535)

No-of-Pages                ::= INTEGER (1..15)

-- Q

-- P

Page-Inf ::= SEQUENCE {
    message-info-useful-octetsMessage-Info-Useful-Octets,
    message-info-page     Message-Info-Page
}
-- message-info-useful-octets indicates the number of used octets
-- in message-info-page.

Page-Inf-List ::= SEQUENCE (SIZE (1..maxPage-Inf-List)) OF Page-Inf

-- Q

-- R

Recovery-Indication ::= ENUMERATED {
    data-lost,
    data-available
}
```

```
Repetition-Period          ::= INTEGER (1..1024)
-- Unit: 1.883 seconds

Reserved-Slots             ::= INTEGER (0..40)

-- S

Schedule-Period            ::= INTEGER {
   no-drx  (0)    -- **TODO** Check if this is correct
} (0..40)

Serial-Number              ::= INTEGER (0..65535)
-- **TODO** Check whether the above definition is really what is wanted
-- **TODO** or whether the following definition better describes structure
-- **TODO** of a serial number.
--
-- Serial-Number ::= SEQUENCE {
-- geographical-scope   ENUMERATED {
--                immediate-cell-wide,
--                normal-plmn-wide,
--                normal-location-area-wide,
--                normal-cell-wide
--            },
-- message-code        INTEGER (0..1023),
-- update-number       INTEGER (0..15)
-- }
--
```

```
-- T

-- U

-- V

-- W

-- X

-- Y

END
```

9.3.5 Common Definitions

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

SABP-CommonDataTypes {} { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN

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

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

ProcedureCode   ::= INTEGER (0..255)

ProtocolExtensionID  ::= INTEGER (0..65535)

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

END
```

9.3.6 Constant Definitions

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

SABP-Constants { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN

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

id-Write-Replace      INTEGER ::= 0
id-Kill               INTEGER ::= 1
id-Status-CBCH-Query      INTEGER ::= 2
id-Status-Message-Query   INTEGER ::= 3
id-Restart-Ind        INTEGER ::= 4
id-Reset              INTEGER ::= 5
id-Failure-Ind        INTEGER ::= 6
id-Set-DRX            INTEGER ::= 7
id-Capacity-Reservation   INTEGER ::= 8
id-Capacity-Ind       INTEGER ::= 9


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

id-Category           INTEGER ::= 0
```

```
id-Cause                INTEGER ::= 1
id-Cbch-Loading-List        INTEGER ::= 2
id-Cbs-Page-Inf         INTEGER ::= 3
id-Cell-List-from-CBC       INTEGER ::= 4
id-Cell-List-to-CBC     INTEGER ::= 5
id-Channel-Indicator        INTEGER ::= 6
id-Data-Coding-Scheme       INTEGER ::= 7
id-Diagnostic           INTEGER ::= 8
id-Failure-List         INTEGER ::= 9
id-Message-Identifier       INTEGER ::= 10
id-New-Serial-Number        INTEGER ::= 11
id-No-of-Broadcast-Req      INTEGER ::= 12
id-No-of-Broadcasts-Compl-List  INTEGER ::= 13
id-No-of-Pages          INTEGER ::= 14
id-Old-Serial-Number        INTEGER ::= 15
id-Recovery-Indication      INTEGER ::= 16
id-Repetition-Period        INTEGER ::= 17
id-Reserved-Slots       INTEGER ::= 18
id-Schedule-Period      INTEGER ::= 19
id-Serial-Number        INTEGER ::= 20


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

--

-- Extension constants

--

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

```
-- **************************************************************
--
-- Lists
--
-- **************************************************************

maxCbch-Loading-List     INTEGER ::= 256 -- **TODO**
maxCell-Id-List          INTEGER ::= 256 -- **TODO**
maxCell-List-to-CBC      INTEGER ::= 256 -- **TODO**
maxFailure-List          INTEGER ::= 256 -- **TODO**
maxNo-of-Broadcasts-Compl-List INTEGER ::= 256 -- **TODO**
maxPage-Inf-List         INTEGER ::= 256 -- **TODO**

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

END
```

9.3.7 Container Definitions

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

```
SABP-Containers -- { object identifier to be allocated }--

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    Presence,
    ProtocolExtensionID,
    ProtocolIE-ID
FROM SABP-CommonDataTypes

    maxProtocolExtensions,
    maxProtocolIEs
FROM SABP-Constants;

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

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

SABP-PROTOCOL-IES ::= CLASS {
    &id             ProtocolIE-ID       UNIQUE,
    &criticality        Criticality     DEFAULT ignore,
    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID              &id
    CRITICALITY         &criticality
    TYPE            &Value
    PRESENCE            &presence
}

-- **************************************************************
--
-- Class Definition for Protocol Extensions
--
-- **************************************************************

SABP-PROTOCOL-EXTENSION ::= CLASS {
    &id             ProtocolExtensionID  UNIQUE,
    &criticality        Criticality     DEFAULT ignore,
    &Extension
}
WITH SYNTAX {
```

```
    ID              &id
    CRITICALITY     &criticality
    EXTENSION       &Extension
}

-- **************************************************************
--
-- Container for Protocol IEs
--
-- **************************************************************

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

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

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

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

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

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

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


END
```

10Handling of Unknown, Unforeseen or Erroneous Protocol Data

10.1General

Protocol Error cases can be divided into three classes:

- Transfer Syntax Error
- Abstract Syntax Error
- Logical Error

10.2Transfer Syntax Error

A Transfer Syntax Error occurs when the receiver is not able to decode the received message i.e. the transfer syntax can not be opened. If Transfer Syntax Error occurs, the receiver should initiate Error Indication procedure with appropriate cause value for the protocol error.

10.3Abstract Syntax Error

10.3.1General

In the SABP 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 chapter 10.3.2. An IE/IE group shall be regarded as not comprehended if the receiving node either cannot decode the IE/IE Group or does not comprehend the function represented by the IE value. The case of the not comprehended IE/IE group is an Abstract Syntax Error.

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 for the IE/IE group due to which Abstract Syntax Error occurred in accordance with Chapter 10.3.2.

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

10.3.2Handling of the Criticality Information at Reception

10.3.2.1Procedure Code

The receiving node shall treat the different types of criticality information of the *Procedure Code* according to the following:

Reject IE:

- If a message is received with a *Procedure Code* marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall reject the procedure using the Error Indication procedure.

Ignore IE and Notify Sender:

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

Ignore IE:

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

10.3.2.2 IEs other than the Procedure Code

The receiving node shall treat the different types of criticality information of an IE/IE group other than the *Procedure Code* 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.

- 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 initiate the Error Indication procedure.

- If a *response* message is received containing one or more IEs marked with "*Reject IE*" which the receiving node does no comprehend, the receiving node shall 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 only the understood IEs/IE groups, and report in the response message of the procedure 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 comoprehended IE/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.

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 failure message, the failure 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 failure message, the ERROR INDICATION procedure shall be initiated with an appropriate cause value.

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

Class 2:

Where the logical error occurs in a message of a class 2 procedure, the ERROR INDICATION procedure shall be initiated with an appropriate cause value.

~~Annex A (normative):~~

12History

Document history		
0.0.0	January 2000	Skeleton document created.
0.0.1	February 2000	Version 1 created from Manessman & CMG source documents.
0.02	February 2000	Version 2 with revisions, as agreed in the Dusseldorf, Germany, Ad-Hoc.
0.03	February 2000	Version 3 – Criticality IE added to EP Response messages. Criticlity Diagnostic defined (taken from RANAP)
0.04	February 2000	Version 4 – Changes agreed after discussion of version 3, held during RAN3 Meeting #11
0.05	February 2000	Version 5 – Changes agreed after discussion of version 3, held during RAN3 Meeting #11
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