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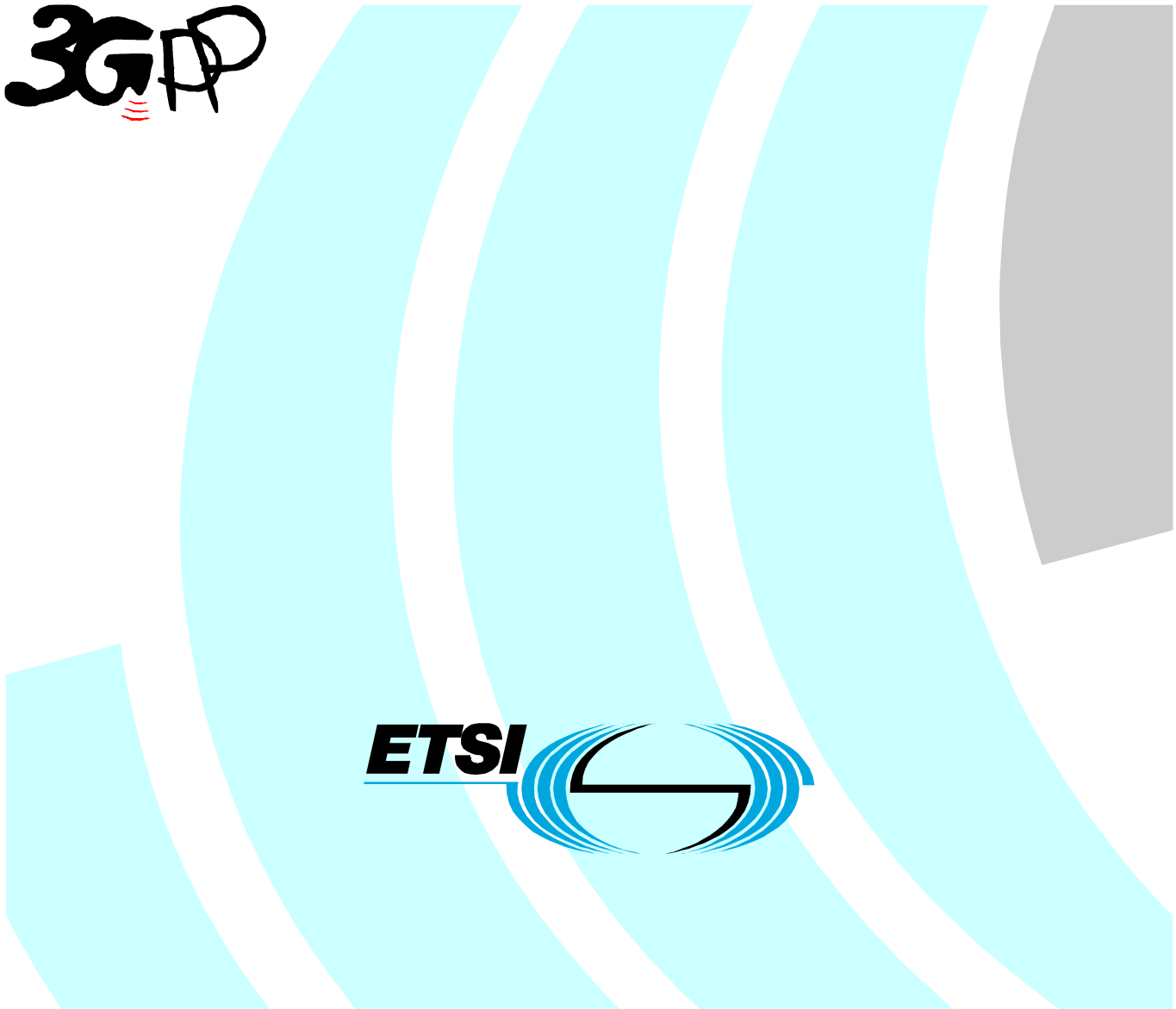
Technical Specification

Universal Mobile Telecommunications System (UMTS);
UTRAN Iupc interface Positioning Calculation Application Part (PCAP) signalling
(3GPP TS 25.453 version 5.3.0 Release 5)



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Foreword

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Contents

Foreword

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

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1 Scope

The present document specifies the *Positioning Calculation Application Part (PCAP)* between the Radio Network Controller (RNC) and the Stand-alone A-GPS SMLC (SAS). It fulfills the RNC-SAS communication requirements specified in [6] and thus defines the Iupc interface and its associated signaling procedures.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 25.450: "UTRAN Iupc interface general aspects and principles".

[2] 3GPP TS 25.451: "UTRAN Iupc interface layer 1".

[3] 3GPP TS 25.452: "UTRAN Iupc interface signalling transport".

[4] 3GPP TS 25.331: "Radio Resource Control (RRC) Protocol Specification".

[5] 3GPP TS 25.401: "UTRAN Overall Description".

[6] 3GPP TS 25.305: "Stage 2 functional specification of UE positioning in UTRAN".

[7] ITU-T Recommendation X.680 (12/97): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[8] ITU-T Recommendation X.681 (12/97): "Information technology - Abstract Syntax Notation One (ASN.1): Information object specification".

[9] ITU-T Recommendation X.691 (12/97): "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

[10] ICD-GPS-200: (12 April 2000) "Navstar GPS Space Segment/Navigation User Interface".

[11] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[12] 3GPP TR 25.921: "Guidelines and principles for protocol description and error handling".

3 Definitions and abbreviations

3.1 Definitions

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

Standalone A-GPS SMLC (SAS): logical node that interconnects to the RNC over the Iupc interface via the PCAP protocol
An SAS performs the following procedures:

- provide GPS related data to the RNC;

- performs the position calculation function for UE assisted GPS.

Elementary Procedure: PCAP consists of Elementary Procedures (EPs)
An Elementary Procedure is a unit of interaction between the RNC and the SAS. 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.

Class 2 EPs are considered always successful.

Information Exchange Context: Information Exchange Context is created by the first Information Exchange Initiation Procedure initiated by the RNC and requested from the SAS
The Information Exchange Context is deleted by the Information Exchange Termination or the Information Exchange Failure procedure when there is no more Information Exchange to be provided by the RNC to the SAS. The Information Exchange Context is identified by an SCCP connection as, for Information Exchanges, only the connection oriented mode of the signalling bearer is used.

3.2 Abbreviations

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

A-GPS	Assisted GPS
ASN.1	Abstract Syntax Notation One
CN	Core Network
CRNC	Controlling RNC
DGPS	Differential GPS
EP	Elementary Procedure
GPS	Global Positioning System
MSC	Mobile services Switching Center
PCAP	Positioning Calculation Application Part
PRC	Pseudorange Correction
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RRC	Radio Resource Control
SAS	Standalone A-GPS SMLC
SCCP	Signalling Connection Control Part
SIB	System Information Block
SMLC	Serving Mobile Location Center
SRNC	Serving RNC
SRNS	Serving RNS
TOW	Time of Week
UE	User Equipment
UTRAN	Universal Terrestrial Radio Access Network

4 General

4.1 Procedure Specification Principles

The principle for specifying the procedure logic is to specify the functional behaviour of the SAS exactly and completely. The RNC functional behaviour is left unspecified.

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

- The procedure text discriminates between:

  1) Functionality which "shall" be executed:

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

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

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

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

4.2 Forwards and Backwards Compatibility

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

4.3 Specification Notations

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

Procedure	When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Position Calculation procedure.
Message	When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. POSITION CALCULATION REQUEST message.
IE	When referring to an information element (IE) in the specification the *Information Element Name* is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. *Request Type* IE.
Value of an IE	When referring to the value of an information element (IE) in the specification the "Value" is written as it is specified in clause 9.2 enclosed by quotation marks, e.g. "Abstract Syntax Error (Reject)" or "Geographical Coordinates ".

5 PCAP Services

PCAP provides the signalling services between RNC and SAS that are required to fulfill the PCAP functions described in clause 7. PCAP services are categorized as follows:

1. Position Calculation Service: They are related to a single UE and involve the transfer of GPS measurement data and UE position estimate data over the Iupc interface between the SRNC and the SAS. They utilise connectionless signalling transport provided by the Iupc signalling bearer.

2. Information Exchange Service: They involve the transfer of GPS related data over the Iupc interface between the RNC and the SAS on demand, on modification, or at regular intervals. They utilise connection-oriented signalling transport provided by the Iupc signalling bearer.

6 Services Expected from Signalling Transport

Signalling transport [3] shall provide the following service for the PCAP.

1. Connection oriented data transfer service. This service is supported by a signalling connection between the RNC and the SAS. It shall be possible to dynamically establish and release signalling connections based on the need. Each point-to-point operation shall have its own signalling connection. The signalling connection shall provide in sequence delivery of PCAP messages. PCAP shall be notified if the signalling connection breaks.

2. Connectionless data transfer service. PCAP shall be notified in case a PCAP message did not reach the intended peer PCAP entity.

7 Functions of PCAP

PCAP has the following functions:

- Position Calculation. This function enables the SRNC to interact with an SAS in the process of performing a position estimate of a UE.

- Information Exchange. This function enables the RNC to obtain GPS related data from an SAS.

- Reporting of General Error Situations. This function allows reporting of general error situations for which function specific error messages have not been defined.

The mapping between the above functions and PCAP elementary procedures is shown in the table 1.

Table 1: Mapping between functions and PCAP elementary procedures

Function	Elementary Procedure(s)
Position Calculation	a) Position Calculation
Information Exchange	a) Information Exchange Initiation b) Information Reporting c) Information Exchange Termination d) Information Exchange Failure
Reporting of General Error Situations	a) Error Indication

8 PCAP Procedures

8.1 Elementary Procedures

In the following tables, all EPs are divided into class 1 and class 2 EPs (see clause 3.1 for explanation of the different classes).

Table 2: Class 1

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
Position Calculation	POSITION CALCULATION REQUEST	POSITION CALCULATION RESPONSE	POSITION CALCULATION FAILURE
Information Exchange Initiation	IINFORMATION EXCHANGE INITIATION REQUEST	INFORMATION EXCHANGE INITIATION RESPONSE	INFORMATION EXCHANGE INITIATION FAILURE

Table 3: Class 2

Elementary Procedure	Message
Information Reporting	INFORMATION REPORT
Information Exchange Termination	INFORMATION EXCHANGE TERMINATION REQUEST
Information Exchange Failure	INFORMATION EXCHANGE FAILURE INDICATION
Error Indication	ERROR INDICATION

8.2 Position Calculation

8.2.1 General

The purpose of the Position Calculation procedure is to enable an SRNC to query an SAS for a position estimate of a UE. The procedure uses connectionless signalling.

8.2.2 Successful Operation

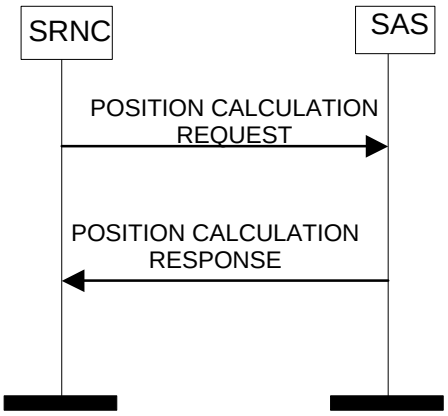

Figure 1: Position Calculation procedure, Successful Operation

The procedure is initiated with a POSITION CALCULATION REQUEST message sent from the SRNC to the SAS. When the SAS receives the POSITION CALCULATION REQUEST message, it shall calculate the UE position based on the provided measurement data.

Response Message:

If the SAS was able to calculate the position estimate, it shall respond with a POSITION CALCULATION RESPONSE message.

8.2.3 Unsuccessful Operation

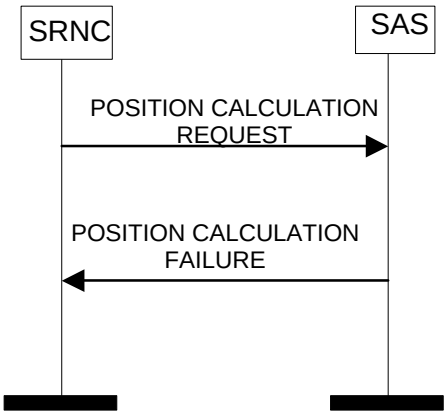

Figure 2: Position Calculation procedure, Unsuccessful Operation

If the SAS is unable to perform the position estimate for any reason, it shall return a POSITION CALCULATION FAILURE message to the SRNC.

Typical cause values are:

- Invalid reference informatio;
- Position calculation error: invalid GPS measured results;
- Processing Overload;
- Hardware Failure;
- O&M Intervention.

8.2.4 Abnormal Conditions

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8.3 Information Exchange Initiation

8.3.1 General

This procedure is used by a RNC to request the initiation of an information exchange with a SAS.

This procedure uses the signalling bearer connection for the Information Exchange Context.

8.3.2 Successful Operation

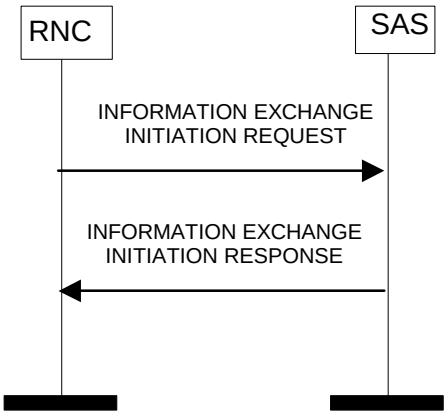

Figure 3: Information Exchange Initiation procedure, Successful Operation

The procedure is initiated with an INFORMATION EXCHANGE INITIATION REQUEST message sent from RNC to SAS.

If the *Information Type* IE is set to 'Implicit', the SAS is responsible for selecting the type of assistance data.

Upon reception, the SAS shall provide the requested information according to the parameters given in the request. Unless specified below, the meaning of the parameters are given in other specifications.

Information Report Characteristics:

The *Information Report Characteristics* IE indicates how the reporting of the information shall be performed.

If the *Information Report Characteristics* IE is set to 'On-Demand', the SAS shall report the requested information immediately.

If the *Information Report Characteristics* IE is set to "Periodic", the SAS shall periodically initiate the Information Reporting procedure for all the requested information, with the requested report frequency.

If the *Information Report Characteristics* IE is set to "On-Modification", the SAS shall report the requested information immediately and then shall initiate the Information Reporting procedure in accordance to the following conditions:

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Almanac and Satellite Health", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in almanac/health information for at least one visible satellite.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "UTC Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the GPS UTC model.

  - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.

- If the *Information Type* IE is set to 'Explicit' and the *Explicit Information Item* IE includes "Ionospheric Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the GPS ionospheric model.

  - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Navigation Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the clock/ephemeris information for at least one visible satellite or in the list of visible satellites.

  - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "DGPS Corrections", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the quality of the DGPS corrections information for at least one visible satellite or in the list of visible satellites.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Reference Time", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the time-of-week assistance information for at least one visible satellite or in the list of visible satellites.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Acquisition Assistance", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in acquisition assistance information for at least one visible satellite or in the list of visible satellites.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Real Time Integrity", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the real-time integrity status of at least one visible satellite.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Almanac and Satellite Health SIB", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in almanac/health information for at least one visible satellite.

    - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.

Response message:

If the SAS was able to determine the information requested by the RNC, it shall respond with the INFORMATION EXCHANGE INITIATION RESPONSE message. The message shall include the same Information Exchange ID that was included in the INFORMATION EXCHANGE REQUEST message.

When the response message includes data to be reported (see above), the SAS shall include at least one IE in the *Requested Data Value* IE.

8.3.3 Unsuccessful Operation

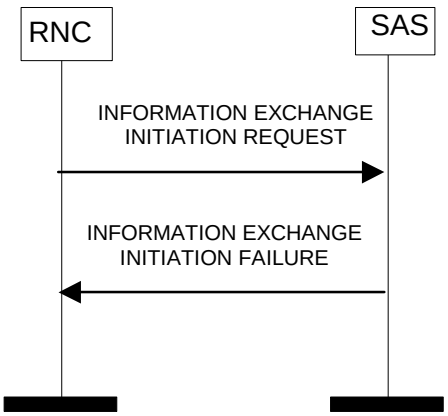

Figure 4: Information Exchange Initiation procedure, Unsuccessful Operation

If the requested Information Type received in the *Information Type* IE indicates a type of information that SAS cannot provide, the SAS shall regard the Information Exchange Initiation procedure as failed.

If the requested information provision cannot be carried out, the SAS shall send the INFORMATION EXCHANGE INITIATION FAILURE message. The message shall include the same Information Exchange ID that was used in the INFORMATION EXCHANGE INITIATION REQUEST message and the *Cause* IE set to an appropriate value.

Typical cause values are as follows:

- Information temporarily not available;
- Information Provision not supported for the object;
- Processing Overload;
- Hardware Failure;
- O&M Intervention.

8.3.4 Abnormal Conditions

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8.4 Information Reporting

8.4.1 General

This procedure is used by a SAS to report the result of information requested by a RNC using the Information Exchange Initiation.

This procedure uses the signalling bearer connection for the Information Exchange Context.

8.4.2 Successful Operation

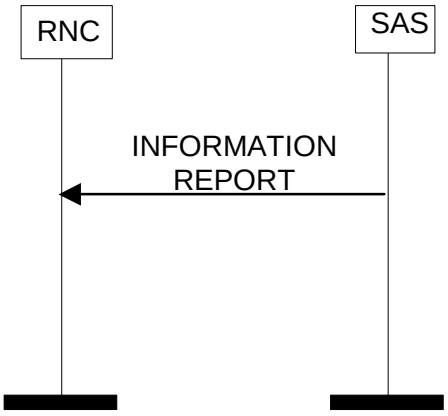

Figure 5: Information Reporting procedure, Successful Operation

If the requested information reporting criteria are met, the SAS shall initiate an Information Reporting procedure. Unless specified below, the meaning of the parameters are given in other specifications.

The *Information Exchange ID* IE shall be set to the Information Exchange ID provided by the RNC when initiating the information exchange with the Information Exchange Initiation procedure.

The *Requested Data Value* IE shall include at least one IE containing the data to be reported.

8.4.3 Abnormal Conditions

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8.5 Information Exchange Termination

8.5.1 General

This procedure is used by a RNC to terminate the information exchange requested using the Information Exchange Initiation.

This procedure uses the signalling bearer connection for the Information Exchange Context.

8.5.2 Successful Operation

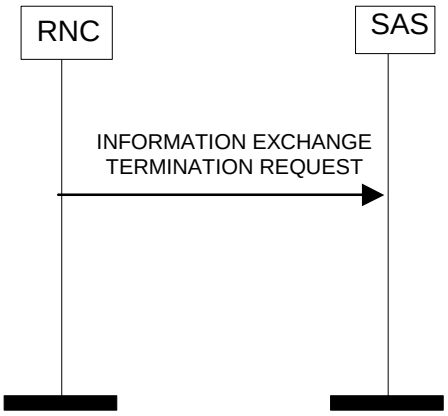

Figure 6: Information Exchange Termination procedure, Successful Operation

This procedure is initiated with an INFORMATION EXCHANGE TERMINATION REQUEST message.

Upon reception, the SAS shall terminate the information exchange corresponding to the Information Exchange ID.

8.5.3 Abnormal Conditions

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8.6 Information Exchange Failure

8.6.1 General

This procedure is used by a SAS to notify a RNC that the information exchange it previously requested using the Information Exchange Initiation can no longer be reported.

This procedure uses the signalling bearer connection for the Information Exchange Context.

8.6.2 Successful Operation

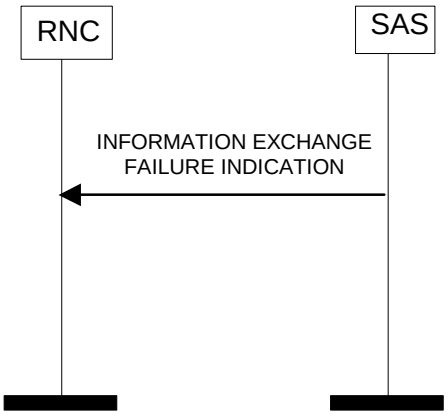

Figure 7: Information Exchange Failure procedure, Successful Operation

This procedure is initiated with a INFORMATION EXCHANGE FAILURE INDICATION message, sent from the SAS to the RNC, to inform the RNC that information previously requested by the Information Exchange Initiation procedure can no longer be reported. The message shall include the same Information Exchange ID that was used in the INFORMATION EXCHANGE INITIATION REQUEST message and the *Cause* IE set to an appropriate value.

Typical cause values are as follows:

Radio Network Layer Cause

Information temporarily not available.

8.7 Error Indication

8.7.1 General

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

8.7.2 Successful Operation

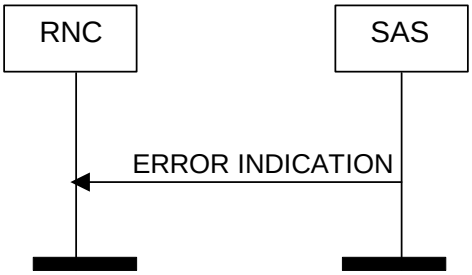

Figure 8: Error Indication procedure, SAS Originated, Successful Operation

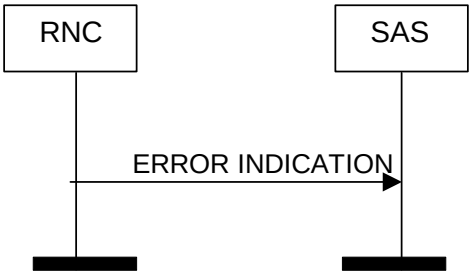

Figure 9: Error Indication procedure, RNC Originated, Successful Operation

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

The ERROR INDICATION message shall include either the *Cause* IE, or the *Criticality Diagnostics* IE, or both the *Cause* IE and the *Criticality Diagnostics* IE.

Typical cause values for the ERROR INDICATION message are:

- Transfer Syntax Error;
- Abstract Syntax Error (Reject);
- Abstract Syntax Error (Ignore and Notify);
- Message not Compatible with Receiver State;
- Unspecified.

8.7.3 Abnormal Conditions

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9 Elements for PCAP Communication

9.1 Message Functional Definition and Content

9.1.1 General

Clause 9.1 presents the contents of PCAP messages in tabular format. The corresponding ASN.1 definitions are presented in clause 9.3. In case there is contradiction between the tabular format in clause 9.1 and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional IEs, where the tabular format shall take precedence.

NOTE: The messages have been defined in accordance to the guidelines specified in [12].

9.1.2 Message Contents

9.1.2.1 Presence

All information elements in the message descriptions below are marked mandatory, optional or conditional according to table 4.

Table 4: Meaning of abbreviations used in PCAP messages

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

9.1.2.2 Criticality

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

Table 5: Meaning of content within "Criticality" column

Abbreviation	Meaning
–	No criticality information is applied explicitly.
YES	Criticality information is applied. This is usable only for non-repeatable IEs
GLOBAL	The IE and all its repetitions together have one common criticality information. This is usable only for repeatable IEs.
EACH	Each repetition of the IE has its own criticality information. It is not allowed to assign different criticality values to the repetitions. This is usable only for repeatable IEs.

9.1.2.3 Range

The Range column indicates the allowed number of copies of repetitive IEs/IE groups.

9.1.2.4 Assigned Criticality

This column provides the actual criticality information as defined in clause 10.3.2, if applicable.

9.1.3 Position Calculation Request

Table 6

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		-	
Initial UE Position Estimate	M		9.2.2.6		YES	reject
Measured Results		*0..<maxNoOfSets>*				
>GPS Measured Results	M		9.2.2.12		YES	reject

Table 7

Range bound	Explanation
MaxNoOfSets	Maximum number of sets of GPS Measured Results included in the Position Calculation Request message. The value for maxNoOfSets is 3.

9.1.4 Position Calculation Response

Table 8

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		-	
UE Position Estimate	M		9.2.2.6		YES	ignore
Criticality Diagnostics	O		9.2.2.4		YES	ignore

9.1.5 POSITION CALCULATION FAILURE

Table 9

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		-	
Cause	M		9.2.2.3		YES	ignore
Criticality Diagnostics	O		9.2.2.4		YES	ignore

9.1.6 Information Exchange Initiation Request

Table 10

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
Information Exchange ID	M		9.2.2.19		YES	reject
Information Exchange Object Type	M		9.2.2.20		YES	reject
CHOICE *Information Exchange Object Type*	M				YES	reject
>Reference Position					-	
>>Reference Position Estimate/UE Initial Position	M		9.2.2.6		-	reject
Information Type	M		9.2.2.22		YES	reject
Information Report Characteristics	M		9.2.2.21		YES	reject
GPS-UTRAN Time Relationship Uncertainty	C-GPS		9.2.2.18		YES	reject

Table 11

Condition	Explanation
GPS	The IE shall be present if the information requested in the *Information Type* IE contains GPS-related data

9.1.7 Information Exchange Initiation Response

Table 12

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		-	
Information Exchange ID	M		9.2.2.19		YES	ignore
CHOICE *Information Exchange Object Type*	M				YES	ignore
>Reference Position					-	
>>Requested Data Value	M		9.2.2.26		-	ignore
Criticality Diagnostics	O		9.2.2.4		YES	ignore

9.1.8 Information Exchange Initiation Failure

Table 13

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		-	
Information Exchange ID	M		9.2.2.19		YES	ignore
Cause	M		9.2.2.3		YES	ignore
Criticality Diagnostics	O		9.2.2.4		YES	ignore

9.1.9 Information Report

Table 14

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		–	
Information Exchange ID	M		9.2.2.19		YES	ignore
CHOICE *Information Exchange Object Type*	M				YES	ignore
>Reference Position					-	
>>Requested Data Value Information	M		9.2.2.27		-	ignore

9.1.10 Information Exchange Termination Request

Table 15

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		–	
Information Exchange ID	M		9.2.2.19		YES	ignore

9.1.11 Information Exchange Failure Indication

Table 16

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		–	
Information Exchange ID	M		9.2.2.19		YES	ignore
Cause	M		9.2.2.3		YES	ignore

9.1.12 Error Indication

Table 17

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		-	
Cause	O		9.2.2.3		YES	ignore
Criticality Diagnostics	O		9.2.2.4		YES	ignore

9.2 Information Element Functional Definitions and Contents

9.2.1 General

Clause 9.2 presents the PCAP IE definitions in tabular format. The corresponding ASN.1 definitions are presented in clause 9.3. In case there is contradiction between the tabular format in clause 9.2 and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.

When specifying information elements which are to be represented by bitstrings, if not otherwise specifically stated in the semantics description of the concerned IE or elsewhere, the following principle applies with regards to the ordering of bits:

- The first bit (leftmost bit) contains the most significant bit (MSB);
- The last bit (rightmost bit) contains the least significant bit (LSB);
- When importing bitstrings from other specifications, the first bit of the bitstring contains the first bit of the concerned information;

9.2.2 Radio Network Layer Related IEs

9.2.2.1 Almanac and Satellite Health SIB

Table 18

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS Almanac and Satellite Health	M		9.2.2.9	
SatMask	M		Bitstring(1..32)	indicates the satellites that contain the pages being broadcast in this data set
LSB TOW	M		Bit string(8)	

9.2.2.2 Altitude and direction

Table 19

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

9.2.2.3 Cause

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

Table 20

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE *Cause Group*				
>Radio Network Layer				
>>Radio Network Layer Cause	M		ENUMERATED (invalid reference information, information temporarily not available, information provision not supported for the object, position calculation error: invalid GPS measured results, ...)	
>Transport Layer				
>>Transport Layer Cause	M		ENUMERATED (Transport Resource Unavailable, Unspecified, ...)	
>Protocol				
>>Protocol Cause	M		ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State, Semantic Error, Unspecified, Abstract Syntax Error (Falsely Constructed Message), ...)	
> Misc				
>>Misc Cause	M		ENUMERATED (Processing Overload, Hardware Failure, O&M Intervention, Unspecified ...)	

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

Table 21

Radio Network Layer cause	Meaning
Invalid reference information	The reference information (GPS-UTRAN Time Relationship Uncertainty and/or Initial UE Position Estimate) provided by the RNC are invalid
Information temporarily not available	The information requested by RNC is temporarily not available
Information Provision not supported for the object	The SAS does not support provision of the requested information for the concerned object types
Position calculation error: invalid GPS measured results	The SAS cannot calculate position due to invalid GPS measured results

Table 22

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

Table 23

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

Table 24

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

9.2.2.4 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the RNC or the SAS when parts of a received message have not been comprehended or are missing. It contains information about which IE was not comprehended or is missing.

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

Table 25

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	O		INTEGER (0..255)	
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 Criticality	O		ENUMERATED(reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Transaction ID	O		Transaction ID	
Information Element Criticality Diagnostics		*0..<maxnoof errors>*		
>IE Criticality	M		ENUMERATED(reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value 'Ignore" shall never be used.
>IE Id	M		INTEGER (0..65535)	The IE Id of the not understood or missing IE as defined in the ASN.1 part of the specification.
>Repetition Number	O		INTEGER (0..255)	The *Repetition Number* IE gives - in case of a not understood IE: The number of occurrences of the reported IE up to and including the not understood occurrence - in case of a missing IE: The number of occurrences up to but not including the missing occurrence. Note: All the counted occurrences of the reported IE must have the same topdown hierachical message structure of IEs with assigned criticality above them.
>Message Structure	O		9.2.2.23	The *Message Structure* IE describes the structure where the not understood or missing IE was detected. This IE is included if the not understood IE is not the top level of the message.
>Type of Error	M		ENUMERATED(not understood, missing, …)	

Table 26

Range bound	Explanation
Maxnooferrors	Maximum number of IE errors allowed to be reported with a single message.

9.2.2.5 DGPS Corrections

This IE contains DGPS corrections which may be employed to compensate for ranging errors due to atmospheric delay, orbital modeling, and satellite clock drift.

Table 27

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS TOW sec	M		Integer(0..604799)	In seconds GPS time-of-week when the DGPS corrections were calculated
Status/Health	M		Enumerated(UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data)	
DPGS information	C-Status/Health	*1..<maxSat>*		
>SatID	M		Enumerated (0…63)	
>IODE	M		Integer(0..239)	
>UDRE	M		Enumerated(UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE)	The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite.
>PRC	M		Integer(-2047..2047)	Scaling factor 0.32 Meters
>Range Rate Correction	M		Integer(-127..127)	Scaling factor 0.032 meters/sec
>Delta PRC2	M		Integer(-127..127)	In meters
>Delta Range Rate Correction 2	M		Integer(-7..7)	Scaling factor 0.032 meters/sec
>Delta PRC3	O		Integer(-127..127)	In meters
>Delta Range Rate Correction 3	O		Integer(-7..7)	Scaling factor 0.032 meters/sec

Table 28

Condition	Explanation
Status/Health	This IE shall be present if the *Status/Health* IE is not equal to "no data" or "invalid data"

Table 29

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

9.2.2.6 Geographical Area

Geographical Area IE is used to identify an area using geographical coordinates. The reference system is the same as the one used in [11].

Table 30

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE *Geographical Area*				
>*Point*				Ellipsoid point
>>Geographical Coordinates	M		9.2.2.7	
>*Point With Uncertainty*				Ellipsoid point with uncertainty circle
>>Geographical Coordinates	M		9.2.2.7	
>>Uncertainty Code	M		INTEGER(0...127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k}-1)$
>*Polygon*				List of Ellipsoid points
>>Polygon		*1..<maxnoofPoints>*		
>>>Geographical Coordinates	M		9.2.2.7	
>*Ellipsoid point with uncertainty Ellipse*				
>>Geographical Coordinates	M		9.2.2.7	
>>Uncertainty Ellipse	M		9.2.2.30	
>>Confidence	M		INTEGER(0...127)	
>*Ellipsoid point with altitude*				
>>Geographical Coordinates	M		9.2.2.7	
>>Altitude and direction	M		9.2.2.2	
>*Ellipsoid point with altitude and uncertainty Ellipsoid*				
>>Geographical Coordinates	M		9.2.2.7	
>>Altitude and direction	M		9.2.2.2	
>>Uncertainty Ellipse	M		9.2.2.30	
>>Uncertainty Altitude	M		INTEGER(0...127)	
>>Confidence	M		INTEGER(0...127)	
>*Ellipsoid Arc*				
>>Geographical Coordinates	M		9.2.2.7	
>>Inner radius	M		INTEGER ($0...2^{16}-1$)	The relation between the value (N) and the radius (r) in meters it describes is $5N \leq r < 5(N+1)$, except for $N=2^{16}-1$ for which the range is extended to include all grater values of (r).
>>Uncertainty radius	M		INTEGER(0...127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k}-1)$
>>Offset angle	M		INTEGER(0...179)	The relation between the value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$

IE/Group Name	Presence	Range	IE type and reference	Semantics description
>>Included angle	M		INTEGER(0...179)	The relation between the value (N) and the angle (a) in degrees it describes is 2N≤ a <2(N+1)
>>Confidence	M		INTEGER(0...127)	

Table 31

Range bound	Explanation
MaxnoofPoints	Maximum no. of points in polygon. Value is 15.

9.2.2.7 Geographical Coordinates

This IE contains the geographical coordinates.

Table 32

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

9.2.2.8 GPS Acquisition Assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

Table 33

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS TOW msec	M		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).
Satellite information		*1..<maxSat>*		
>SatID	M		Integer(0..63)	
>Doppler (0th order term)	M		Integer(-2048..2047)	Scaling factor 2.5Hz
>**Extra Doppler**		*0..1*		
>>Doppler (1st order term)	M		Integer(-42..21)	Scaling factor 1/42
>>Doppler Uncertainty	M		Enumerated(12.5,25,50,100,200)	In Hz
>Code Phase	M		Integer(0..1022)	In Chips, specifies the centre of the search window
>Integer Code Phase	M		Integer(0..19)	Number of 1023 chip segments
>GPS Bit number	M		Integer(0..3)	Specifies GPS bit number (20 1023 chip segments)
>Code Phase Search Window	M		Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192)	Specifies the width of the search window.
>**Azimuth and Elevation**		*0..1*		
>>Azimuth	M		Integer(0..31)	Scaling factor 11.25 Degrees
>>Elevation	M		Integer(0..7)	Scaling factor 11.25 Degrees

Table 34

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

9.2.2.9 GPS Almanac and Satellite Health

This IE contains a reduced-precision subset of the clock and ephemeris parameters.

Table 35

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
WN_a	M		Bit string(8)	
Satellite information		*1..<maxSat>*		
>DataID	M		Bitstring(2)	See [10]
>SatID	M		Enumerated(0..63)	Satellite ID
>e	M		Bit string(16)	Eccentricity [10]
>t_{oa}	M		Bit string(8)	Reference Time Ephemeris [10]
>δI	M		Bit string(16)	
>OMEGADOT	M		Bit string(16)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [10]
>SV Health	M		Bit string(8)	
>$A^{1/2}$	M		Bit string(24)	Semi-Major Axis (meters)$^{1/2}$ [10]
>$OMEGA_0$	M		Bit string(24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [10]
>M_0	M		Bit string(24)	Mean Anomaly at Reference Time (semi-circles) [10]
>ω	M		Bit string(24)	Argument of Perigee (semi-circles) [10]
>af_0	M		Bit string(11)	apparent clock correction [10]
>af_1	M		Bit string(11)	apparent clock correction [10]
SV Global Health	O		Bit string(192)	This enables GPS time recovery and possibly extended GPS correlation intervals

Table 36

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

9.2.2.10 GPS Clock and Ephemeris Parameters

The IE contains the GPS clock information and GPS Ephemeris.

Table 37

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
C/A or P on L2	M		Bit string(2)	Code(s) on L2 Channel [10]
URA Index	M		Bit string(4)	User Range Accuracy [10]
SV Health	M		Bit string(6)	[10]
IODC	M		Bit string(10)	Issue of Data, Clock [10]
L2 P Data Flag	M		Bit string(1)	[10]
SF 1 Reserved	M		Bit string(87)	[10]
T_{GD}	M		Bit string(8)	Estimated group delay differential [10]
t_{oc}	M		Bit string(16)	apparent clock correction [10]
af_2	M		Bit string(8)	apparent clock correction [10]
af_1	M		Bit string(16)	apparent clock correction [10]
af_0	M		Bit string(22)	apparent clock correction [10]
C_{rs}	M		Bit string(16)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) [10]
Δn	M		Bit string(16)	Mean Motion Difference From Computed Value (semi-circles/sec) [10]
M_0	M		Bit string(32)	Mean Anomaly at Reference Time (semi-circles) [10]
C_{uc}	M		Bit string(16)	Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) [10]
E	M		Bit string(32)	C
C_{us}	M		Bit string(16)	Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) [10]
$(A)^{1/2}$	M		Bit string(32)	Semi-Major Axis (meters)$^{1/2}$ [10]
t_{oe}	M		Bit string(16)	Reference Time Ephemeris [10]
Fit Interval Flag	M		Bit string(1)	[10]
AODO	M		Bit string(5)	Age Of Data Offset [10]
C_{ic}	M		Bit string(16)	Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) [10]
$OMEGA_0$	M		Bit string(32)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [10]
C_{is}	M		Bit string(16)	Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) [10]
i_0	M		Bit string(32)	Inclination Angle at Reference Time (semi-circles) [10]
C_{rc}	M		Bit string(16)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) [10]
ω	M		Bit string(32)	Argument of Perigee (semi-circles) [10]
OMEGAdot	M		Bit string(24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [10]
Idot	M		Bit string(14)	Rate of Inclination Angle (semi-circles/sec) [10]

9.2.2.11 GPS Ionospheric Model

The IE contains fields needed to model the propagation delays of the GPS signals through the ionosphere.

Table 38

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
α_0	M		Bit string(8)	note 1
α_1	M		Bit string(8)	note 1
α_2	M		Bit string(8)	note 1
α_3	M		Bit string(8)	note 1
β_0	M		Bit string(8)	note 2
β_1	M		Bit string(8)	note 2
β_2	M		Bit string(8)	note 2
β_3	M		Bit string(8)	note 2
NOTE 1: The parameters αn are the coefficients of a cubic equation representing the amplitude of the vertical delay [10]. NOTE 2: The parameters βn are the coefficients of a cubic equation representing the period of the ionospheric model [10].				

9.2.2.12 GPS Measured Results

The purpose of this information element is to provide reported GPS measurement information from the SRNC to the SAS.

Table 39

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS TOW msec	M		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). This time is the GPS TOW measured by the UE. GPS Time of Week in microseconds = 1000 * GPS TOW msec + GPS TOW rem usec
GPS TOW rem usec	O		Integer(0..999)	GPS Time of Week in microseconds MOD 1000.
Measurement Parameters		*1..<maxSat>*		
>Satellite ID	M		Enumerated(0..63)	
>C/N_o	M		Integer(0..63)	The estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (Typical levels will be in the range of 20 – 50 dB-Hz).
>Doppler	M		Integer(-32768..32768)	Hz, scale factor 0.2.
>Whole GPS Chips	M		Integer(0..1023)	Unit in GPS chips
>Fractional GPS Chips	M		Integer(0..(2^{10}-1))	Scale factor 2^{-10}
>Multipath Indicator	M		Enumerated(NM, low, medium, high)	See note 1
>Pseudorange RMS Error	M		Enumerated(range index 0..range index 63)	See note 2
NOTE 1: Table 41 gives the mapping of the multipath indicator field. NOTE 2: Table 42 gives the bitmapping of the Pseudorange RMS Error field.				

Table 40

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

Table 41

Value	Multipath Indication
NM	Not measured
Low	MP error < 5m
Medium	5m < MP error < 43m
High	MP error > 43m

Table 42

Range Index	Mantissa	Exponent	Floating-Point value, x_i	Pseudorange value, P
0	000	000	0.5	P < 0.5
1	001	000	0.5625	0.5 <= P < 0.5625
i	X	Y	0.5 * (1 + x/8) * 2y	xi-1 <= P < xi
62	110	111	112	104 <= P < 112
63	111	111	--	112 <= P

9.2.2.13 GPS Navigation Model

This IE contain information required to manage the transfer of precise navigation data to the GPS-capable UE.

Table 43

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Satellite information		*1..<maxSat>*		
>SatID	M		Enumerated(0..63)	Satellite ID
>Satellite Status	M		Enumerated(NS_NN, ES_SN, ES_NN, REVD)	See note
>GPS Clock and Ephemeris parameters	C-*Satellite status*		9.2.2.10	
NOTE: The UE shall interpret enumerated symbols as follows.				

Table 44

Value	Indication
NS_NN	New satellite, new Navigation Model
ES_SN	Existing satellite, same Navigation Model
ES_NN	Existing satellite, new Navigation Model
REVD	Reserved

Table 45

Condition	Explanation
Satellite status	The IE shall be present if the *Satellite Status* IE is not set to ES_SN

Table 46

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

9.2.2.14 GPS Real Time Integrity

Table 47

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE *Bad Satellites Presence*	M			
>Bad Satellites				
>>**Satellite information**		*1..<maxNoSat>*		
>>>BadSatID	M		Enumerated(0..63)	Satellite ID
>No Bad Satellites			NULL	

Table 48

Range bound	Explanation
MaxNoSat	Maximum number of satellites for which data is included in this IE.

9.2.2.15 GPS Reference Time

Table 49

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS Week	M		Integer(0..1023)	
GPS TOW msec	M		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).
GPS TOW rem usec	O		Integer(0..999)	GPS Time of Week in microseconds MOD 1000. GPS Time of Week in microseconds = 1000 * GPS TOW msec + GPS TOW rem usec
GPS TOW Assist		*0..<maxSat>*		
>SatID	M		Enumerated(0..63)	
>TLM Message	M		Bit string(14)	
>Anti-Spoof	M		Enumerated (present, not present)	
>Alert	M		Enumerated (present, not present)	
>TLM Reserved	M		Bit string(2)	

Table 50

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

9.2.2.16 GPS Transmission TOW

Table 51

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS Transmission TOW			Integer (0..604799)	The GPS time-of-week in seconds

9.2.2.17 GPS UTC Model

The UTC Model field contains a set of parameters needed to relate GPS time to Universal Time Coordinate (UTC).

Table 52

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
A_1	M		Bit string(24)	sec/sec [10]
A_0	M		Bit string(32)	seconds [10]
t_{ot}	M		Bit string(8)	seconds [10]
Δt_{LS}	M		Bit string(8)	seconds [10]
WN_t	M		Bit string(8)	weeks [10]
WN_{LSF}	M		Bit string(8)	weeks [10]
DN	M		Bit string(8)	days [10]
Δt_{LSF}	M		Bit string(8)	seconds [10]

9.2.2.18 GPS-UTRAN Time Relationship Uncertainty

This IE contains the uncertainty of the GPS and UTRAN time relationship.

Table 53

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS-UTRAN Time Relationship Uncertainty			ENUMERATED (50ns, 500ns, 1us, 10us, 1ms, 10ms, 100ms, unreliable)	RNC estimate of uncertainty in GPS-UTRAN time relationship

9.2.2.19 Information Exchange ID

The Information Exchange ID uniquely identifies any requested information per RNC-SAS pair.

Table 54

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Information Exchange ID			Integer(0 .. 2^20-1)	

9.2.2.20 Information Exchange Object Type

The Information Exchange Object type indicates the type of object that the requested information shall be valid for.

Table 55

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Information Exchange Object Type			ENUMERATED(Reference Position, …)	

9.2.2.21 Information Report Characteristics

The information report characteristics define how the reporting shall be performed.

Table 56

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Information Report Characteristics Type	M		ENUMERATED(On Demand, Periodic, On Modification, ...)	
Information Report Periodicity	C-Periodic		ENUMERATED (1min…1hr, …) step 1min, (1hr…24hr, …) step 1hr, …	Indicates the frequency with which the SAS shall send broadcast data reports.

Table 57

Condition	Explanation
Periodic	This IE shall be present if the *Information Report Characteristics Type* IE indicates 'periodic'

9.2.2.22 Information Type

The Information Type indicates which kind of information the SAS shall provide.

Table 58

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE *Information Type*	M			
>*Implicit*				
>>Method Type	M		9.2.2.25	
>*Explicit*				
>>**Explicit Information**		*1..<maxnoofExpInfo>*		
>>>CHOICE *Explicit Information Item*	M			
>>>>*Almanac and Satellite Health*			NULL	
>>>>*UTC Model*				
>>>>>Transmission TOW Indicator	M		9.2.2.29	
>>>>*Ionospheric Model*				
>>>>>Transmission TOW Indicator	M		9.2.2.29	
>>>>*Navigation Model*				
>>>>>Transmission TOW Indicator	M		9.2.2.29	
>>>>>**Nav. Model Additional Data**		*0..1*		
>>>>>>GPS Week	M		Integer (0..1023)	
>>>>>>GPS_Toe	M		Integer (0..167)	GPS time of ephemeris in hours of the latest ephemeris set
>>>>>>T-Toe limit	M		Integer (0..10)	ephemeris age tolerance in hours
>>>>>>**Satellite related data**		*0..<maxSat-1>*		
>>>>>>>SatID	M		Integer (0..63)	
>>>>>>>IODE	M		Integer (0..239)	Issue of Data Ephemeris for SatID
>>>>*DGPS Corrections*			NULL	
>>>>*Reference Time*			NULL	
>>>>*Acquisition Assistance*			NULL	
>>>>*Real Time Integrity*			NULL	
>>>>*Almanac and Satellite Health SIB*				
>>>>>Transmission TOW Indicator	M		9.2.2.29	

Table 59

Range Bound	Explanation
maxnoofExpInfo	Maximum number of Explicit Information supported in one Information Exchange.
MaxSat	Maximum number of satellites for which data is included in this IE.

9.2.2.23 Message Structure

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

Table 60

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

Table 61

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

9.2.2.24 Message Type

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

Table 62

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Procedure Code	M		ENUMERATED (Position Calculation, Information Exchange Initiation, Information Reporting, Information Exchange Termination, Information Exchange Failure, Error Indication, …)	
Type of Message	M		ENUMERATED (Initiating Message, Successful Outcome, Unsuccessful Outcome, Outcome)	

9.2.2.25 Method Type

Table 63

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Method Type			ENUMERATED (UE_Assisted, UE_Based.)	

9.2.2.26 Requested Data Value

The Requested Data Value contains the relevant data concerning the ongoing information exchange.

Table 64

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Almanac and Satellite Health	O		9.2.2.9	
UTC Model	O		9.2.2.17	
Ionospheric Model	O		9.2.2.11	
Navigation Model	O		9.2.2.13	
DGPS Corrections	O		9.2.2.5	
Reference Time	O		9.2.2.15	
Acquisition Assistance	O		9.2.2.8	
Real Time Integrity	O		9.2.2.14	
Almanac and Satellite Health SIB	O		9.2.2.1	
GPS Transmission TOW	O		9.2.2.16	

9.2.2.27 Requested Data Value Information

The Requested Data Value Information IE provides information both on whether or not the Requested Data Value is provided in the message or not and if provided also the Requested Data Value itself.

Table 65

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE *Information Availability Indicator*	M				–	
>***Information Available***					–	
>>Requested Data Value	M		9.2.2.26		–	
>*Information not Available*			NULL		–	

9.2.2.28 Transaction ID

The Transaction ID is used to associate all the messages belonging to the same procedure. Messages belonging to the same procedure shall use the same Transaction ID.

The Transaction ID is determined by the initiating peer of a procedure.

The Transaction ID shall uniquely identify a procedure among all ongoing parallel procedures using the same procedure code, and initiated by the same protocol peer.

Table 66

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Transaction ID			CHOICE INTEGER (0..127) or INTEGER (0..32767)	The Transaction ID shall be interpreted for its integer value, not for the type of encoding (“short” or “long”).

9.2.2.29 Transmission TOW Indicator

Table 67

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Transmission TOW Indicator			ENUMERATED(requested, not requested)	

9.2.2.30 Uncertainty Ellipse

This IE contains the uncertainty ellipse of a geographical area.

Table 68

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Uncertainty semi-major	M		INTEGER(0...127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k-1)$
Uncertainty semi-minor	M		INTEGER(0...127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k-1)$
Orientation of major axis	M		INTEGER(0...179)	The relation between the value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$

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

9.3.0 General

PCAP ASN.1 definition conforms with [7], [8], and [9].

The ASN.1 definition specifies the structure and content of PCAP messages. PCAP messages can contain any IEs specified in the object set definitions for that message without the order or number of occurrence being restricted by ASN.1. However, for this version of the standard, a sending entity shall construct a PCAP message according to the PDU definitions module and with the following additional rules (Note that in the following IE means an IE in the object set with an explicit id. If one IE needed to appear more than once in one object set, then the different occurrences have different IE ids):

- IEs shall be ordered (in an IE container) in the order they appear in object set definitions.
- Object set definitions specify how many times IEs may appear. An IE shall appear exactly once if the presence field in an object has value "mandatory". An IE may appear at most once if the presence field in an object has value "optional" or "conditional". If in a tabular format there is multiplicity specified for an IE (i.e. an IE list) then in the corresponding ASN.1 definition the list definition is separated into two parts. The first part defines an IE container list where the list elements reside. The second part defines list elements. The IE container list appears as an IE of its own. For this version of the standard an IE container list may contain only one kind of list elements.

If a PCAP message that is not constructed as defined above is received, this shall be considered as Abstract Syntax Error, and the message shall be handled as defined for Abstract Syntax Error in clause 10.3.6.

Clause 9.3 presents the Abstract Syntax of PCAP protocol with ASN.1. In case there is contradiction between the ASN.1 definition in this clause and the tabular format in clauses 9.1 and 9.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.

9.3.1 Usage of private message mechanism for non-standard use

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

- for special operator- (and/or vendor) specific features considered not to be part of the basic functionality, i.e. the functionality required for a complete and high-quality specification in order to guarantee multivendor interoperability;

- by vendors for research purposes, e.g. to implement and evaluate new algorithms/features before such features are proposed for standardisation.

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

9.3.2 Elementary Procedure Definitions

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    ProcedureCode,
    TransactionID
FROM PCAP-CommonDataTypes

    PositionCalculationRequest,
    PositionCalculationResponse,
    PositionCalculationFailure,
    InformationExchangeInitiationRequest,
    InformationExchangeInitiationResponse,
    InformationExchangeInitiationFailure,
    InformationReport,
    InformationExchangeTerminationRequest,
    InformationExchangeFailureIndication,
    ErrorIndication,
    PrivateMessage
FROM PCAP-PDU-Contents

    id-PositionCalculation,
    id-InformationExchangeInitiation,
    id-InformationReporting,
    id-InformationExchangeTermination,
    id-InformationExchangeFailure,
    id-ErrorIndication,
    id-privateMessage
FROM PCAP-Constants;

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

PCAP-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage          ,
    &SuccessfulOutcome          OPTIONAL,
    &UnsuccessfulOutcome        OPTIONAL,
    &Outcome                    OPTIONAL,
    &procedureCode              ProcedureCode   UNIQUE,
    &criticality                Criticality     DEFAULT ignore
}

WITH SYNTAX {
    INITIATING MESSAGE          &InitiatingMessage
    [SUCCESSFUL OUTCOME         &SuccessfulOutcome]
    [UNSUCCESSFUL OUTCOME       &UnsuccessfulOutcome]
    [OUTCOME                    &Outcome]
    PROCEDURE CODE              &procedureCode
```

```
    [CRITICALITY               &criticality]
}

-- **************************************************************
--
-- Interface PDU definitions
--
-- **************************************************************

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


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

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

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

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

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

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

PCAP-ELEMENTARY-PROCEDURES-CLASS-1 PCAP-ELEMENTARY-PROCEDURE ::= {
    positionCalculation         |
    informationExchangeInitiation,
    ...
}


PCAP-ELEMENTARY-PROCEDURES-CLASS-2 PCAP-ELEMENTARY-PROCEDURE ::= {
    informationReporting            |
    informationExchangeTermination  |
    informationExchangeFailure      |
    errorIndication             |
```

```
    privateMessage,
    ...
}


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

positionCalculation PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositionCalculationRequest
    SUCCESSFUL OUTCOME      PositionCalculationResponse
    UNSUCCESSFUL OUTCOME    PositionCalculationFailure
    PROCEDURE CODE          id-PositionCalculation
    CRITICALITY             ignore
}


informationExchangeInitiation PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      InformationExchangeInitiationRequest
    SUCCESSFUL OUTCOME      InformationExchangeInitiationResponse
    UNSUCCESSFUL OUTCOME    InformationExchangeInitiationFailure
    PROCEDURE CODE          id-InformationExchangeInitiation
    CRITICALITY             reject
}


informationReporting PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      InformationReport
    PROCEDURE CODE          id-InformationReporting
    CRITICALITY             ignore
}


informationExchangeTermination PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      InformationExchangeTerminationRequest
    PROCEDURE CODE          id-InformationExchangeTermination
    CRITICALITY             ignore
}


informationExchangeFailure PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      InformationExchangeFailureIndication
    PROCEDURE CODE          id-InformationExchangeFailure
    CRITICALITY             ignore
}


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

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


END
```

9.3.3 PDU Definitions

```
-- **************************************************************
--
-- PDU definitions for PCAP.
--
-- **************************************************************

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

```
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Cause,
    CriticalityDiagnostics,
    GPS-UTRAN-TRU,
    InformationExchangeID,
    InformationReportCharacteristics,
    InformationType,
    MeasuredResultsList,
    RequestedDataValue,
    RequestedDataValueInformation,
    UE-PositionEstimate
FROM PCAP-IEs

    TransactionID
FROM PCAP-CommonDataTypes

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

    id-Cause,
    id-CriticalityDiagnostics,
    id-GPS-UTRAN-TRU,
    id-InformationExchangeID,
    id-InformationExchangeObjectType-InfEx-Rprt,
    id-InformationExchangeObjectType-InfEx-Rqst,
    id-InformationExchangeObjectType-InfEx-Rsp,
    id-InformationReportCharacteristics,
    id-InformationType,
    id-MeasuredResultsList,
    id-RequestedDataValue,
    id-RequestedDataValueInformation,
    id-TransactionID,
    id-UE-PositionEstimate
FROM PCAP-Constants;


-- **************************************************************
--
-- POSITION CALCULATION REQUEST
--
-- **************************************************************

PositionCalculationRequest ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {PositionCalculationRequestIEs} },
    protocolExtensions  ProtocolExtensionContainer { {PositionCalculationRequestExtensions} }
    OPTIONAL,
    ...
}

PositionCalculationRequestIEs PCAP-PROTOCOL-IES ::= {
    { ID id-UE-PositionEstimate     CRITICALITY reject  TYPE UE-PositionEstimate    PRESENCE
mandatory   } |
    { ID id-MeasuredResultsList     CRITICALITY reject  TYPE MeasuredResultsList    PRESENCE
mandatory   },
    ...
}

PositionCalculationRequestExtensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
-- **************************************************************
--
-- POSITION CALCULATION RESPONSE
--
-- **************************************************************

PositionCalculationResponse ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {PositionCalculationResponseIEs} },
    protocolExtensions  ProtocolExtensionContainer { {PositionCalculationResponseExtensions} }
    OPTIONAL,
    ...
}

PositionCalculationResponseIEs PCAP-PROTOCOL-IES ::= {
    { ID id-UE-PositionEstimate         CRITICALITY ignore  TYPE UE-PositionEstimate        PRESENCE
mandatory } |
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE
optional    },
    ...
}

PositionCalculationResponseExtensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- POSITION CALCULATION FAILURE
--
-- **************************************************************

PositionCalculationFailure ::= SEQUENCE {
    protocolIEs         ProtocolIE-Container       { {PositionCalculationFailureIEs} },
    protocolExtensions  ProtocolExtensionContainer { {PositionCalculationFailureExtensions} }
    OPTIONAL,
    ...
}

PositionCalculationFailureIEs PCAP-PROTOCOL-IES ::= {
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE
mandatory} |
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE
optional },
    ...
}

PositionCalculationFailureExtensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- INFORMATION EXCHANGE INITIATION REQUEST
--
-- **************************************************************

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

InformationExchangeInitiationRequest-IEs PCAP-PROTOCOL-IES ::= {
    { ID id-InformationExchangeID                       CRITICALITY reject  TYPE
InformationExchangeID                   PRESENCE    mandatory }|
    { ID id-InformationExchangeObjectType-InfEx-Rqst    CRITICALITY reject  TYPE
InformationExchangeObjectType-InfEx-Rqst        PRESENCE mandatory }|
    -- This IE represents both the Information Exchange Object Type IE and the choice based on the
Information Exchange Object Type
    -- as described in the tabular message format in clause 9.1.
    { ID id-InformationType                             CRITICALITY reject  TYPE InformationType
                        PRESENCE    mandatory }|
    { ID id-InformationReportCharacteristics            CRITICALITY reject  TYPE
InformationReportCharacteristics    PRESENCE    mandatory }|
    { ID id-GPS-UTRAN-TRU                               CRITICALITY reject  TYPE GPS-UTRAN-TRU
                        PRESENCE conditional },
```

```
    -- This IE shall be present if the information requested in the Information Type IE contains
GPS-related data
    ...
}

InformationExchangeInitiationRequest-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

InformationExchangeObjectType-InfEx-Rqst ::= CHOICE {
    referencePosition               RefPosition-InfEx-Rqst,
    ...
}

RefPosition-InfEx-Rqst ::= SEQUENCE {
    referencePositionEstimate       UE-PositionEstimate,
    iE-Extensions                   ProtocolExtensionContainer  { { RefPositionItem-InfEx-Rqst-
ExtIEs} }       OPTIONAL,
    ...
}

RefPositionItem-InfEx-Rqst-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}



-- **************************************************************
--
-- INFORMATION EXCHANGE INITIATION RESPONSE
--
-- **************************************************************

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

InformationExchangeInitiationResponse-IEs PCAP-PROTOCOL-IES ::= {
    { ID    id-InformationExchangeID                    CRITICALITY ignore  TYPE
InformationExchangeID                   PRESENCE    mandatory }|
    { ID    id-InformationExchangeObjectType-InfEx-Rsp  CRITICALITY ignore  TYPE
InformationExchangeObjectType-InfEx-Rsp     PRESENCE    mandatory }|
    { ID    id-CriticalityDiagnostics                   CRITICALITY ignore  TYPE
CriticalityDiagnostics                  PRESENCE    optional    },
    ...
}

InformationExchangeInitiationResponse-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

InformationExchangeObjectType-InfEx-Rsp ::= CHOICE {
    referencePosition               RefPosition-InfEx-Rsp,
    ...
}

RefPosition-InfEx-Rsp ::= SEQUENCE {
    requestedDataValue              RequestedDataValue,
    iE-Extensions                   ProtocolExtensionContainer  { { RefPositionItem-InfEx-Rsp-
ExtIEs} }       OPTIONAL,
    ...
}

RefPositionItem-InfEx-Rsp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- INFORMATION EXCHANGE INITIATION FAILURE
--
-- **************************************************************

InformationExchangeInitiationFailure ::= SEQUENCE {
```

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

InformationExchangeInitiationFailure-IEs PCAP-PROTOCOL-IES ::= {
    { ID    id-InformationExchangeID        CRITICALITY     ignore  TYPE InformationExchangeID
    PRESENCE    mandatory }|
    { ID    id-Cause                        CRITICALITY     ignore  TYPE Cause
    PRESENCE    mandatory }|
    { ID    id-CriticalityDiagnostics       CRITICALITY     ignore  TYPE CriticalityDiagnostics
    PRESENCE    optional    },
    ...
}

InformationExchangeInitiationFailure-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- INFORMATION REPORT
--
-- **************************************************************

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

InformationReport-IEs PCAP-PROTOCOL-IES ::= {
    { ID    id-InformationExchangeID                        CRITICALITY ignore  TYPE
InformationExchangeID       PRESENCE    mandatory }|
    { ID    id-InformationExchangeObjectType-InfEx-Rprt     CRITICALITY ignore  TYPE
InformationExchangeObjectType-InfEx-Rprt    PRESENCE    mandatory },
    ...
}

InformationReport-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

InformationExchangeObjectType-InfEx-Rprt ::= CHOICE {
    referencePosition               RefPosition-InfEx-Rprt,
    ...
 }

RefPosition-InfEx-Rprt ::= SEQUENCE {
    requestedDataValueInformation   RequestedDataValueInformation,
    iE-Extensions                   ProtocolExtensionContainer  {{ RefPositionItem-InfEx-Rprt-ExtIEs
}}      OPTIONAL,
    ...

 }

RefPositionItem-InfEx-Rprt-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- INFORMATION EXCHANGE TERMINATION REQUEST
--
-- **************************************************************

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

InformationExchangeTerminationRequest-IEs PCAP-PROTOCOL-IES ::= {
```

```
    { ID    id-InformationExchangeID            CRITICALITY     ignore  TYPE InformationExchangeID
            PRESENCE    mandatory},
    ...
}

InformationExchangeTerminationRequest-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- INFORMATION EXCHANGE FAILURE INDICATION
--
-- **************************************************************

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

InformationExchangeFailureIndication-IEs PCAP-PROTOCOL-IES ::= {
    { ID    id-InformationExchangeID            CRITICALITY ignore          TYPE
InformationExchangeID           PRESENCE    mandatory   }|
    { ID    id-Cause                            CRITICALITY ignore          TYPE Cause
                PRESENCE    mandatory   },
    ...
}

InformationExchangeFailureIndication-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


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

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

ErrorIndicationIEs PCAP-PROTOCOL-IES ::= {
    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE
optional } |
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE
optional },
        ...
}

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


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

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

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

END
```

9.3.4 Information Element Definitions

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    maxNrOfErrors,
    maxSat,
    maxSatLess1,
    maxNrOfLevels,
    maxNrOfPoints,
    maxNrOfExpInfo,
    id-TypeOfError,
    id-MessageStructure
FROM PCAP-Constants

    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
    TransactionID,
    TriggeringMessage
FROM PCAP-CommonDataTypes

    ProtocolExtensionContainer{},
    PCAP-PROTOCOL-EXTENSION
FROM PCAP-Containers;


-- **************************************************************
--
-- Almanac and Satellite Health SIB
--
-- **************************************************************

AlmanacAndSatelliteHealthSIB ::=    SEQUENCE {
    gpsAlmanacAndSatelliteHealth        GPS-AlmanacAndSatelliteHealth,
    satMask                             BIT STRING (SIZE (1..32)),
    lsbTOW                              BIT STRING (SIZE (8))
}


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

Cause ::= CHOICE {
    radioNetwork            CauseRadioNetwork,
    transport               CauseTransport,
    protocol                CauseProtocol,
    misc                    CauseMisc,
    ...
}
CauseRadioNetwork ::= ENUMERATED {
    invalid-reference-information,
    information-temporarily-not-available,
    information-provision-not-supported-for-the-object,
    position-calculation-error-invalid-GPS-measured-results,
    ...
}
```

```
CauseTransport ::= ENUMERATED {
    transport-resource-unavailable,
    unspecified,
    ...
}

CauseProtocol ::= ENUMERATED {
    transfer-syntax-error,
    abstract-syntax-error-reject,
    abstract-syntax-error-ignore-and-notify,
    message-not-compatible-with-receiver-state,
    semantic-error,
    unspecified,
    abstract-syntax-error-falsely-constructed-message,
    ...
}


CauseMisc ::= ENUMERATED {
    processing-overload,
    hardware-failure,
    o-and-m-intervention,
    unspecified,
    ...
}


-- **************************************************************
--
-- CriticalityDiagnostics
--
-- **************************************************************

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode                ProcedureCode              OPTIONAL,
    triggeringMessage            TriggeringMessage       OPTIONAL,
    procedureCriticality         Criticality             OPTIONAL,
    transactionID                TransactionID           OPTIONAL,
    iEsCriticalityDiagnostics    CriticalityDiagnostics-IE-List  OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} }
OPTIONAL,
    ...
}

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
        iECriticality           Criticality,
        iE-ID                   ProtocolIE-ID,
        repetitionNumber        RepetitionNumber0       OPTIONAL,
        iE-Extensions           ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs}
} OPTIONAL,
        ...
    }

CriticalityDiagnostics-IE-List-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
{   ID id-MessageStructure      CRITICALITY ignore      EXTENSION MessageStructure      PRESENCE
optional    }|
{   ID id-TypeOfError           CRITICALITY ignore      EXTENSION TypeOfError           PRESENCE
mandatory   },
    ...
}

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

RepetitionNumber0 ::= INTEGER (0..255, ...)
RepetitionNumber1 ::= INTEGER (1..256, ...)


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

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

```
-- DGPSCorrections
--
-- **************************************************************


DGPSCorrections ::=                 SEQUENCE {
    gps-TOW-sec                         INTEGER (0..604799),
    statusHealth                        DiffCorrectionStatus,
    dgps-CorrectionSatInfoList          DGPS-CorrectionSatInfoList  OPTIONAL,
    -- not included if satelliteHealth is equal to noData or invalidData
    iE-Extensions                       ProtocolExtensionContainer { { DGPSCorrections-ExtIEs } }
    OPTIONAL,
    ...
}

DGPSCorrections-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


DiffCorrectionStatus ::=            ENUMERATED {
                                        udre-1-0, udre-0-75, udre-0-5, udre-0-3,
                                        udre-0-2, udre-0-1, noData, invalidData }

DGPS-CorrectionSatInfoList ::=      SEQUENCE (SIZE (1..maxSat)) OF
                                        DGPS-CorrectionSatInfo

DGPS-CorrectionSatInfo ::=          SEQUENCE {
    satID                               INTEGER (0..63),
    iode                                INTEGER (0..239),
    udre                                UDRE,
    prc                                 PRC,
    rrc                                 RRC,
    deltaPRC2                           DeltaPRC,
    deltaRRC2                           DeltaRRC,
    deltaPRC3                           DeltaPRC,
    deltaRRC3                           DeltaRRC
}

UDRE ::=                            ENUMERATED {
                                        lessThan1,
                                        between1-and-4,
                                        between4-and-8,
                                        over8 }

PRC ::=                             INTEGER (-2047..2047)

RRC ::=                             INTEGER (-127..127)

DeltaPRC ::=                        INTEGER (-127..127)

DeltaRRC ::=                        INTEGER (-7..7)




-- **************************************************************
--
-- UE-PositionEstimate (i.e., Geographical Area)
--
-- **************************************************************

-- UE-PositionEstimate is based on Geographical Area Description in 23.032

UE-PositionEstimate ::= CHOICE {
    point                       GA-Point,
    pointWithUnCertainty        GA-PointWithUnCertainty,
    polygon                     GA-Polygon,
    pointWithUncertaintyEllipse GA-PointWithUnCertaintyEllipse,
    pointWithAltitude           GA-PointWithAltitude,
    pointWithAltitudeAndUncertaintyEllipsoid        GA-PointWithAltitudeAndUncertaintyEllipsoid,
    ellipsoidArc                GA-EllipsoidArc,
    ...
}

GeographicalCoordinates ::= SEQUENCE {
```

```
    latitudeSign            ENUMERATED { north, south },
    latitude                INTEGER (0..8388607),
    longitude               INTEGER (-8388608..8388607),
    iE-Extensions           ProtocolExtensionContainer { {GeographicalCoordinates-ExtIEs} }
OPTIONAL,
    ...
}

GeographicalCoordinates-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-AltitudeAndDirection ::= SEQUENCE {
    directionOfAltitude     ENUMERATED {height, depth},
    altitude        INTEGER (0..32767),
    ...
}

GA-EllipsoidArc ::= SEQUENCE {
    geographicalCoordinates     GeographicalCoordinates,
    innerRadius                 INTEGER (0..65535),
    uncertaintyRadius           INTEGER (0..127),
    offsetAngle                 INTEGER (0..179),
    includedAngle               INTEGER (0..179),
    confidence                  INTEGER (0..127),
    iE-Extensions               ProtocolExtensionContainer { { GA-EllipsoidArc-ExtIEs} } OPTIONAL,
    ...
}

GA-EllipsoidArc-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-Point ::= SEQUENCE {
    geographicalCoordinates     GeographicalCoordinates,
    iE-Extensions           ProtocolExtensionContainer { {GA-Point-ExtIEs} } OPTIONAL,
    ...
}

GA-Point-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-PointWithAltitude ::= SEQUENCE {
    geographicalCoordinates     GeographicalCoordinates,
    altitudeAndDirection        GA-AltitudeAndDirection,
    iE-Extensions               ProtocolExtensionContainer { { GA-PointWithAltitude-ExtIEs} }
OPTIONAL,
    ...
}

GA-PointWithAltitude-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-PointWithAltitudeAndUncertaintyEllipsoid ::= SEQUENCE {
    geographicalCoordinates     GeographicalCoordinates,
    altitudeAndDirection        GA-AltitudeAndDirection,
    uncertaintyEllipse          GA-UncertaintyEllipse,
    uncertaintyAltitude         INTEGER (0..127),
    confidence                  INTEGER (0..127),
    iE-Extensions               ProtocolExtensionContainer { { GA-
PointWithAltitudeAndUncertaintyEllipsoid-ExtIEs} } OPTIONAL,
    ...
}

GA-PointWithAltitudeAndUncertaintyEllipsoid-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-PointWithUnCertainty ::=SEQUENCE {
    geographicalCoordinates     GeographicalCoordinates,
    iE-Extensions           ProtocolExtensionContainer { {GA-PointWithUnCertainty-ExtIEs} }
OPTIONAL,
    uncertaintyCode         INTEGER (0..127)
}

GA-PointWithUnCertainty-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

GA-PointWithUnCertaintyEllipse ::= SEQUENCE {
    geographicalCoordinates     GeographicalCoordinates,
    uncertaintyEllipse          GA-UncertaintyEllipse,
    confidence                  INTEGER (0..127),
    iE-Extensions               ProtocolExtensionContainer { { GA-PointWithUnCertaintyEllipse-
ExtIEs} } OPTIONAL,
    ...
}

GA-PointWithUnCertaintyEllipse-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-Polygon ::= SEQUENCE (SIZE (1..maxNrOfPoints)) OF
    SEQUENCE {
        geographicalCoordinates     GeographicalCoordinates,
        iE-Extensions           ProtocolExtensionContainer { {GA-Polygon-ExtIEs} } OPTIONAL,
        ...
    }

GA-Polygon-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GA-UncertaintyEllipse ::= SEQUENCE {
    uncertaintySemi-major       INTEGER (0..127),
    uncertaintySemi-minor       INTEGER (0..127),
    orientationOfMajorAxis      INTEGER (0..179),
    ...
}



-- **************************************************************
--
-- GPS-AcquisitionAssistance:
--
-- **************************************************************


GPS-AcquisitionAssistance ::=   SEQUENCE {
    gps-TOW-1msec                       INTEGER (0..604799999),
    satelliteInformationList            AcquisitionSatInfoList,
    iE-Extensions                       ProtocolExtensionContainer { { GPS-AcquisitionAssistance-
ExtIEs } }      OPTIONAL,
    ...
}

GPS-AcquisitionAssistance-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

AcquisitionSatInfoList ::=          SEQUENCE (SIZE (1..maxSat)) OF
                                        AcquisitionSatInfo

AcquisitionSatInfo ::=              SEQUENCE {
    satID                               INTEGER (0..63),
    doppler0thOrder                     INTEGER (-2048..2047),
    extraDopplerInfo                    ExtraDopplerInfo                    OPTIONAL,
    codePhase                           INTEGER (0..1022),
    integerCodePhase                    INTEGER (0..19),
    gps-BitNumber                       INTEGER (0..3),
    codePhaseSearchWindow               CodePhaseSearchWindow,
    azimuthAndElevation                 AzimuthAndElevation                 OPTIONAL
}

ExtraDopplerInfo ::=                SEQUENCE {
    doppler1stOrder                     INTEGER (-42..21),
    dopplerUncertainty                  DopplerUncertainty
}

DopplerUncertainty ::=              ENUMERATED {
                                        hz12-5, hz25, hz50, hz100, hz200 }
```

```
CodePhaseSearchWindow ::=           ENUMERATED {
                                        w1023, w1, w2, w3, w4, w6, w8,
                                        w12, w16, w24, w32, w48, w64,
                                        w96, w128, w192 }

AzimuthAndElevation ::=             SEQUENCE {
    azimuth                             INTEGER (0..31),
    elevation                           INTEGER (0..7)
}


-- **************************************************************
--
-- GPS Almanac and Satellite Health
--
-- **************************************************************


GPS-AlmanacAndSatelliteHealth ::=   SEQUENCE {
    wn-a                                BIT STRING (SIZE (8)),
    almanacSatInfoList                  AlmanacSatInfoList,
    svGlobalHealth                      BIT STRING (SIZE (192)) OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { GPS-
AlmanacAndSatelliteHealth-ExtIEs } }        OPTIONAL,
    ...
}

GPS-AlmanacAndSatelliteHealth-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


AlmanacSatInfoList ::=              SEQUENCE (SIZE (1..maxSat)) OF
                                        AlmanacSatInfo

AlmanacSatInfo ::=                  SEQUENCE {
    dataID                              BIT STRING (SIZE (2)),
    satID                               INTEGER (0..63),
    e                                   BIT STRING (SIZE (16)),
    t-oa                                BIT STRING (SIZE (8)),
    deltaI                              BIT STRING (SIZE (16)),
    omegaDot                            BIT STRING (SIZE (16)),
    satHealth                           BIT STRING (SIZE (8)),
    a-Sqrt                              BIT STRING (SIZE (24)),
    omega0                              BIT STRING (SIZE (24)),
    m0                                  BIT STRING (SIZE (24)),
    omega                               BIT STRING (SIZE (24)),
    af0                                 BIT STRING (SIZE (11)),
    af1                                 BIT STRING (SIZE (11))
}


-- **************************************************************
--
-- GPS Clock And Ephemeris Parameters
--
-- **************************************************************

GPS-ClockAndEphemerisParameters ::= SEQUENCE {
    codeOnL2                            BIT STRING (SIZE (2)),
    uraIndex                            BIT STRING (SIZE (4)),
    satHealth                           BIT STRING (SIZE (6)),
    iodc                                BIT STRING (SIZE (10)),
    l2Pflag                             BIT STRING (SIZE (1)),
    sf1Revd                             SubFrame1Reserved,
    t-GD                                BIT STRING (SIZE (8)),
    t-oc                                BIT STRING (SIZE (16)),
    af2                                 BIT STRING (SIZE (8)),
    af1                                 BIT STRING (SIZE (16)),
    af0                                 BIT STRING (SIZE (22)),
    c-rs                                BIT STRING (SIZE (16)),
    delta-n                             BIT STRING (SIZE (16)),
    m0                                  BIT STRING (SIZE (32)),
    c-uc                                BIT STRING (SIZE (16)),
    e                                   BIT STRING (SIZE (32)),
    c-us                                BIT STRING (SIZE (16)),
    a-Sqrt                              BIT STRING (SIZE (32)),
```

```
    t-oe                                BIT STRING (SIZE (16)),
    fitInterval                         BIT STRING (SIZE (1)),
    aodo                                BIT STRING (SIZE (5)),
    c-ic                                BIT STRING (SIZE (16)),
    omega0                              BIT STRING (SIZE (32)),
    c-is                                BIT STRING (SIZE (16)),
    i0                                  BIT STRING (SIZE (32)),
    c-rc                                BIT STRING (SIZE (16)),
    omega                               BIT STRING (SIZE (32)),
    omegaDot                            BIT STRING (SIZE (24)),
    iDot                                BIT STRING (SIZE (14)),
    iE-Extensions                       ProtocolExtensionContainer { { GPS-
ClockAndEphemerisParameters-ExtIEs } }      OPTIONAL,
    ...
}

GPS-ClockAndEphemerisParameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SubFrame1Reserved ::=               SEQUENCE {
    reserved1                           BIT STRING (SIZE (23)),
    reserved2                           BIT STRING (SIZE (24)),
    reserved3                           BIT STRING (SIZE (24)),
    reserved4                           BIT STRING (SIZE (16))
}


-- **************************************************************
--
-- GPS Ionospheric Model
--
-- **************************************************************


 GPS-Ionospheric-Model ::=          SEQUENCE {
    alfa0                               BIT STRING (SIZE (8)),
    alfa1                               BIT STRING (SIZE (8)),
    alfa2                               BIT STRING (SIZE (8)),
    alfa3                               BIT STRING (SIZE (8)),
    beta0                               BIT STRING (SIZE (8)),
    beta1                               BIT STRING (SIZE (8)),
    beta2                               BIT STRING (SIZE (8)),
    beta3                               BIT STRING (SIZE (8)),
    iE-Extensions                       ProtocolExtensionContainer { { GPS-Ionospheric-Model-ExtIEs
} }     OPTIONAL,
    ...
}

GPS-Ionospheric-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- GPS Measured Results
--
-- **************************************************************

MeasuredResultsList ::=             SEQUENCE (SIZE (0..maxNrOfSets)) OF
    GPS-MeasuredResults

maxNrOfSets                         INTEGER ::= 3

GPS-MeasuredResults ::=             SEQUENCE {
    gps-TOW-1msec                       INTEGER (0..604799999),
    gps-MeasurementParamList            GPS-MeasurementParamList,
    gps-TOW-rem-usec                    INTEGER (0..999)            OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { GPS-MeasuredResults-ExtIEs }
}       OPTIONAL,
    ...
}

GPS-MeasuredResults-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
```

```
}

GPS-MeasurementParamList ::=        SEQUENCE (SIZE (1..maxSat)) OF
                                        GPS-MeasurementParam

GPS-MeasurementParam ::=            SEQUENCE {
    satelliteID                         INTEGER (0..63),
    c-N0                                INTEGER (0..63),
    doppler                             INTEGER (-32768..32768),
    wholeGPS-Chips                      INTEGER (0..1023),
    fractionalGPS-Chips                 INTEGER (0..1023),
    multipathIndicator                  MultipathIndicator,
    pseudorangeRMS-Error                INTEGER (0..63)
}

MultipathIndicator ::=              ENUMERATED {
                                        nm,
                                        low,
                                        medium,
                                        high }


-- **************************************************************
--
-- GPS Navigation Model
--
-- **************************************************************


GPS-NavigationModel ::=             SEQUENCE {
    navigationModelSatInfoList          NavigationModelSatInfoList
}

NavigationModelSatInfoList ::=      SEQUENCE (SIZE (1..maxSat)) OF
                                        NavigationModelSatInfo

NavigationModelSatInfo ::=          SEQUENCE {
    satID                               INTEGER (0..63),
    satelliteStatus                     SatelliteStatus,
    gps-clockAndEphemerisParms              GPS-ClockAndEphemerisParameters OPTIONAL,
    -- This IE is not present if satelliteStatus is es-SN
    iE-Extensions                       ProtocolExtensionContainer { { NavigationModelSatInfo-ExtIEs
} }     OPTIONAL,
    ...
}

NavigationModelSatInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SatelliteStatus ::=                 ENUMERATED {
                                        ns-NN,
                                        es-SN,
                                        es-NN,
                                        reserved }



-- **************************************************************
--
-- GPS Real Time Integrity
--
-- **************************************************************

GPS-RealTimeIntegrity ::= CHOICE {
    badSatellites       BadSatList,
    noBadSatellites     NoBadSatellites
}

BadSatList ::=                      SEQUENCE (SIZE (1..maxSat)) OF
                                        INTEGER (0..63)

NoBadSatellites ::= NULL


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

```
-- GPS Reference Time
--
-- **************************************************************

GPS-ReferenceTime ::=               SEQUENCE {
    gps-Week                            INTEGER (0..1023),
    gps-TOW-1msec                       INTEGER (0..604799999),
    gps-TOW-rem-usec                    INTEGER (0..999)                    OPTIONAL,
    gps-TOW-AssistList                  GPS-TOW-AssistList                  OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { GPS-ReferenceTime-ExtIEs } }
        OPTIONAL,
    ...
}

GPS-ReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GPS-TOW-AssistList ::=              SEQUENCE (SIZE (1..maxSat)) OF
                                        GPS-TOW-Assist

GPS-TOW-Assist ::=                  SEQUENCE {
    satID                               INTEGER (0..63),
    tlm-Message                         BIT STRING (SIZE (14)),
    antiSpoof                           ENUMERATED {present, notPresent},
    alert                               ENUMERATED {present, notPresent},
    tlm-Reserved                        BIT STRING (SIZE (2))
}


-- **************************************************************
--
-- GPS Transmission TOW
--
-- **************************************************************

GPS-Transmission-TOW ::= INTEGER (0..604799)



-- **************************************************************
--
-- GPS UTC Model
--
-- **************************************************************

GPS-UTC-Model ::=                   SEQUENCE {
    a1                                  BIT STRING (SIZE (24)),
    a0                                  BIT STRING (SIZE (32)),
    t-ot                                BIT STRING (SIZE (8)),
    delta-t-LS                          BIT STRING (SIZE (8)),
    wn-t                                BIT STRING (SIZE (8)),
    wn-lsf                              BIT STRING (SIZE (8)),
    dn                                  BIT STRING (SIZE (8)),
    delta-t-LSF                         BIT STRING (SIZE (8)),
    iE-Extensions                       ProtocolExtensionContainer { { GPS-UTCmodel-ExtIEs } }
    OPTIONAL,
    ...
}

GPS-UTCmodel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- GPS UTRAN Time Relationship Uncertainty
-- nsec=nanosecond, usec=microsecond, msec=millisecond, sec=second
--
-- **************************************************************

GPS-UTRAN-TRU ::=   ENUMERATED {
                        nsec-50,
                        nsec-500,
                        usec-1,
```

```
                        usec-10,
                        msec-1,
                        msec-10,
                        msec-100,
                        unreliable }


-- **************************************************************
--
-- Information Exchange ID
--
-- **************************************************************

InformationExchangeID ::= INTEGER (0..1048575)


-- **************************************************************
--
-- Information Report Characteristics
--
-- **************************************************************

InformationReportCharacteristics ::= SEQUENCE {
    type                    InformationReportCharacteristicsType,
    periodicity             InformationReportPeriodicity        OPTIONAL,
    -- present if type indicates periodic
    ...
}

InformationReportCharacteristicsType ::= ENUMERATED {
    onDemand,
    periodic,
    onModification,
    ...
}


InformationReportPeriodicity ::= CHOICE {
    min             INTEGER (1..60,...),
-- Unit min, Step 1min
    hour            INTEGER (1..24,...),
-- Unit hour, Step 1hour
    ...
}

-- **************************************************************
--
-- Information Type
--
-- **************************************************************


InformationType ::= CHOICE {
    implicitInformation         MethodType,
    explicitInformation         ExplicitInformationList,
    ...
}


ExplicitInformationList ::= SEQUENCE (SIZE (1..maxNrOfExpInfo)) OF ExplicitInformation

ExplicitInformation ::= CHOICE {
    almanacAndSatelliteHealth       AlmanacAndSatelliteHealth,
    utcModel                        UtcModel,
    ionosphericModel                IonosphericModel,
    navigationModel                 NavigationModel,
    dgpsCorrections                 DgpsCorrections,
    referenceTime                   ReferenceTime,
    acquisitionAssistance           AcquisitionAssistance,
    realTimeIntegrity               RealTimeIntegrity,
    almanacAndSatelliteHealthSIB    AlmanacAndSatelliteHealthSIB-InfoType,
    ...
}

AlmanacAndSatelliteHealth ::= NULL

UtcModel ::= SEQUENCE {
    transmissionTOWIndicator        TransmissionTOWIndicator,
```

```
    ...
}

IonosphericModel ::= SEQUENCE {
    transmissionTOWIndicator        TransmissionTOWIndicator,
    ...
}

NavigationModel ::= SEQUENCE {
    transmissionTOWIndicator        TransmissionTOWIndicator,
    navModelAdditionalData              NavModelAdditionalData          OPTIONAL,
    ...
}


NavModelAdditionalData ::= SEQUENCE {
    gps-Week                            INTEGER (0..1023),
    gps-TOE                             INTEGER (0..167),
    t-TOE-limit                         INTEGER (0..10),
    satRelatedDataList                  SatelliteRelatedDataList,
    ...
}

SatelliteRelatedDataList ::= SEQUENCE (SIZE (0..maxSatLess1)) OF SatelliteRelatedData

SatelliteRelatedData ::= SEQUENCE {
    satID                               INTEGER (0..63),
    iode                                INTEGER (0..239)
}

DgpsCorrections ::= NULL

ReferenceTime ::= NULL

AcquisitionAssistance ::= NULL

RealTimeIntegrity ::= NULL

AlmanacAndSatelliteHealthSIB-InfoType ::= SEQUENCE {
    transmissionTOWIndicator        TransmissionTOWIndicator,
    ...
}


TransmissionTOWIndicator ::= ENUMERATED {
    requested,
    not-Requested
}

-- **************************************************************
--
-- Message Structure
--
-- **************************************************************

MessageStructure ::= SEQUENCE (SIZE (1..maxNrOfLevels)) OF
    SEQUENCE {
        iE-ID                   ProtocolIE-ID,
        repetitionNumber        RepetitionNumber1       OPTIONAL,
        iE-Extensions           ProtocolExtensionContainer { {MessageStructure-ExtIEs} } OPTIONAL,
        ...
    }

MessageStructure-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- Method Type
--
-- **************************************************************

MethodType ::= ENUMERATED {
    ue-assisted,
    ue-based
}
```

```
-- **************************************************************
--
-- Requested Data Value
--
-- **************************************************************

RequestedDataValue ::= SEQUENCE {
    gpsAlmanacAndSatelliteHealth        GPS-AlmanacAndSatelliteHealth               OPTIONAL,
    gps-UTC-Model                       GPS-UTC-Model                               OPTIONAL,
    gps-Ionospheric-Model               GPS-Ionospheric-Model                       OPTIONAL,
    gps-NavigationModel                 GPS-NavigationModel                         OPTIONAL,
    dgpsCorrections                     DGPSCorrections                             OPTIONAL,
    referenceTime                       GPS-ReferenceTime                           OPTIONAL,
    gps-AcquisitionAssistance           GPS-AcquisitionAssistance                   OPTIONAL,
    gps-RealTime-Integrity              GPS-RealTimeIntegrity                       OPTIONAL,
    almanacAndSatelliteHealthSIB        AlmanacAndSatelliteHealthSIB                OPTIONAL,
    gps-Transmission-TOW                GPS-Transmission-TOW                        OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { RequestedDataValue-ExtIEs} }
        OPTIONAL,
    ...
}

--at least one of the above IEs shall be present in the requested data value

RequestedDataValue-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- Requested Data Value Information
--
-- **************************************************************

RequestedDataValueInformation ::= CHOICE {
    informationAvailable        InformationAvailable,
    informationNotAvailable     InformationNotAvailable
}

InformationAvailable::= SEQUENCE {
    requestedDataValue      RequestedDataValue,
    iE-Extensions           ProtocolExtensionContainer { { InformationAvailable-ExtIEs} }
    OPTIONAL,
    ...
}

InformationAvailable-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

InformationNotAvailable ::= NULL


END
```

9.3.5 Common Definitions

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

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

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

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

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

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


ProcedureCode       ::= INTEGER (0..255)


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

TransactionID       ::= CHOICE {
    shortTID            INTEGER (0..127),
    longTID             INTEGER (0..32767)
}

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

END
```

9.3.6 Constant Definitions

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    ProcedureCode,
    ProtocolIE-ID
FROM PCAP-CommonDataTypes;


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

id-PositionCalculation              ProcedureCode ::= 1
id-InformationExchangeInitiation    ProcedureCode ::= 2
id-InformationReporting             ProcedureCode ::= 3
id-InformationExchangeTermination   ProcedureCode ::= 4
id-InformationExchangeFailure       ProcedureCode ::= 5
id-ErrorIndication                  ProcedureCode ::= 6
id-privateMessage                   ProcedureCode ::= 7



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

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

maxNrOfErrors                       INTEGER ::= 256
maxSat                              INTEGER ::= 16
maxSatLess1                         INTEGER ::= 15
maxNrOfLevels                       INTEGER ::= 256
maxNrOfPoints                       INTEGER ::= 15
maxNrOfExpInfo                      INTEGER ::= 32

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

id-Cause                                        ProtocolIE-ID ::= 1
id-CriticalityDiagnostics                       ProtocolIE-ID ::= 2
id-GPS-UTRAN-TRU                                ProtocolIE-ID ::= 3
id-InformationExchangeID                        ProtocolIE-ID ::= 4
id-InformationExchangeObjectType-InfEx-Rprt     ProtocolIE-ID ::= 5
id-InformationExchangeObjectType-InfEx-Rqst     ProtocolIE-ID ::= 6
id-InformationExchangeObjectType-InfEx-Rsp      ProtocolIE-ID ::= 7
id-InformationReportCharacteristics             ProtocolIE-ID ::= 8
id-InformationType                              ProtocolIE-ID ::= 9
id-MeasuredResultsList                          ProtocolIE-ID ::= 10
id-MessageStructure                             ProtocolIE-ID ::= 19
id-MethodType                                   ProtocolIE-ID ::= 11
id-RefPosition-InfEx-Rqst                       ProtocolIE-ID ::= 12
id-RefPosition-InfEx-Rsp                        ProtocolIE-ID ::= 13
id-RefPosition-Inf-Rprt                         ProtocolIE-ID ::= 14
id-RequestedDataValue                           ProtocolIE-ID ::= 15
id-RequestedDataValueInformation                ProtocolIE-ID ::= 16
id-TransactionID                                ProtocolIE-ID ::= 17
id-UE-PositionEstimate                          ProtocolIE-ID ::= 18
id-TypeOfError                                  ProtocolIE-ID ::= 21

END
```

9.3.7 Container Definitions

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

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

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

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

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

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

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

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

PCAP-PRIVATE-IES ::= CLASS {
    &id                 PrivateIE-ID,
    &criticality        Criticality,
    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    TYPE                &Value
    PRESENCE            &presence
}

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

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

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

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

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

```
    SEQUENCE (SIZE (lowerBound..upperBound)) OF
        ProtocolIE-Container {{IEsSetParam}}

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

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

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

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

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

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

END
```

9.4 Message Transfer Syntax

PCAP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in [9].

The following encoding rules apply in addition to what has been specified in X.691 [9]:

When a bitstring value is placed in a bit-field as specified in 15.6 to 15.11 in [9], the leading bit of the bitstring value shall be placed in the leading bit of the bit-field, and the trailing bit of the bitstring value shall be placed in the trailing bit of the bit-field.

NOTE - When using the "bstring" notation, the leading bit of the bitstring value is on the left, and the trailing bit of the bitstring value is on the right. The term ‘leading bit’ is to be interpreted as equal to the term ‘first bit’ defined in [7].

10 Handling of Unknown, Unforeseen and Erroneous Protocol Data

10.1 General

Protocol Error cases can be divided into three classes:

- Transfer Syntax Error.
- Abstract Syntax Error.
- Logical Error.

Protocol errors can occur in the following functions within a receiving node.

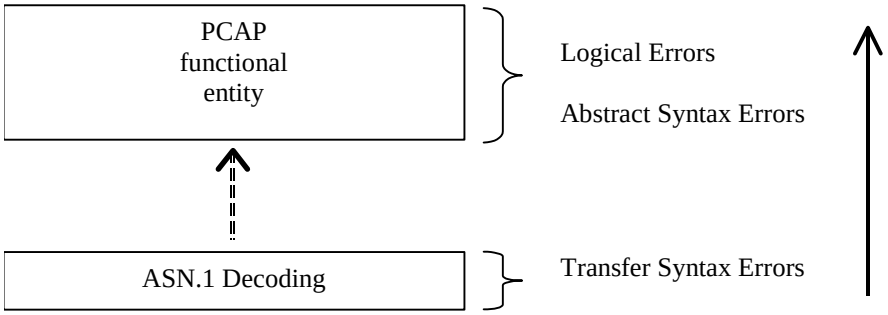

Figure 10: Protocol Errors in PCAP

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

10.2 Transfer Syntax Error

A Transfer Syntax Error occurs when the receiver is not able to decode the received physical message. Transfer syntax errors are always detected in the process of ASN.1 decoding. If a Transfer Syntax Error occurs, the receiver should initiate Error Indication procedure with appropriate cause value for the Transfer Syntax protocol error.

Examples for Transfer Syntax Errors are:

- Violation of value ranges in ASN.1 definition of messages. e.g.: If an IE has a defined value range of 0 to 10 (ASN.1: INTEGER (0..10)), and 12 will be received, then this will be treated as a transfer syntax error.
- Violation in list element constraints. e.g.: If a list is defined as containing 1 to 10 elements, and 12 elements will be received, than this case will be handled as a transfer syntax error.
- Missing mandatory elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).
- Wrong order of elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).

10.3 Abstract Syntax Error

10.3.1 General

An Abstract Syntax Error occurs when the receiving functional PCAP entity:

1) receives IEs or IE groups that cannot be understood (unknown IE id);
2) receives IEs for which the logical range is violated (e.g.: ASN.1 definition: 0 to 15, the logical range is 0 to 10 (values 11 to 15 are undefined), and 12 will be received; this case will be handled as an abstract syntax error using criticality information sent by the originator of the message);
3) does not receive IEs or IE groups but according to the specified presence of the concerning object, the IEs or IE groups should have been present in the received message;
4) receives IEs or IE groups that are defined to be part of that message in wrong order or with too many occurrences of the same IE or IE group;
5) receives IEs or IE groups but according to the conditional presence of the concerning object and the specified condition, the IEs or IE groups should not have been present in the received message.

Cases 1 and 2 (not comprehended IE/IE group) are handled based on received Criticality information. Case 3 (missing IE/IE group) is handled based on Criticality information and Presence information for the missing IE/IE group specified in the version of the specification used by the receiver. Case 4 (IEs or IE groups in wrong order or with too many occurrences) and Case 5 (erroneously present conditional IEs or IE groups) result in rejecting the procedure.

If an Abstract Syntax Error occurs, the receiver shall read the remaining message and shall then for each detected Abstract Syntax Error that belong to cases 1-3 act according to the Criticality Information and Presence Information for the IE/IE group due to which Abstract Syntax Error occurred in accordance with subclauses 10.3.4 and 10.3.5. The handling of cases 4 and 5 is specified in subclause 10.3.6.

10.3.2 Criticality Information

In the PCAP messages there is criticality information set for individual IEs and/or IE groups. This criticality information instructs the receiver how to act when receiving an IE or an IE group that is not comprehended, i.e. the entire item (IE or IE group) which is not (fully or partially) comprehended shall be treated in accordance with its own criticality information as specified in subclause 10.3.4.

In addition, the criticality information is used in case of the missing IE/IE group abstract syntax error (see subclause 10.3.5).

The receiving node shall take different actions depending on the value of the Criticality Information. The three possible values of the Criticality Information for an IE/IE group are:

- Reject IE.
- Ignore IE and Notify Sender.
- Ignore IE.

The following rules restrict when a receiving entity may consider an IE, an IE group, or an EP not comprehended (not implemented), and when action based on criticality information is applicable:

1. IE or IE group: When one new or modified IE or IE group is implemented for one EP from a standard version, then other new or modified IEs or IE groups specified for that EP in that standard version shall be considered comprehended by a receiving entity (some may still remain unsupported).

NOTE: This restriction is not applicable to a sending entity for constructing messages.

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

When the criticality information cannot even be decoded in a not comprehended IE or IE group, the Error Indication procedure shall be initiated with an appropriate cause value

10.3.3 Presence Information

For many IEs/IE groups which are optional according to the ASN.1 transfer syntax, PCAP specifies separately if the presence of these IEs/IE groups is optional or mandatory with respect to RNS application by means of the presence field of the concerning object of class PCAP-PROTOCOL-IES, PCAP -PROTOCOL-IES-PAIR, PCAP -PROTOCOL-EXTENSION or PCAP -PRIVATE-IES.

The presence field of the indicated classes supports three values:

1. Optional;
2. Conditional;
3. Mandatory.

If an IE/IE group is not included in a received message and the presence of the IE/IE group is mandatory or the presence is conditional and the condition is true according to the version of the specification used by the receiver, an abstract syntax error occurs due to a missing IE/IE group.

If an IE/IE group is included in a received message and the presence of the IE/IE group is conditional and the condition is false according to the version of the specification used by the receiver, an abstract syntax error occurs due to this erroneously present conditional IE/IE group.

10.3.4 Not comprehended IE/IE group

10.3.4.1 Procedure Code

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

Reject IE:

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

Ignore IE and Notify Sender:

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

Ignore IE:

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

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

10.3.4.1A Type of Message

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

10.3.4.2 IEs other than the Procedure Code and Type of Message

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

Reject IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the rejection of one or more IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall terminate the procedure and initiate the Error Indication procedure.

- If a *response* message is received containing one or more IEs/IE groups marked with "*Reject IE*", that the receiving node does not comprehend, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and report in the response message of the procedure that one or more IEs/IE groups have been ignored. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a message *initiating* a procedure that does not have a message to report the outcome of the procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and initiate the Error Indication procedure to report that one or more IEs/IE groups have been ignored.

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

Ignore IE:

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

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

When reporting not comprehended IEs/IE groups marked with "*Reject IE*" or "*Ignore IE and Notify Sender*" using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group. The *Repetition Number* IE shall be included in the *Information Element Criticality Diagnostics* IE if the reported IE/IE group was part of a "SEQUENCE OF" definition.

When reporting not comprehended IEs/IE groups marked with "*Reject IE*" or "*Ignore IE and Notify Sender*" using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, the *Transaction Id* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group. The *Repetition Number* IE shall be included in the *Information Element Criticality Diagnostics* IE if the reported IE/IE group was part of a "SEQUENCE OF" definition.

10.3.5 Missing IE or IE group

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

Reject IE:

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Reject IE*"; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the missing IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a received message *initiating* a procedure that does not have a message to report unsuccessful outcome is missing one or more IEs/IE groups with specified criticality "*Reject IE*", the receiving node shall initiate the Error Indication procedure.

- If a received *response* message is missing one or more IEs/IE groups with specified criticality "*Reject IE*, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and report in the response message of the procedure that one or more IEs/IE groups were missing. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a received message *initiating* a procedure that does not have a message to report the outcome of the procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.

- If a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.

Ignore IE:

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message.

- If a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs/IE groups are missing.

When reporting missing IEs/IE groups with specified criticality "*Reject IE*" or "*Ignore IE and Notify Sender*" using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

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

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

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

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

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

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

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 of the IEs/IE groups containing the erroneous values.

Class 1:

Protocol Causes:

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:

1. Semantic Error.

2. 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 procedure shall be terminated and 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, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.

Class 2:

Where the logical error occurs in a message of a class 2 procedure, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value.

10.5 Exceptions

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

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

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

Annex A (informative): Guidelines for Usage of the Criticality Diagnostics IE

A.1 EXAMPLE MESSAGE Layout

Assume the following message format:

Table A.1

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M				YES	Reject
Transaction ID	M				–	
A	M				YES	reject
B	M				YES	reject
>E		*1..<maxE>*			EACH	ignore
>>F		*1..<maxF>*			-	
>>>G		*0..3, …*			EACH	ignore
>>H		*1..<maxH>*			EACH	ignore
>>>G		*0..3, …*			EACH	ignore and notify
>>G	M				YES	reject
>>J		*1..<maxJ>*			-	
>>>G		*0..3, …*			EACH	reject
C	M				YES	reject
>K		*1..<maxK>*			EACH	ignore and notify
>>L		*1..<maxL>*			-	
>>>M	O				-	
D	M				YES	reject

NOTE: The IEs F, J, and L do not have assigned criticality. The IEs F, J, and L are consequently realised as the ASN.1 type SEQUENCE OF of "ordinary" ASN.1 type, e.g. INTEGER. On the other hand, the repeatable IEs with assigned criticality are realised as the ASN.1 type SEQUENCE OF of an IE object, e.g. ProtocolIE-Single-Container.

For the corresponding ASN.1 layout, see clause A.4.

A.2 Example on a Received EXAMPLE MESSAGE

Assume further more that a received message based on the above tabular format is according to figure A.1.

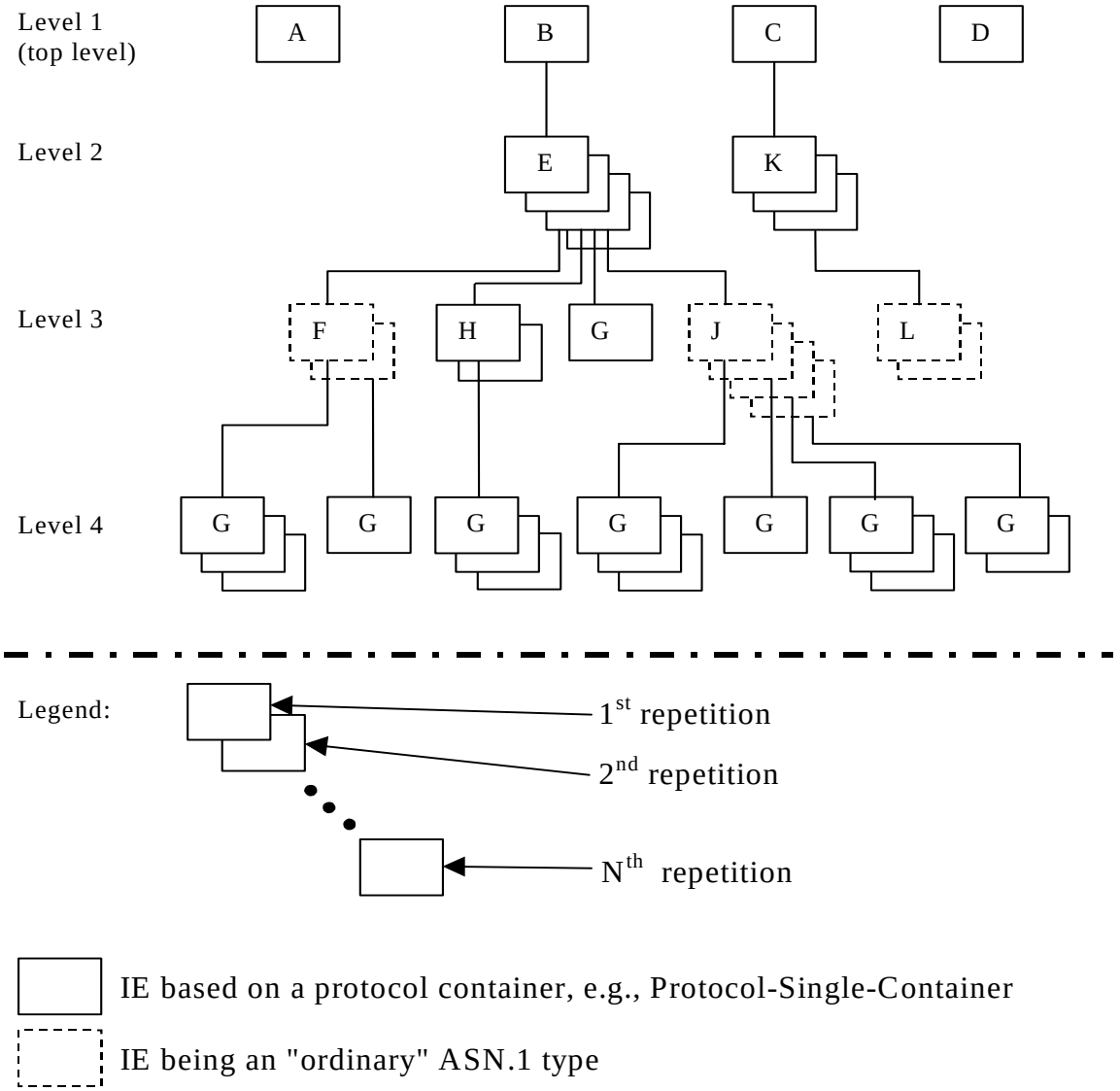

Figure A.1: Example of content of a received NBAP message based on the EXAMPLE MESSAGE

A.3 Content of Criticality Diagnostics

A.3.1 Example 1

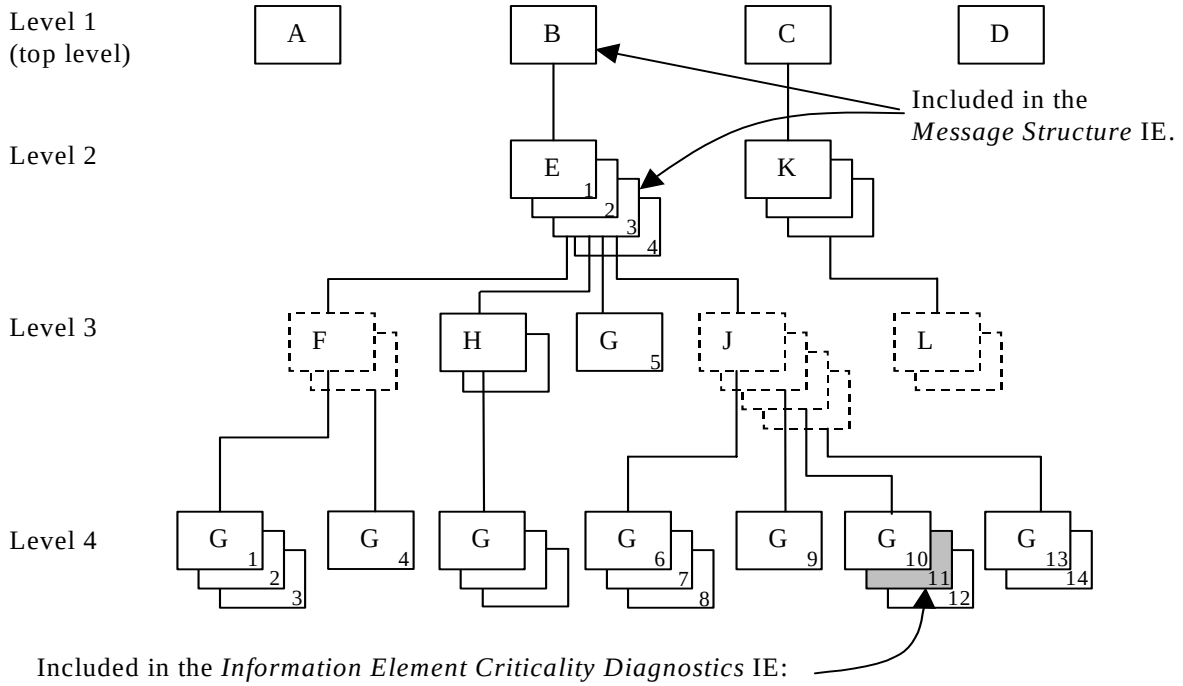

Figure A.2: Example of a received NBAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE J shown in the figure A.2, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IEas in table A.2.

Table A.2

IE name	Value	Comment
IE Criticality	Reject	Criticality for IE on the reported level, i.e. level 4.
IE ID	id-G	IE ID from the reported level, i.e. level 4.
Repetition Number	11	Repetition number on the reported level, i.e. level 4. (Since the IE E (level 2) is the lowest level included in the *Message Structure* IE this is the eleventh occurrence of IE G within the IE E (level 2).
Type of Error	not understood	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE 1: The IE J on level 3 cannot be included in the *Message Structure* IE since they have no criticality of their own.

NOTE 2: The repetition number of the reported IE indicates the number of repetitions of IE G received up to the detected erroneous repetition, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.3.2 Example 2

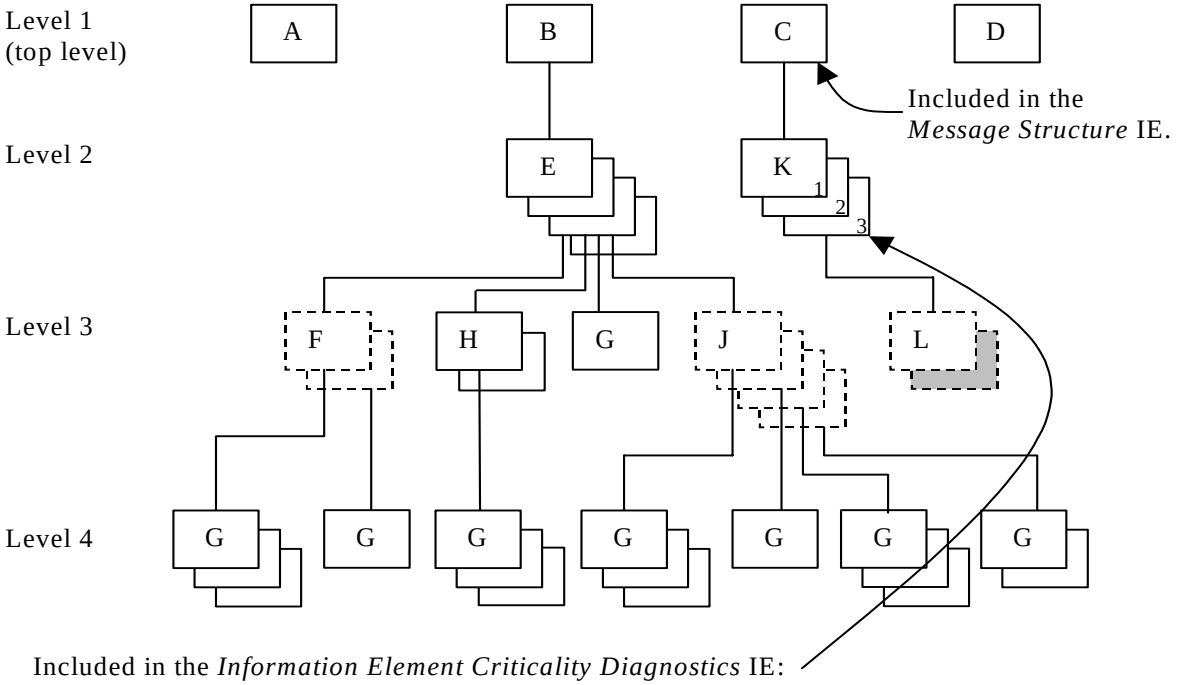

Figure A.3: Example of a received NBAP message containing a not comprehended IE

If there is an error within the second instance (marked as grey) in the sequence (IE L in the tabular format) on level 3 below IE K in the structure shown in the figure A.3, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IEas in table A.3.

Table A.3

IE name	Value	Comment
IE Criticality	ignore and notify	Criticality for IE on the reported level, i.e. level 2.
IE ID	id-K	IE ID from the reported level, i.e. level 2.
Repetition Number	3	Repetition number on the reported level, i.e. level 2.
Type of Error	not understood	
Message Structure, *first repetition*		
>IE ID	id-C	IE ID from the lowest level above the reported level, i.e. level 1.

NOTE: The IE L on level 3 cannot be reported individually included in the *Message Structure* IE since it has no criticality of its own.

A.3.3 Example 3

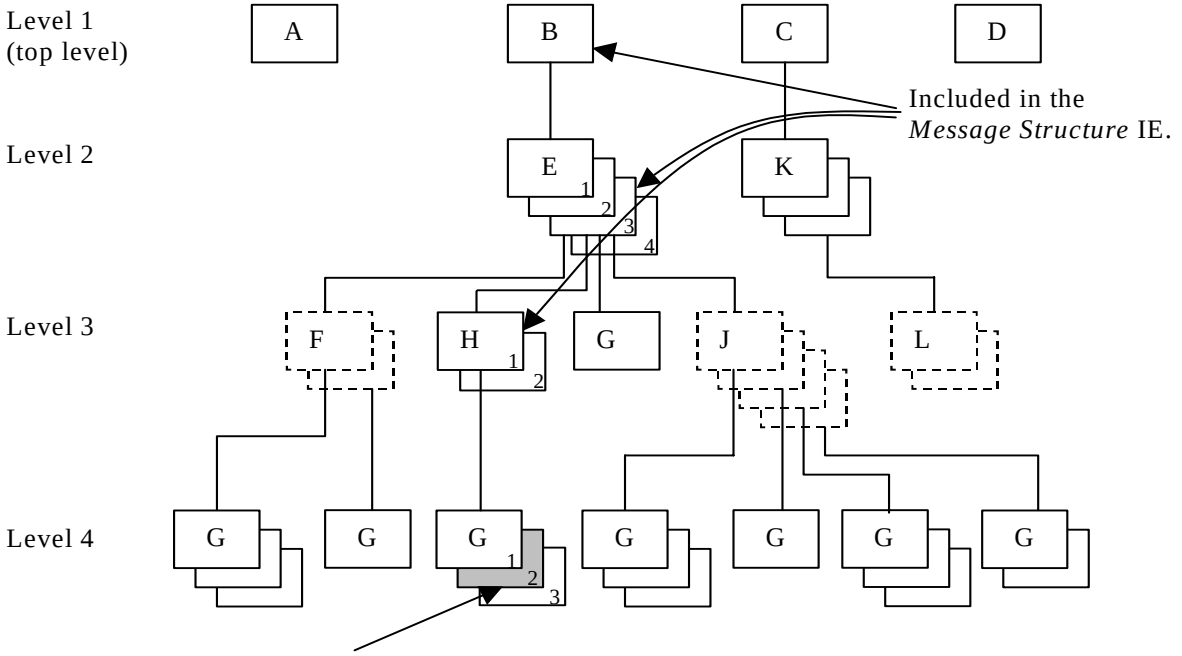

Figure A.4: Example of a received NBAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE H shown in the figure A.4, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IEas in table A.4.

Table A.4

IE name	Value	Comment
IE Criticality	Reject	Criticality for IE on the reported level, i.e. level 4.
IE ID	id-G	IE ID from the reported level, i.e. level 4.
Repetition Number	2	Repetition number on the reported level, i.e. level 4.
Type of Error	not understood	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from level 2.
>Repetition Number	3	Repetition number from level 2.
Message Structure, *third repetition*		
>IE ID	id-H	IE ID from the lowest level above the reported level, i.e. level 3.
>Repetition Number	1	Repetition number from the lowest level above the reported level, i.e. level 3.

NOTE: The repetition number of level 4 indicates the number of repetitions of IE G received up to the detected erroneous repetition, counted below the same instance of the previous level with assigned criticality (instance 1 of IE H on level 3).

A.3.4 Example 4

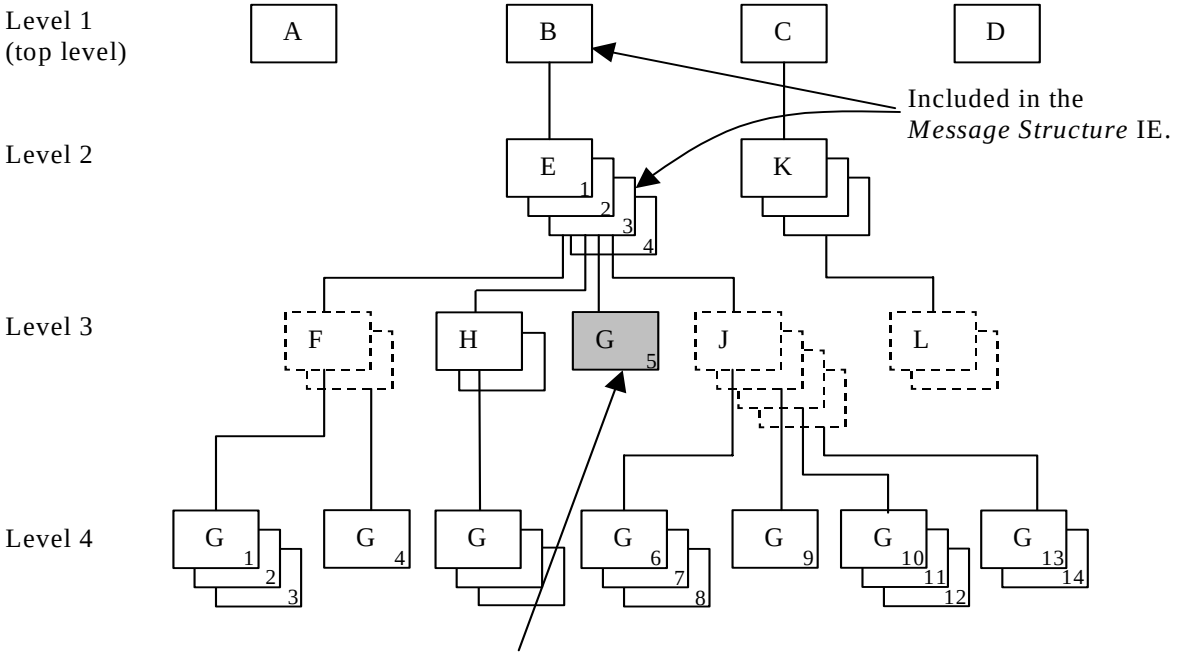

Figure A.5: Example of a received NBAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE E shown in the figure A.5, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IE, as in table A.5.

Table A.5

IE name	Value	Comment
IE Criticality	Reject	Criticality for IE on the reported level, i.e. level 3.
IE ID	id-G	IE ID from the reported level, i.e. level 3.
Repetition Number	5	Repetition number on the reported level, i.e. level 3. (Since the IE E (level 2) is the lowest level included in the *Message Structure* IE this is the fifth occurrence of IE G within the IE E (level 2).
Type of Error	not understood	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE: The repetition number of the reported IE indicates the number of repetitions of IE G received up to the detected erroneous repetition, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.3.5 Example 5

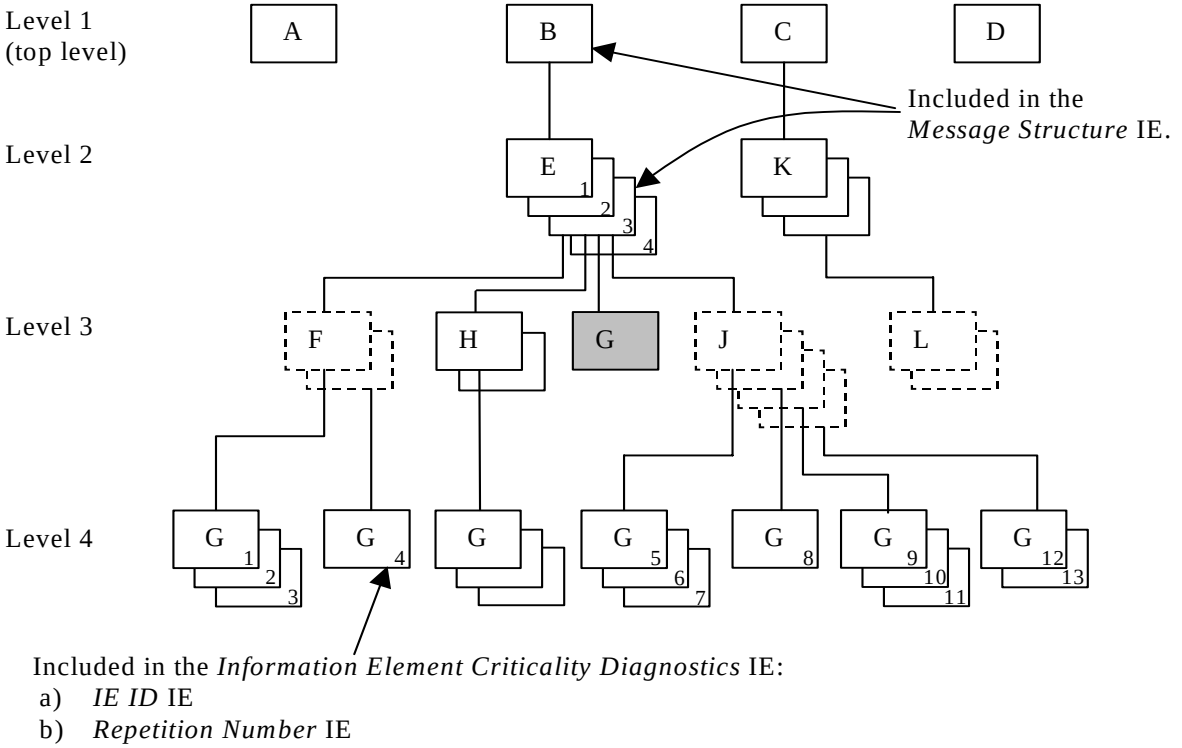

Figure A.6: Example of a received NBAP message with a missing IE

If the instance marked as grey in the IE G in the IE E shown in the figure A.6, is missing this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IE, as in table A.6.

Table A.6

IE name	Value	Comment
IE Criticality	reject	Criticality for IE on the reported level, i.e. level 3.
IE ID	id-G	IE ID from the reported level, i.e. level 3.
Repetition Number	4	Repetition number up to the missing IE on the reported level, i.e. level 3. (Since the IE E (level 2) is the lowest level included in the *Message Structure* IE there have been four occurrences of IE G within the IE E (level 2) up to the missing occurrence.
Type of Error	missing	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE: The repetition number of the reported IE indicates the number of repetitions of IE G received up to but not including the missing occurrence, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.4 ASN.1 of EXAMPLE MESSAGE

```
ExampleMessage ::= SEQUENCE {
    ProtocolIEs         ProtocolIE-Container        {{ExampleMessage-IEs}},
    ProtocolExtensions  ProtocolExtensionContainer  {{ExampleMessage-Extensions}}   OPTIONAL,
    ...
}

ExampleMessage-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-A   CRITICALITY reject  TYPE A  PRESENCE mandatory} |
    { ID id-B   CRITICALITY reject  TYPE B  PRESENCE mandatory} |
    { ID id-C   CRITICALITY reject  TYPE C  PRESENCE mandatory} |
    { ID id-D   CRITICALITY reject  TYPE D  PRESENCE mandatory} ,
    ...
}

B ::= SEQUENCE {
    e               E-List,
    iE-Extensions   ProtocolExtensionContainer { {B-ExtIEs} }   OPTIONAL,
    ...
}

B-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

E-List ::= SEQUENCE (SIZE (1..maxE)) OF ProtocolIE-Single-Container { {E-IEs} }

E-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-E   CRITICALITY ignore  TYPE E  PRESENCE mandatory  }
}

E ::= SEQUENCE {
    f               F-List,
    h               H-List,
    g               G-List1,
    j               J-List,
    iE-Extensions   ProtocolExtensionContainer { {E-ExtIEs} }   OPTIONAL,
    ...
}

E-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

F-List ::= SEQUENCE (SIZE (1..maxF)) OF F

F ::= SEQUENCE {
    g               G-List2 OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { {F-ExtIEs} }   OPTIONAL,
    ...
}

F-ExtIEs    NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

G-List2 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G2-IEs} }

G2-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-G   CRITICALITY ignore  TYPE G  PRESENCE mandatory  }
}

H-List ::= SEQUENCE (SIZE (1..maxH)) OF ProtocolIE-Single-Container { {H-IEs} }

H-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-H   CRITICALITY ignore  TYPE H  PRESENCE mandatory  }
}

H ::= SEQUENCE {
    g               G-List3 OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {H-ExtIEs} } OPTIONAL,
    ...
}

H-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
```

```
}

G-List3 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G3-IEs} }

G3-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-G   CRITICALITY notify  TYPE G  PRESENCE mandatory  }
}

G-List1 ::= ProtocolIE-Single-Container { {G1-IEs} }

G1-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-G   CRITICALITY reject  TYPE G  PRESENCE mandatory  }
}

J-List ::= SEQUENCE (SIZE (1..maxJ)) OF J

J ::= SEQUENCE {
    g               G-List4 OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { {J-ExtIEs} }   OPTIONAL,
    ...
}

J-ExtIEs    NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

G-List4 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G4-IEs} }

G4-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-G   CRITICALITY reject  TYPE G  PRESENCE mandatory  }
}

C ::= SEQUENCE {
    k               K-List,
    iE-Extensions   ProtocolExtensionContainer { {C-ExtIEs} }   OPTIONAL,
    ...
}

C-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

K-List ::= SEQUENCE (SIZE (1..maxK)) OF ProtocolIE-Single-Container { {K-IEs} }

K-IEs NBAP-PROTOCOL-IES ::= {
    { ID id-K   CRITICALITY notify  TYPE K  PRESENCE mandatory  }
}

K ::= SEQUENCE {
    l               L-List,
    iE-Extensions   ProtocolExtensionContainer { {K-ExtIEs} }   OPTIONAL,
    ...
}

K-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

L-List ::= SEQUENCE (SIZE (1..maxL)) OF L

L ::= SEQUENCE {
    m               M   OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { {L-ExtIEs} }   OPTIONAL,
    ...
}

L-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

ExampleMessage-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
06/2001	12	RP-010402			Approved at TSG RAN #12 and placed under Change Control	-	5.0.0
09/2001	13	RP-010603	002	1	Correction to the Error handling of the ERROR INDICATION message	5.0.0	5.1.0
09/2001	13	RP-010603	003		Proposed CR to 25.453 on Semantics Description of C/No	5.0.0	5.1.0
09/2001	13	RP-010603	004		Proposed CR to 25.453 on Clause 10	5.0.0	5.1.0
09/2001	13	RP-010603	005	1	Error handling of the Erroneously Present Conditional Ies	5.0.0	5.1.0
09/2001	13	RP-010603	006	1	Clarification of chapter 10	5.0.0	5.1.0
09/2001	13	RP-010603	007		PCAP Criticality	5.0.0	5.1.0
12/2001	14	RP-010875	008	1	Bitstrings ordering	5.1.0	5.2.0
12/2001	14	RP-010875	009	1	Reference corrections	5.1.0	5.2.0
12/2001	14	RP-010875	010	1	Clarification for the definition of the ASN.1 constants	5.1.0	5.2.0
12/2001	14	RP-010875	012	1	Procedure Code Criticality in Error Indication	5.1.0	5.2.0
12/2001	14	RP-010875	013	2	Addition of amendment to clarify the PER encoding of bitstrings	5.1.0	5.2.0
12/2001	14	RP-010875	014	1	Clarification of the Transaction ID	5.1.0	5.2.0
12/2001	14	RP-010875	015		Correction the Clause 10 Error Handling	5.1.0	5.2.0
-3/2002	15	RP-020211	016		Modification on the Object Identifier	5.2.0	5.3.0

History

Document history		
V5.3.0	March 2002	Publication