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Universal Mobile Telecommunications System (UMTS); UTRAN Iu-PS interface Positioning Calculation Application Part (PCAP) signalling (3GPP TS 25.453 version 7.7.0 Release 7)



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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

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

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

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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 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.
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- [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 (07/2002): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [8] ITU-T Recommendation X.681 07/2002): "Information technology - Abstract Syntax Notation One (ASN.1): Information object specification".
- [9] ITU-T Recommendation X.691 (07/2002): "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".
- [13] 3GPP TS 25.133: "Requirements for support of Radio Resource management (FDD)".
- [14] 3GPP TS 25.123: "Requirements for support of Radio Resource management (TDD)".
- [15] 3GPP TS 22.071: "Location Services (LCS); Service Description; Stage1".
- [16] 3GPP TS 25.212: "Multiplexing and Channel Coding (FDD)".
- [17] 3GPP TS 25.213: "Spreading and Modulation (FDD)".
- [18] 3GPP TS 25.223: "Spreading and Modulation (TDD)".
- [19] 3GPP TS 25.221: "Physical channels and mapping of transport channels onto physical channels (TDD)".
- [20] 3GPP TS 25.101: "User Equipment (UE) radio transmission and reception (FDD)".

- [21] 3GPP TS 25.102: "UE radio transmission and reception (TDD)".
- [22] Galileo OS Signal in Space ICD (OS SIS ICD), Draft 0, Galileo Joint Undertaking, May 23rd, 2006.

3 Definitions and abbreviations

3.1 Definitions

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

Stand-Alone SMLC (SAS): logical node that interconnects to the RNC over the Iupc interface via the PCAP protocol. An SAS performs the following procedures:

- provide GNSS (i.e. GPS or GANSS (e.g. Galileo)) related data to the RNC;
- performs the position calculation function based upon UE Positioning measurement data.
- in SAS centric mode, selects the positioning method and controls the positioning procedure.

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 after 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.

Positioning Initiation Context: In the SAS centric mode of operation each positioning request is assigned a unique logical connection identity, i.e., SCCP Source and Destination Local Reference numbers.

RNC Centric Mode of Operation: The RNC determines, initiates and controls the positioning method to be used for each positioning request.

SAS Centric Mode of Operation: The SAS determines, initiates and controls the positioning method to be used for each positioning request.

Positioning Event: The activity associated with the positioning of a UE resulting from the reception of UE positioning request from the CN.

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
FDD	Frequency Division Duplex
GANSS	Galileo and Additional Navigation Satellite Systems
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
MSC	Mobile services Switching Center
OTDOA	Observed Time Difference Of Arrival
PCAP	Positioning Calculation Application Part
PRC	Pseudorange Correction
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RRC	Radio Resource Control
SAS	Stand-Alone SMLC
SCCP	Signalling Connection Control Part
SIB	System Information Block
SMLC	Serving Mobile Location Center
SRNC	Serving RNC
SRNS	Serving RNS
TDD	Time Division Duplex
TOW	Time of Week
UE	User Equipment
U-TDOA	Uplink Time Difference Of Arrival
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:

- [FDD] This tagging of a word indicates that the word preceding the tag "[FDD]" applies only to FDD. This tagging of a heading indicates that the heading preceding the tag "[FDD]" and the section following the heading applies only to FDD.
- [TDD] This tagging of a word indicates that the word preceding the tag "[TDD]" applies only to TDD, including 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[TDD]" and the section following the heading applies only to TDD, including 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD.
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- 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 UE Positioning 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 or GANSS 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.
3. SAS Centric Position Service: They are related to the capability of the SAS to determine the positioning method used for individual positioning events. In this case the SRNC may allow A-GPS, A-GANSS, OTDOA, Cell ID and U-TDOA positioning events for a single UE to be originated by the SAS via PCAP messages. 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 or GANSS 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.
- SAS Centric Position. This function enables the SRNC to interact with an SAS in the process of performing a position estimate of a UE.

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 b) Position Parameter Modification c) Abort
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
SAS Centric Position	a) Position Initiation b) Position Activation c) Position Parameter Modification d) Abort e) Position Periodic Report f) Position Periodic Result g) Position Periodic Termination

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	IIINFORMATION EXCHANGE INITIATION REQUEST	INFORMATION EXCHANGE INITIATION RESPONSE	INFORMATION EXCHANGE INITIATION FAILURE
Position Initiation	POSITION INITIATION REQUEST	POSITION INITIATION RESPONSE	POSITION INITIATION FAILURE
Position Activation	POSITION ACTIVATION REQUEST	POSITION ACTIVATION RESPONSE	POSITION ACTIVATION 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
Position Parameter Modification	POSITION PARAMETER MODIFICATION
Abort	ABORT
Position Periodic Report	POSITION PERIODIC REPORT
Position Periodic Result	POSITION PERIODIC RESULT
Position Periodic Termination	POSITION PERIODIC TERMINATION

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

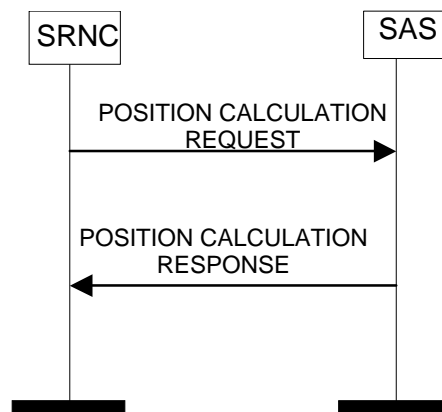


Figure 1: Position Calculation procedure, Successful Operation

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 and, if supported and requested, velocity based on the provided measurement data. This procedure may be repeated by the SRNC as needed for periodic location. If the POSITION CALCULATION REQUEST message is part of periodic location, this message may include the *Periodic Position Calculation Info* IE to enable the SAS to better fulfill future such requests.

If the *Initial UE Position Estimate* IE is included in the POSITION CALCULATION REQUEST message, the SAS shall use this value for the calculation of the UE Position Estimate in case of A-GPS positioning methods are used. The SAS may use this value for the calculation of the UE Position when any other methods are used.

If the *Cell-ID Measured Results Sets* IE is included in the POSITION CALCULATION REQUEST message and both of the *Round Trip Time Info* IE and the *Round Trip Time Info With Type 1* IE are included in the *Cell-ID Measured Results Info List* IE, the SAS shall use the *Round Trip Time Info* IE.

If the *Horizontal Accuracy Code* IE and possibly the *Vertical Accuracy Code* IE are included in the POSITION CALCULATION REQUEST message, the SAS shall use these values in order to assess whether the resulting position estimation fulfills the requested accuracy.

If the *SAS Response Time* IE is included in the POSITION CALCULATION REQUEST message, the SAS shall send a POSITION CALCULATION RESPONSE message within the indicated time after reception of the POSITION CALCULATION REQUEST message.

If the *Include Velocity* IE is set to "requested" in the POSITION CALCULATION REQUEST message, the SAS shall include the *Velocity Estimate* IE, if available, in the POSITION CALCULATION RESPONSE message.

If a *GANSS Measured Results* IE is included in the POSITION CALCULATION REQUEST message and does not contain the *GANSS Time ID* IE, the SAS shall assume that the corresponding GANSS timing refers to the "Galileo" timing.

The *GANSS Measured Results* IE contains one or several *GANSS Generic Measurement Information* IEs, each of them associated with a given GANSS:

- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS ID* IE, the SAS shall assume that the associated GANSS is "Galileo".
- If a *GANSS Generic Measurement Information* IE associated with "Galileo" does not contain the *GANSS Signal ID* IE, the SAS shall assume the value "Galileo L1 OS" (see [22]).

Response Message:

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

Whenever one of the geographic area shapes *Ellipsoid point with uncertainty Ellipse* IE, *Ellipsoid point with altitude and uncertainty Ellipsoid* IE or *Ellipsoid Arc* IE is reported, the *Confidence* IE shall indicate the probability that the UE is located within the uncertainty region of the shape. The value of the *Confidence* IE shall be in the interval of "1" to "100".

If at least the *Horizontal Accuracy Code* IE was included in the POSITION CALCULATION REQUEST message and the calculated position estimate fulfils the requested accuracy, the *Accuracy Fulfilment Indicator* IE with the value "requested accuracy fulfilled" shall be included in the POSITION CALCULATION RESPONSE message. If the calculated position estimate does not fulfil the requested accuracy, the *Accuracy Fulfilment Indicator* IE with the value "requested accuracy not fulfilled" shall be included in the POSITION CALCULATION RESPONSE message.

8.2.3 Unsuccessful Operation

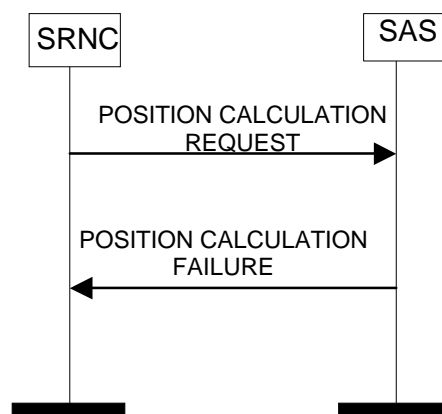


Figure 2: Position Calculation procedure, Unsuccessful Operation

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 information;
- Position calculation error: invalid GPS or Galileo measured results;
- Initial UE Position Estimate missing;

- Processing Overload;
- Hardware Failure;
- O&M Intervention.;
- Invalid U-TDOA measured results;
- U-TDOA positioning method not supported;
- U-TDOA positioning method not supported in specified UTRAN cell;
- SAS unable to perform U-TDOA positioning within Response Time.

8.2.4 Abnormal Conditions

If the *Vertical Accuracy Code* IE is included and the *Horizontal Accuracy Code* IE is not included in the POSITION CALCULATION REQUEST message, the SAS shall reject the procedure.

If the RRC State is indicated as being *CELL_DCH* in the POSITION CALCULATION REQUEST message and [FDD - neither the *DCH Information* IE nor the *E-DPCH Information* IE][TDD – no *DCH Information* IE] is included, the SAS shall reject the procedure using the POSITION CALCULATION FAILURE message.

If the *GPS Measured Results* IE is included in the POSITION CALCULATION REQUEST message but the *Initial UE Position Estimate* IE is not, the SAS shall return the POSITION CALCULATION FAILURE message to the SRNC.

If neither of the *GPS Measurement Results* IE, the *Cell-ID Measured Results Sets* IE nor the *OTDOA Measurement Group* IE is included in the POSITION CALCULATION REQUEST message, the SAS shall return the POSITION CALCULATION FAILURE message to the SRNC.

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

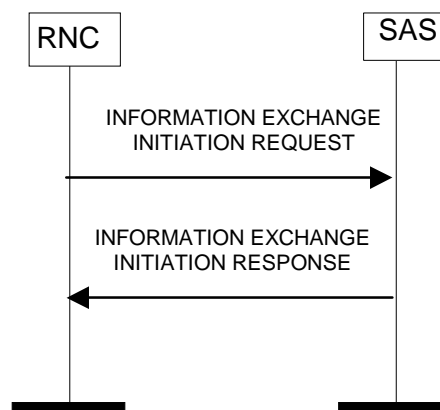


Figure 3: Information Exchange Initiation procedure, Successful Operation

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.

If the *Information Exchange Object Type* IE is set to "Cell-ID Measured Results Sets" the SAS shall use the "Cell-ID Measured Results Info List" for obtaining an initial UE position estimate.

If the *GANSS-UTRAN Time Relationship Uncertainty* IE included in the INFORMATION EXCHANGE INITIATION REQUEST message does not contain the *GANSS ID* IE, the SAS shall assume that the *GANSS-UTRAN Time Relationship Uncertainty* IE is associated with "Galileo".

If the *Information Type* IE is set to "Explicit" and an *Explicit Information Item* IE is set to "GANSS Common Data", at least one of the GANSS Reference Time, GANSS Ionosphere Model or GANSS Reference Location types shall be requested.

If the *Information Type* IE is set to "Explicit" and an *Explicit Information Item* IE is set to "GANSS Generic Data", at least one of the *GANSS Real Time Integrity*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model* or *GANSS Navigation Mode* IEs shall be present in each *GANSS Generic Data Item* IE associated with a given GANSS.

- If the *GANSS Generic Data Item* IE does not contain the *GANSS ID* IE, the SAS shall assume that the corresponding GANSS is "Galileo".

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 report the requested information immediately and then 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 if available. If the requested information is not available at the moment of receiving the INFORMATION EXCHANGE INITIATION REQUEST message, but expected to become available after some acquisition time, the SAS shall initiate the Information Reporting procedure when the requested information becomes available. The SAS shall then 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 in the t_{oa} or WN_a parameter 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 in the t_{ot} or WN_t parameter 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.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "GANSS Almanac and Satellite Health", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{oa} or WN_a parameter has occurred in almanac/health information for at least one visible satellite.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "GANSS UTC Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{ot} or WN_t parameter has occurred in the GANSS UTC model.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to 'Explicit' and the *Explicit Information Item* IE includes "GANSS Ionospheric Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the GANSS ionospheric model.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "GANSS Navigation Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the ephemeris 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 "GANSS Time Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the time information.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "DGANSS 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 DGANSS corrections information for at least one visible satellite or in the list of visible satellites.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "GANSS 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 "GANSS Reference Measurement Information", 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 *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "GANSS 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 *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If any of the above *Information Type* IEs becomes temporarily unavailable, the SAS shall initiate the Information Reporting procedure for this specific Information Item by indicating "Information Not Available" in the *Requested Data Value Information* IE. If the Information becomes available again, the SAS shall initiate the Information Reporting procedure for this specific Information.

Response message:

If the SAS is 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 INITIATION REQUEST message. When the *Report Characteristics* IE is set to "On Modification" or "Periodic", the INFORMATION EXCHANGE INITIATION RESPONSE message shall contain the *Requested Data Value* IE if the data are available. When the *Report Characteristics* IE is set to "On Demand", the INFORMATION EXCHANGE INITIATION RESPONSE message shall contain the *Requested Data Value* IE.

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.

If the *Requested Data Value* IE contains the *GANSS Common Assistance Data* IE, at least one of the *GANSS Reference Time*, *GANSS Ionosphere Model* or *GANSS Reference Location* IEs shall be present.

- If the *GANSS Reference Location* IE does not contain the *GANSS Time ID* IE, the corresponding GANSS timing refers to the "Galileo" timing.

Any *GANSS Generic Assistance Data* IE associated with a given GANSS included in the *Requested Data Value* IE shall contain at least one of the *GANSS Real Time Integrity*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model* or *GANSS Navigation Model* IEs.

- If the *GANSS Generic Data Item* IE does not contain the *GANSS ID* IE, the corresponding GANSS is "Galileo".
- The *DGANSS Corrections* IE contains one or several *DGANSS Information* IE(s), each of them associated with a GANSS Signal. A *DGANSS Information* IE for "Galileo" that does not contain the *GANSS Signal ID* IE is by default associated with "Galileo L1 OS" (see [22]).
- The *GANSS Real Time Integrity* IE contains one or several *Satellite Information* IEs, each of them associated with a satellite and a GANSS Signal. A *Satellite Information* IE for "Galileo" that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see [22]).
- The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for "Galileo" that does not contain the *GANSS Signal ID* IE is by default associated with "Galileo L1 OS" (see [22]).

8.3.3 Unsuccessful Operation

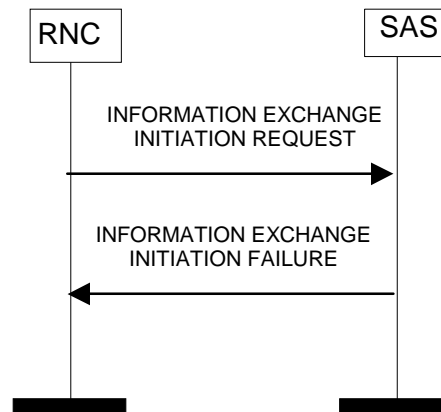


Figure 4: Information Exchange Initiation procedure, Unsuccessful Operation

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

If the *Information Exchange Object Type* IE is set to "Reference Position" and the *Information Type* IE set to "Explicit" and the *Explicit Information Item* IE is set to "Reference Location" the SAS shall reject the Information Exchange Initiation procedure and shall send the INFORMATION EXCHANGE INITIATION FAILURE message.

The allowed combinations of the Information Type and Information Report Characteristics are shown in the table below marked with "X". For not allowed combinations, the SAS shall reject the Information Exchange Initiation procedure using the INFORMATION EXCHANGE INITIATION FAILURE message.

Table 3a: Allowed Information Type and Information Report Characteristics combinations

Type	Information Report Characteristics Type		
	On Demand	Periodic	On Modification
Almanac and Satellite Health	X	X	X
UTC Model	X	X	X
Ionospheric Model	X	X	X
Navigation Model	X	X	X
DGPS Corrections	X	X	X
Reference Time	X	X	X
Acquisition Assistance	X	X	X
Real Time Integrity	X	X	X
Almanac and Satellite Health SIB	X	X	X
Reference Location	X		
GANSS Reference Time	X	X	X
GANSS Ionospheric Model	X	X	X
GANSS Reference Location	X		
GANSS Real Time Integrity	X	X	X
DGANSS Corrections	X	X	X
GANSS Almanac and Satellite Health	X	X	X
GANSS Reference Measurement Information	X	X	X
GANSS UTC Model	X	X	X
GANSS Time Model	X	X	X
GANSS Navigation Model	X	X	X

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

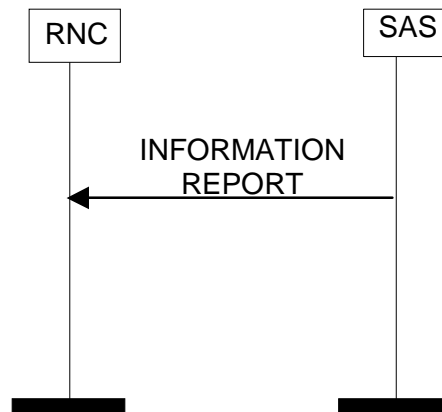


Figure 5: Information Reporting procedure, Successful Operation

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.

If the *Requested Data Value* IE contains the *GANSS Common Assistance Data* IE, at least one of the *GANSS Reference Time*, *GANSS Ionosphere Model* or *GANSS Reference Location* IEs shall be present.

Any *GANSS Generic Assistance Data* IE associated with a given GANSS included in the *Requested Data Value* IE shall contain at least one of the *GANSS Real Time Integrity*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model* or *GANSS Navigation Model* IEs.

- If the *GANSS Generic Data Item* IE does not contain the *GANSS ID* IE, the corresponding GANSS is “Galileo”.
- The *DGANSS Corrections* IE contains one or several *DGANSS Information* IE(s), each of them associated with a GANSS Signal. A *DGANSS Information* IE for “Galileo” that does not contain the *GANSS Signal ID* IE is by default associated with “Galileo L1 OS” (see [22]).
- The *GANSS Real Time Integrity* IE contains one or several *Satellite Information* IEs, each of them associated with a satellite and a GANSS Signal. A *Satellite Information* IE for “Galileo” that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see [22]).
- The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for “Galileo” that does not contain the *GANSS Signal ID* IE is by default associated with “Galileo L1 OS” (see [22]).

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

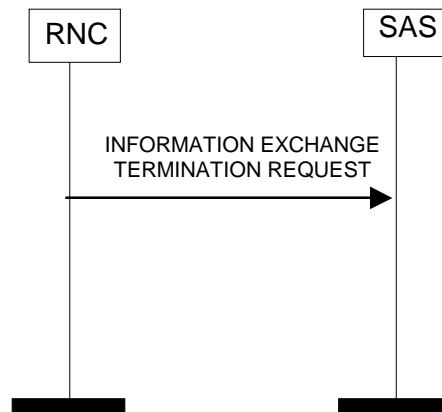


Figure 6: Information Exchange Termination procedure, Successful Operation

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

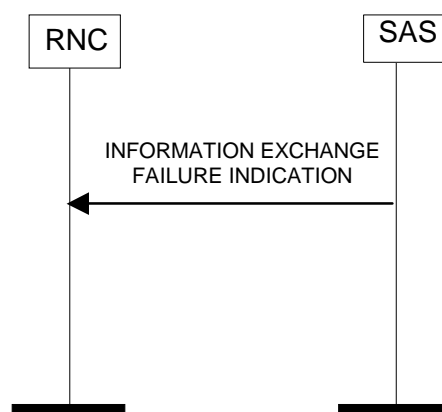


Figure 7: Information Exchange Failure procedure, Successful Operation

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:

- 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

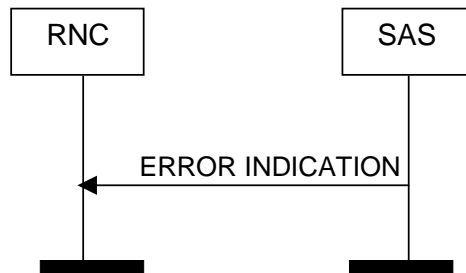


Figure 8: Error Indication procedure, SAS Originated, Successful Operation

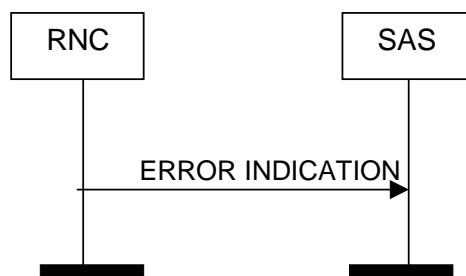


Figure 9: Error Indication procedure, RNC Originated, Successful Operation

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 are as follows:

- 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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8.8 Position Initiation

8.8.1 General

This procedure is used by an SRNC to request from an SAS the position (non-periodic or periodic) of a UE using the SAS centric mode of operation.

The connection-oriented service of the signalling bearer shall be established in conjunction with this procedure.

8.8.2 Successful Operation

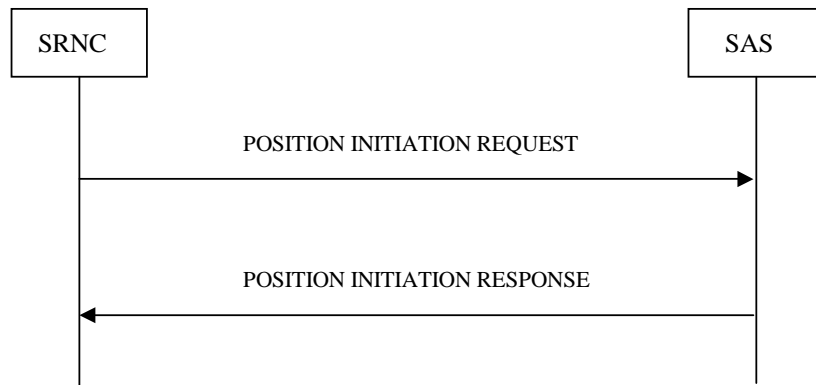


Figure 9a: Position Initiation procedure, Successful Operation

This procedure is initiated with a POSITION INITIATION REQUEST message sent from the SRNC to the SAS and ends with a POSITION INITIATION RESPONSE message from the SAS to the SRNC.

The POSITION INITIATION REQUEST message may contain one or several *Network Assisted GANSS Support IE(s)*, each of them indicating the UE position capability with regard to GANSS.

- If a *Network Assisted GANSS Support IE* does not contain the *GANSS ID IE*, the SAS shall assume that the corresponding GANSS is "Galileo".
- If a *Network Assisted GANSS Support IE* corresponding to "Galileo" does not contain the *GANSS Signal ID IE*, the SAS shall assume that the corresponding GANSS Signal is "Galileo L1 OS" (see [22]).

Response Message:

If the POSITION INITIATION REQUEST message contains a request for direct reporting, and following completion of one or more positioning attempts, possibly using multiple positioning methods, the SAS shall pass the UE position to the SRNC in a POSITION INITIATION RESPONSE message.

If the POSITION INITIATION REQUEST message contains a request for periodic reporting, the SAS shall pass the final UE position to the SRNC in a POSITION INITIATION RESPONSE message.

Whenever one of the geographic area shapes *Ellipsoid point with uncertainty Ellipse IE*, *Ellipsoid point with altitude and uncertainty Ellipsoid IE* or *Ellipsoid Arc IE* is reported, the *Confidence IE* shall indicate the probability that the UE is located within the uncertainty region of the shape. The value of the *Confidence IE* shall be in the interval of "1" to "100".

If at least the *Horizontal Accuracy Code IE* was included in the POSITION INITIATION REQUEST message and the calculated position estimate fulfils the requested accuracy, the *Accuracy Fulfilment Indicator IE* with the value "requested accuracy fulfilled" shall be included in the POSITION INITIATION RESPONSE message. If the calculated position estimate does not fulfil the requested accuracy, the *Accuracy Fulfilment Indicator IE* with the value "requested accuracy not fulfilled" shall be included in the POSITION INITIATION RESPONSE message.

8.8.3 Unsuccessful Operation

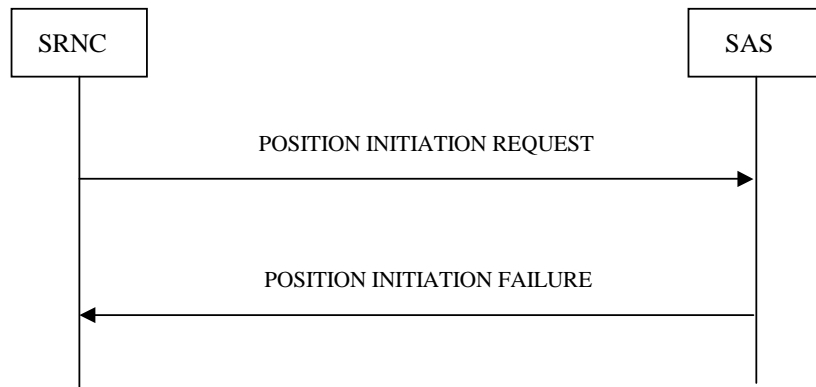


Figure 9b: Position Initiation procedure, Unsuccessful Operation

When the SAS is unable to accept a POSITION INITIATION REQUEST message or the SAS cannot provide a position estimate in case of direct reporting, the POSITION INITIATION FAILURE message shall be sent to the SRNC.

Typical cause values are:

- Processing Overload;
- Hardware Failure;
- O&M Intervention;
- Information temporarily not available

8.8.4 Abnormal Conditions

If the *Vertical Accuracy Code* IE is included and the *Horizontal Accuracy Code* IE is not included in the POSITION INITIATION REQUEST message, the SAS shall reject the procedure.

8.9 Position Activation

8.9.1 General

The purpose of the Position Activation procedure is to enable the SAS to initiate a particular positioning method used for an individual positioning event. This procedure uses connection-oriented signalling.

8.9.2 Successful Operation

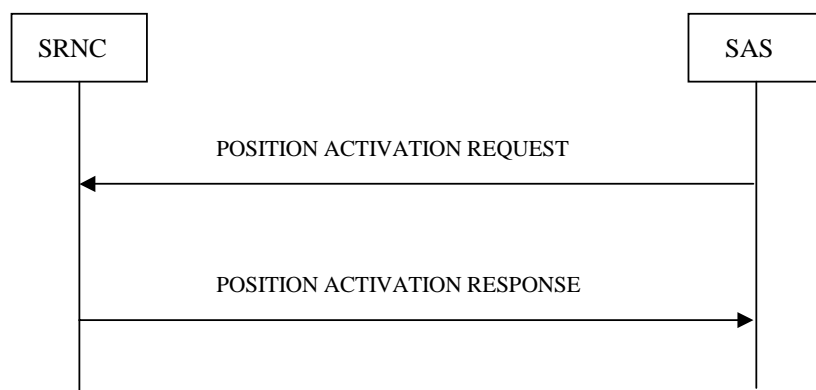


Figure 9c: Position Activation procedure, Successful Operation

The SAS initiates this procedure by sending a POSITION ACTIVATION REQUEST message to the SRNC containing the required positioning method and any assistance data and instructions associated with that positioning method. The SRNC then sends a POSITION ACTIVATION RESPONSE message to the SAS confirming the requested action and providing any information required by the requested positioning method; e.g. UE channel information for the U-TDOA positioning method or A-GPS measurements for UE assisted A-GPS. In the POSITION ACTIVATION RESPONSE message, the SRNC should include either the *UE Position Estimate Info IE*, *GPS Measurement Results IE*, *GANSS Measurement Results IE*, *Cell-ID Measured Results Sets IE*, *OTDOA Measured Results Sets IE* or *UTDOA Group IE*.

If the POSITION ACTIVATION REQUEST message contains periodic reporting information to start a periodic RNC positioning procedure (i.e., *Amount of Reporting IE* is included), the POSITION ACTIVATION RESPONSE message may be returned confirming the requested action and not including any measurements. In that case, all periodic measurement reports are conveyed using POSITION PERIODIC REPORT messages.

If the *GPS Positioning Instructions IE* or the *GANSS Positioning Instructions IE* is included in a POSITION ACTIVATION REQUEST message containing the *Measurement Validity IE*, the SRNC should include the *Measurement Instructions Used IE* in a POSITION ACTIVATION RESPONSE message if the Measurement Validity used by the SRNC is different from the Measurement Validity requested by the SAS.

If the POSITION ACTIVATION REQUEST message contains the *Position Method IE* with value “Cell ID”, the *Amount of Reporting IE* shall not be included.

If the POSITION ACTIVATION REQUEST message contains the *Position Method IE* with value “Cell ID”, the RNC may include the measurements requested in the *Requested Cell-ID Measurements IE* in the POSITION ACTIVATION RESPONSE message. If both of the *Round Trip Time Info IE* and the *Round Trip Time Info With Type 1 IE* are included in the POSITION ACTIVATION RESPONSE message, the SAS shall use the *Round Trip Time Info IE*.

If the SRNC receives a new POSITION ACTIVATION REQUEST message before it has responded to a previous non-periodic request, the SRNC should terminate all activity for the previous request, without sending any response to the initial request, and process the new request.

If the SRNC receives a new POSITION ACTIVATION REQUEST message for UE position measurement reporting using A-GPS or A-GANSS or OTDOA (periodic or non-periodic) while it is still performing activity for a previous A-GPS or A-GANSS or OTDOA periodic request, the SRNC should terminate all activity for the previous request, including terminating the periodic measurement reporting in the UE, and should process the new request.

If the SRNC receives a new POSITION ACTIVATION REQUEST message for Cell-ID or U-TDOA positioning while it is still performing activity for a previous A-GPS or A-GANSS or OTDOA periodic request (but after returning any POSITION ACTIVATION RESPONSE for this request), the SRNC may both continue with the previous request and process the new request.

If the *GANSS Positioning IE* is included in the POSITION ACTIVATION REQUEST message and contains the *Requested Data Value IE*:

- If the *GANSS Generic Assistance Data IE*, associated with a given GANSS, is included in the *Requested DataValue IE*, it shall contain a *GANSS Real Time Integrity*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model* or *GANSS Navigation Model IE*.
- If the *GANSS Generic Data Item IE* does not contain the *GANSS ID IE*, the corresponding GANSS is “Galileo”.
- The *DGANSS Corrections IE* contains one or several *DGANSS Information IE(s)*, each of them associated with a GANSS Signal. A *DGANSS Information IE* for “Galileo” that does not contain the *GANSS Signal ID IE* is by default associated with “Galileo L1 OS” (see [22]).
- The *GANSS Real Time Integrity IE* contains one or several *Satellite Information IEs*, each of them associated with a satellite and a GANSS Signal. A *Satellite Information IE* for “Galileo” that does not contain the *Bad GANSS Signal ID IE* is by default associated with all the signals of the corresponding satellite (see [22]).
- The *GANSS Reference Measurement Information IE* is associated with a GANSS Signal. A *GANSS Reference Measurement Information IE* for “Galileo” that does not contain the *GANSS Signal ID IE* is by default associated with “Galileo L1 OS” (see [22]).

If the RRC State is indicated as being *CELL_DCH* in the POSITION ACTIVATION RESPONSE message, [FDD - either the *DCH Information IE* or the *E-DPCH Information IE*][TDD - the *DCH Information IE*] should be included.

If the *GANSS Measured Results IE* is included in the POSITION ACTIVATION RESPONSE message and does not contain the *GANSS Time ID IE*, the SAS shall assume that the corresponding GANSS timing refers to the “Galileo” timing.

The *GANSS Measured Results IE* contains one or several *GANSS Generic Measurement Information IEs*, each of them associated with a given GANSS:

- If a *GANSS Generic Measurement Information IE* does not contain the *GANSS ID IE*, the SAS shall assume that the associated GANSS is “Galileo”.
- If a *GANSS Generic Measurement Information IE* associated with “Galileo” does not contain the *GANSS Signal ID IE*, the SAS shall assume the value “Galileo L1 OS” (see [22]).

8.9.3 Unsuccessful Operation

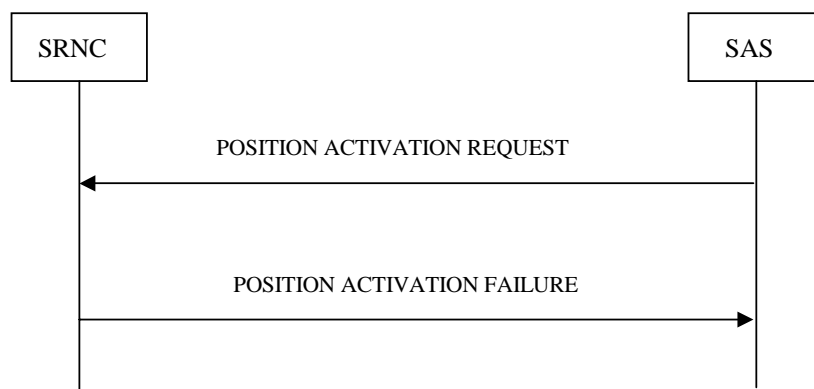


Figure 9d: Position Activation procedure, Unsuccessful Operation

When the SRNC is unable to accept a POSITION ACTIVATION REQUEST message, the POSITION ACTIVATION FAILURE message should be sent to the SAS.

Typical cause values are:

- Processing Overload;
- Hardware Failure;

- O&M Intervention;
- Positioning Method Not Supported
- Location Measurement Failure

8.9.4 Abnormal Conditions

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8.10 Position Parameter Modification

8.10.1 General

The purpose of the Position Parameter Modification procedure is to inform the SAS of any relevant changes to the RF connection or other changes during a positioning event. This procedure uses connectionless signalling when invoked in RNC centric mode and connection-oriented signalling when invoked in SAS centric mode.

8.10.2 Successful Operation

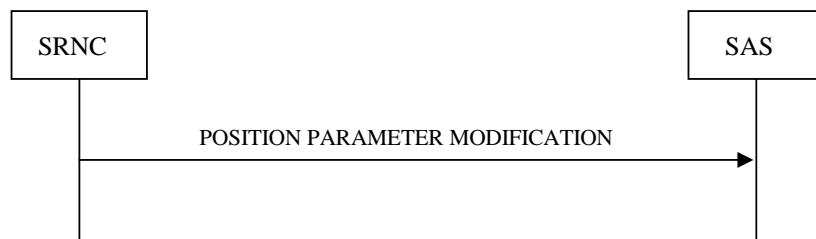


Figure 9e: Position Parameter Modification procedure, Successful Operation

If the SAS receives a POSITION PARAMETER MODIFICATION message, the SAS shall apply the information to the ongoing position estimate (e.g. reconfigure LMUs for U-TDOA) or to a new positioning attempt (e.g. use new serving cell to provide A-GPS assistance data). If there is more than one signalling connection for a UE, the SRNC should send the POSITION PARAMETER MODIFICATION message on each connection. When operating in the RNC centric mode the *Transaction ID* IE should be used to associate the POSITION PARAMETER MODIFICATION message to the correct positioning event.

In the POSITION PARAMETER MODIFICATION message, only one of the *UTRAN Cell Identifier* IE or the *UTDOA GROUP* IE should be included.

The SRNC should send a POSITION PARAMETER MODIFICATION message if an RRC measurement procedure for periodic UE positioning measurement reporting in the UE has been activated by the SRNC upon reception of a POSITION ACTIVATION REQUEST message, and if there is a RRC state transition during the RRC measurement procedure, which does not result in a termination of the UE measurement reporting. The SRNC should continue to notify the SAS of such RRC state changes until the periodic position measurement reporting has been completed or terminated.

8.10.3 Abnormal Conditions

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8.11 Abort

8.11.1 General

The purpose of the Abort procedure is to inform the SAS that the RNC is unable to continue the current positioning activity for a particular UE. This procedure uses connectionless signalling when invoked in RNC centric mode and connection-oriented signalling when invoked in SAS centric mode.

8.11.2 Successful Operation

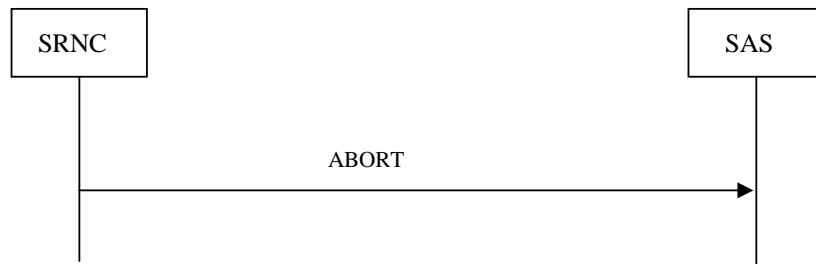


Figure 9f: Abort procedure, Successful Operation

The SRNC should send an ABORT message when the SRNC is unable to continue positioning activity due to cell reselection that results in a different SRNC, loss of contact with the UE or any other reason. When operating in the RNC centric mode the *Transaction ID* IE should be used to associate the ABORT message to the correct positioning event.

If the SAS receives an ABORT message while in the SAS centric mode it should immediately cease positioning attempts and return a POSITION INITIATION RESPONSE message to the SRNC carrying any location estimate already obtained or a POSITION INITIATION FAILURE message if no location estimate was obtained.

If the SAS receives an ABORT message while in the RNC centric mode it should immediately cease positioning attempts and return a POSITION CALCULATION RESPONSE message to the SRNC carrying any location estimate already obtained or a POSITION CALCULATION FAILURE message if no location estimate was obtained. After sending an ABORT message the SRNC should cease positioning activity, if any.

Typical cause values are:

- Processing Overload;
- Hardware Failure;
- O&M Intervention;
- Loss of contact with the UE

8.11.3 Abnormal Conditions

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8.12 Position Periodic Report

8.12.1 General

The purpose of the Position Periodic Report procedure is to send measurement information or UE position estimate from the SRNC to the SAS for periodic location in SAS-centric mode. This procedure uses connection-oriented signalling.

8.12.2 Successful Operation

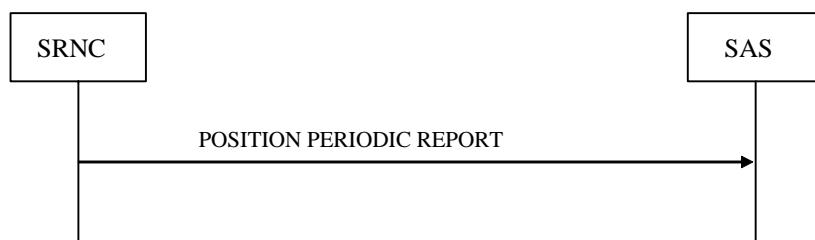


Figure 9g: Position Periodic Report procedure, Successful Operation

This procedure is initiated with a POSITION PERIODIC REPORT message sent from the SRNC to the SAS. The POSITION PERIODIC REPORT message provides the SAS measurement information such as GPS or OTDOA measurements, or an indication of measurement failure.

The SRNC should send the first POSITION PERIODIC REPORT message one reporting interval after the POSITION ACTIVATION RESPONSE message, and should continue to send further POSITION PERIODIC REPORT messages one reporting interval after the previous POSITION PERIODIC REPORT message based on the available measurements. If the RNC can not deliver measurement information when a POSITION PERIODIC REPORT is triggered, the *Cause IE* should be included in the POSITION PERIODIC REPORT message, indicating the reason for measurement failure, e.g. “UE Positioning Error: Not enough OTDOA cells”, “UE Positioning Error: Not enough GPS Satellites”, “UE Positioning Error: Not Accomplished GPS Timing of Cell Frames” or “UE Positioning Error: Undefined Error”. If the *Cause IE* is included in a POSITION PERIODIC REPORT message, the *UE Position Estimate Info IE*, *Velocity Estimate IE*, *GPS Measurement Results IE*, *GANSS Measurement Results IE*, *Cell-ID Measured Results Sets IE*, and *OTDOA Measured Results Sets IE* should not be included.

If the *Cell-ID Measured Results Sets IE* is included in the POSITION PERIODIC REPORT message and both of the *Round Trip Time Info IE* and the *Round Trip Time Info With Type 1 IE* are included in the *Cell-ID Measured Results Info List IE*, the SAS shall use the *Round Trip Time Info IE*.

If the *GANSS Measured Results IE* is included in the POSITION PERIODIC REPORT message and does not contain the *GANSS Time ID IE*, the SAS shall assume that the corresponding GANSS timing refers to the “Galileo” timing.

The *GANSS Measured Results IE* contains one or several *GANSS Generic Measurement Information IEs*, each of them associated with a given GANSS:

- If a *GANSS Generic Measurement Information IE* does not contain the *GANSS ID IE*, the SAS shall assume that the associated GANSS is “Galileo”.
- If a *GANSS Generic Measurement Information IE* associated with “Galileo” does not contain the *GANSS Signal ID IE*, the SAS shall assume the value “Galileo L1 OS” (see [22]).

8.12.3 Abnormal Conditions

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8.13 Position Periodic Result

8.13.1 General

The purpose of the Position Periodic Result procedure is to provide UE position estimates from the SAS to the SRNC for periodic location in SAS-centric mode. This procedure uses connection-oriented signalling.

8.13.2 Successful Operation

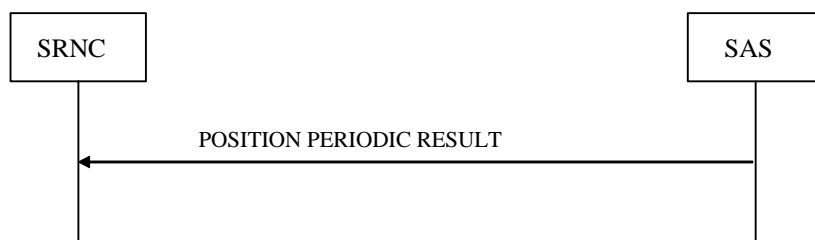


Figure 9h: Position Periodic Result procedure, Successful Operation

This procedure is initiated with a POSITION PERIODIC RESULT message sent from the SAS to the SRNC. The POSITION PERIODIC RESULT message conveys the UE position estimate (or an indication of positioning failure) from the SAS to the SRNC.

The SAS shall send a POSITION PERIODIC RESULT message one reporting interval after the previous POSITION PERIODIC RESULT message. If the SAS can not deliver measurement information when a POSITION PERIODIC RESULT is triggered, the *Cause* IE shall be included in the POSITION PERIODIC RESULT message, indicating the reason for measurement failure, e.g. "Position Calculation error: invalid GPS measured results", "Position Calculation error: invalid Cell-ID measured results", "Position Calculation error: invalid OTDOA measured results" or "Position Calculation error: invalid U-TDOA measured results". If the *Cause* IE is included in a POSITION PERIODIC RESULT message, the *UE Position Estimate* IE, *Velocity Estimate* IE, *Position Data* IE, and *Accuracy Fulfilment Indicator* IE shall not be included.

If the *UE Position Estimate* IE is included in a POSITION PERIODIC RESULT message, the *Position Data* IE shall also be included.

Whenever one of the geographic area shapes *Ellipsoid point with uncertainty Ellipse* IE, *Ellipsoid point with altitude and uncertainty Ellipsoid* IE or *Ellipsoid Arc* IE is reported, the *Confidence* IE shall indicate the probability that the UE is located within the uncertainty region of the shape. The value of the *Confidence* IE shall be in the interval of "1" to "100".

If at least the *Horizontal Accuracy Code* IE was included in a POSITION INITIATION REQUEST message which initiates periodic position reporting, and the periodic position estimate included in a POSITION PERIODIC RESULT messages fulfils the requested accuracy, the *Accuracy Fulfilment Indicator* IE with the value "requested accuracy fulfilled" shall be included. If the calculated position estimate does not fulfil the requested accuracy, the *Accuracy Fulfilment Indicator* IE with the value "requested accuracy not fulfilled" shall be included in the POSITION PERIODIC RESULT message.

8.13.3 Abnormal Conditions

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8.14 Position Periodic Termination

8.14.1 General

The Position Periodic Termination procedure is used by a node to request termination of an ongoing periodic location, or to inform a node about termination of periodic location in SAS-centric mode. This procedure uses connection-oriented signalling.

8.14.2 Successful Operation

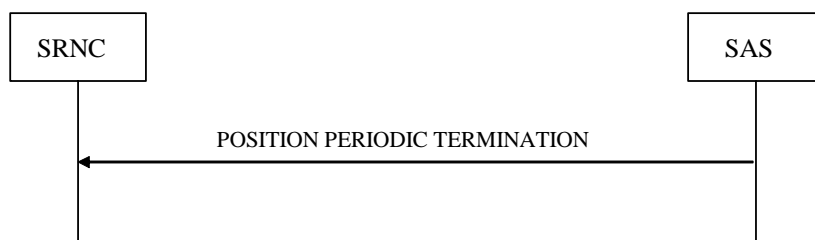


Figure 9i: Position Periodic Termination procedure, SAS Originated, Successful Operation

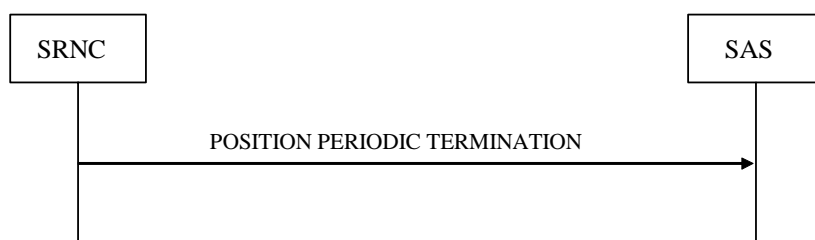


Figure 9k: Position Periodic Termination procedure, RNC Originated, Successful Operation

When the SAS or SRNC needs to terminate ongoing periodic location, a POSITION PERIODIC TERMINATION message is sent to the receiving node.

If an RRC measurement procedure for periodic UE positioning measurement reporting in the UE has been activated by the SRNC upon reception of a POSITION ACTIVATION REQUEST message, and if the SRNC receives a POSITION PERIODIC TERMINATION message, the SRNC should terminate the periodic UE positioning measurement reporting in the UE.

The SRNC should send a POSITION PERIODIC TERMINATION message if an RRC measurement procedure for periodic UE positioning measurement reporting in the UE has been activated by the SRNC upon reception of a POSITION ACTIVATION REQUEST message, and if the SRNC or UE terminates the measurement reporting (e.g., after RRC state transition).

8.14.3 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	O		Geographical Area 9.2.2.6		YES	reject
GPS Measured Results		0..<maxNoOfSets >			GLOBAL	reject
>GPS Measured Results	M		9.2.2.12		–	
Cell-ID Measured Results Sets		0..<maxNoOfMeasurements>			GLOBAL	reject
>Cell-ID Measured Results Info List	M		9.2.2.31		–	
OTDOA Measurement Group		0..1			YES	reject
>OTDOA Reference Cell Info	M		9.2.2.34		–	
>OTDOA Neighbour Cell Info List		1..<maxNoOfMeasNCell>			–	
>>OTDOA Neighbour Cell Info	M		9.2.2.33		–	
>OTDOA Measured Results Sets		1..<maxNoOfMeasurements>			–	
>>OTDOA Measured Results Info List	M		9.2.2.32		–	
Horizontal Accuracy Code	O		9.2.2.38		YES	ignore
Vertical Accuracy Code	O		9.2.2.39		YES	ignore
UTDOA Group	O		9.2.2.74		YES	reject
SAS Response Time	O		Positioning Response Time 9.2.2.69	Indicates the interval allowed for a SAS response for U-TDOA positioning.	YES	ignore
Include Velocity	O		9.2.2.97		YES	ignore
Periodic Position Calculation Info	O		9.2.2.106		YES	ignore
GANSS Measured Results		0..<maxNoOfSets >			GLOBAL	reject
>GANSS Measured Results	M		9.2.2.117		–	

Table 7

Range bound	Explanation
maxNoOfMeasNCell	Maximum number of neighbouring cells on which information can be reported. The value of maxNoOfMeasCell is 32.
maxNoOfSets	Maximum number of sets of Measured Results included in the Position Calculation Request message. The value for maxNoOfSets is 3.
maxNoOfMeasurements	Maximum number of Measurements of Cell-ID Measured Results Info List and OTDOA Measured Results Info List included in the Position Calculation Request message. The value for maxNoOfMeasurements is 16.

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		Geographical Area 9.2.2.6		YES	ignore
Criticality Diagnostics	O		9.2.2.4		YES	ignore
Accuracy Fulfilment Indicator	O		9.2.2.40		YES	ignore
Velocity Estimate	O		9.2.2.98		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
CHOICE <i>Information Exchange Object Type</i>	M				YES	reject
> <i>Reference Position</i>					–	
>>Reference Position Estimate/UE Initial Position	M		Geographical Area 9.2.2.6	For RNC-centric mode.	–	
> <i>Additional Information Exchange Object Types</i>						
>> <i>Reference Position UC-ID</i>						
>>>UTRAN Cell Identifier/UE Initial Position	M		UTRAN Cell Identifier 9.2.2.37	For SAS-centric mode.	–	
>> <i>Cell-ID Measured Results Sets</i>		0..<maxNoOfMeasurements>			GLOBAL	ignore
>>>Cell-ID Measured Results Info List	M		9.2.2.31	For SAS-centric mode.	–	
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
GANSS-UTRAN Time Relationship Uncertainty	C-GANSS		9.2.2.121		YES	reject

Table 11

Condition	Explanation
GPS	The IE shall be present if the information requested in the <i>Information Type</i> IE contains GPS-related data
GANSS	The IE shall be present if the information requested in the <i>Information Type</i> IE contains GANSS-related data

Table 11a

Range bound	Explanation
maxNoOfMeasurements	Maximum number of Measurements of Cell-ID Measured Results Sets. The value for maxNoOfMeasurements is 16.

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 <i>Information Exchange Object Type</i>	O				YES	ignore
> <i>Reference Position</i>					–	
>>Requested Data Value	M		9.2.2.26		–	
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 <i>Information Exchange Object Type</i>	M				YES	ignore
> <i>Reference Position</i>					–	
>>Requested Data Value Information	M		9.2.2.27		–	

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

9.1.13 POSITION INITIATION REQUEST

Table 17a

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		-	
Request Type	M		9.2.2.50		YES	reject
UE Positioning Capability	M		9.2.2.51		YES	reject
UTRAN Cell Identifier	M		9.2.2.37		YES	reject
Vertical Accuracy Code	O		9.2.2.39		YES	ignore
Response Time	O		9.2.2.52		YES	ignore
Positioning Priority	O		9.2.2.53		YES	ignore
Client Type	O		9.2.2.54		YES	ignore
Include Velocity	O		9.2.2.97		YES	ignore
Periodic Location Info	O		9.2.2.107		YES	ignore

9.1.14 position INITIATION response

Table 17b

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		Geographical Area 9.2.2.6		YES	reject
Position Data	M		9.2.2.65		YES	ignore
Accuracy Fulfilment Indicator	O		9.2.2.40		YES	ignore
Velocity Estimate	O		9.2.2.98		YES	ignore

9.1.15 position INITIATION Failure

Table 17c

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

9.1.16 position activation request

Table 17d

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		–	
Positioning Method	M		9.2.2.55		YES	reject
RNC Response Time	M		Positioning Response Time 9.2.2.69	Indicates the interval allowed for a RNC response, or the periodic reporting interval if <i>Amount of Reporting</i> IE is present.	YES	ignore
Positioning Priority	O		9.2.2.53		YES	ignore
Environment Characterisation	O		9.2.2.62		YES	ignore
U-TDOA Positioning		0..1		Only present if Positioning Method is U-TDOA	YES	reject
>U-TDOA Bit Count	M		9.2.2.56	Used if UE is in CELL_FACH mode	–	
>U-TDOA Time Interval	M		9.2.2.57	Used if UE is in CELL_FACH mode	–	
GPS Positioning		0..1		Only present if Positioning Method is A-GPS	YES	reject
>GPS Positioning Instructions	M		9.2.2.101		–	
>Requested Data Value	O		9.2.2.26		–	
OTDOA Assistance Data		0..1		Only present if Positioning Method is OTDOA	YES	reject
>UE Positioning OTDOA Assistance data	M		9.2.2.59		–	
Include Velocity	O		9.2.2.97		YES	ignore
Amount of Reporting	O		9.2.2.108	Amount of reports for periodic reporting.	YES	ignore
Cell-ID Positioning		0..1		Only present if Positioning Method is Cell-ID	YES	ignore
>Requested Cell-ID Measurements	M		9.2.2.112		–	
GANSS Positioning		0..1		Only present if Positioning Method is GNSS	YES	reject
>GANSS Positioning Instructions	M		9.2.2.120		–	

>Requested Data Value	O		9.2.2.26		-	
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9.1.17 position activation response

Table 17e

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 Info	O		9.2.2.102	Position information for UE based positioning methods	YES	ignore
GPS Measured Results		0..<maxNoOfSets>			GLOBAL	reject
>GPS Measured Results	M		9.2.2.12		-	
Cell-ID Measured Results Sets		0..<maxNoOfMeasurements>			GLOBAL	reject
>Cell-ID Measured Results Info List	M		9.2.2.31		-	
OTDOA Measured Results Sets		0..<maxNoOfMeasurements>			GLOBAL	reject
>OTDOA Measured Results Info List	M		9.2.2.32		-	
UTDOA Group	O		9.2.2.74		YES	reject
Velocity Estimate	O		9.2.2.98		YES	ignore
Measurement Instructions Used	O		9.2.2.109		YES	ignore
GANSS Measured Results		0..<maxNoOfSets>			GLOBAL	reject
>GANSS Measured Results	M		9.2.2.117		-	

Table 17f

Range bound	Explanation
maxNoOfSets	Maximum number of sets of Measured Results included in the Position Activation Response message. The value for maxNoOfSets is 3.
maxNoOfMeasurements	Maximum number of Measurements of Cell-ID Measured Results Info List and OTDOA Measured Results Info List included in the Position Activation Response message. The value for maxNoOfMeasurements is 16.

9.1.18 position ACTIVATION Failure

Table 17g

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

9.1.19 Position Parameter modification

Table 17h

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		-	
UTRAN Cell Identifier	O		9.2.2.37		YES	reject
UTDOA Group	O		9.2.2.74		YES	reject
RRC State Change	O		9.2.2.110		YES	ignore

9.1.20 ABORT

Table 17i

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	M		9.2.2.3		YES	ignore

9.1.21 position Periodic Report

Table 17.k

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		-	
UE Position Estimate Info	O		9.2.2.102		YES	ignore
Velocity Estimate	O		9.2.2.98		YES	ignore
GPS Measured Results		<i>0..<maxNoOfSets></i>			GLOBAL	ignore
>GPS Measured Results	M		9.2.2.12		-	
Cell-ID Measured Results Sets		<i>0..<maxNoOfMeasurements></i>			GLOBAL	ignore
>Cell-ID Measured Results Info List	M		9.2.2.31		-	
OTDOA Measured Results Sets		<i>0..<maxNoOfMeasurements></i>			GLOBAL	ignore
>OTDOA Measured Results Info List	M		9.2.2.32		-	
Cause	O		9.2.2.3		YES	ignore
GANSS Measured Results		<i>0..<maxNoOfSets></i>			GLOBAL	ignore
>GANSS Measured Results	M		9.2.2.117		-	

Table 17.l

Range bound	Explanation
maxNoOfSets	Maximum number of sets of Measured Results included in the Position Periodic Report message. The value for maxNoOfSets is 3.
maxNoOfMeasurements	Maximum number of Measurements of Cell-ID Measured Results Info List and OTDOA Measured Results Info List included in the Position Periodic Report message. The value for maxNoOfMeasurements is 16.

9.1.22 position Periodic Result

Table 17.m

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		-	
UE Position Estimate	O		Geographical Area 9.2.2.6		YES	ignore
Velocity Estimate	O		9.2.2.98		YES	ignore
Position Data	O		9.2.2.65		YES	ignore
Accuracy Fulfilment Indicator	O		9.2.2.40		YES	ignore
Cause	O		9.2.2.3		YES	ignore

9.1.23 Position Periodic Termination

Table 17.n

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		-	
Periodic Position Termination Cause	O		9.2.2.111		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		BIT STRING(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		<p>ENUMERATED (invalid reference information, information temporarily not available, information provision not supported for the object, position calculation error: invalid GPS measured results, ..., position calculation error: invalid Cell- ID measured results, position calculation error: invalid OTDOA measured results, position calculation error: A-GPS positioning method not supported, position calculation error: Cell-ID positioning method not supported, position calculation error: OTDOA positioning method not supported, Initial UE Position Estimate missing, position calculation error: invalid U- TDOA measured results, position calculation error: U-TDOA positioning method not supported, position calculation error: U-TDOA positioning method not supported in specified UTRAN cell, positioning method not supported, loss of contact with UE, SAS unable to perform U-TDOA positioning within Response Time, Location measurement failure, UE Positioning Error: Not enough OTDOA cells, UE Positioning Error: Not enough GPS Satellites, UE Positioning Error: Reference Cell not serving cell, UE Positioning Error: Not Accomplished GPS Timing of Cell Frames, UE Positioning Error: Undefined Error, position calculation error: invalid Galileo measured results, position calculation error: A-Galileo positioning method not supported, UE Positioning Error: Not enough Galileo Satellites, UE Positioning Error: Not Accomplished Galileo Timing of Cell Frames)</p>	
>Transport Layer				
>>Transport Layer Cause	M		<p>ENUMERATED (Transport Resource Unavailable, Unspecified, ...)</p>	
>Protocol				
>>Protocol Cause	M		<p>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), ...)</p>	

>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
Position calculation error: invalid Cell-ID measured results	The SAS cannot calculate position due to invalid Cell-ID measured results
Position calculation error: invalid OTDOA measured results	The SAS cannot calculate position due to invalid OTDOA measured results
Position calculation error: A-GPS positioning method not supported	The SAS cannot calculate position because it does not support the A-GPS positioning method
Position calculation error: Cell-ID positioning method not supported	The SAS cannot calculate position because it does not support the Cell-ID positioning method
Position calculation error: OTDOA positioning method not supported	The SAS cannot calculate position because it does not support the OTDOA positioning method
Position calculation error: invalid U-TDOA measured results	The SAS cannot calculate position due to invalid U-TDOA measured results
Position calculation error: U-TDOA positioning method not supported	The SAS cannot calculate position because it does not support the U-TDOA positioning method
Position calculation error: U-TDOA positioning method not supported in specified UTRAN cell	The SAS cannot calculate position because it does not support the U-TDOA positioning method in the specified UTRAN cell
Positioning method not supported	The RNC does not support the requested positioning method
Loss of contact with UE	The RNC reports that it has lost contact with the UE
SAS unable to perform U-TDOA positioning within Response Time	The SAS did not send a U-TDOA position estimate within the interval defined by the Response Time IE
Location measurement failure	The SRNC cannot deliver the requested positioning measurement due to measurement failure.
UE Positioning Error: Not enough OTDOA cells	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not enough OTDOA cells".
UE Positioning Error: Not enough GPS Satellites	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not enough GPS Satellites".
UE Positioning Error: Reference Cell not serving cell	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Reference Cell not serving cell"
UE Positioning Error: Not Accomplished GPS Timing of Cell Frames	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not Accomplished GPS Timing of Cell Frames"
UE Positioning Error: Undefined Error	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Undefined Error"
Position calculation error: invalid Galileo measured results	The SAS cannot calculate position due to invalid Galileo measured results
Position calculation error: A-Galileo positioning method not supported	The SAS cannot calculate position because it does not support the A-Galileo positioning method
UE Positioning Error: Not enough Galileo Satellites	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not enough Galileo Satellites".
UE Positioning Error: Not Accomplished Galileo Timing of Cell Frames	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not Accomplished Galileo Timing of Cell Frames"

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		9.2.2.28	
Information Element Criticality Diagnostics		<i>0..<maxnoof errors></i>		
>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)	<p>The <i>Repetition Number</i> IE gives</p> <ul style="list-style-type: none"> - in case of a not understood IE: The number of occurrences of the reported IE up to and including the not understood occurrence - in case of a missing IE: The number of occurrences up to but not including the missing occurrence. <p>Note: All the counted occurrences of the reported IE must have the same top-down hierarchical message structure of IEs with assigned criticality above them.</p>
>Message Structure	O		9.2.2.23	The <i>Message Structure</i> 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. The value for maxnooferrors is 256.

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 modelling, 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		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>IODE	M		INTEGER (0..255)	
>UDRE	M		ENUMERATED (UDRE \leq 1.0 m, 1.0m < UDRE \leq 4.0m, 4.0m < UDRE \leq 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

Table 28

Condition	Explanation
Status/Health	This IE shall be present if the <i>Status/Health</i> 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 <i>Geographical Area</i>				
> <i>Point</i>				Ellipsoid point
>>Geographical Coordinates	M		9.2.2.7	
> <i>Point With Uncertainty</i>				Ellipsoid point with uncertainty circle
>>Geographical Coordinates	M		9.2.2.7	
>>Uncertainty Code	M		INTEGER (0..127)	The uncertainty "r" expressed in meters is derived from the "Uncertainty Code" k by $r = 10x(1.1^{k-1})$
> <i>Polygon</i>				List of Ellipsoid points
>> Polygon		1..<maxnoofPoints>		
>>>Geographical Coordinates	M		9.2.2.7	
> <i>Ellipsoid point with uncertainty Ellipse</i>				
>>Geographical Coordinates	M		9.2.2.7	
>>Uncertainty Ellipse	M		9.2.2.30	
>>Confidence	M		INTEGER (0..100)	In percentage
> <i>Ellipsoid point with altitude</i>				
>>Geographical Coordinates	M		9.2.2.7	
>>Altitude and direction	M		9.2.2.2	
> <i>Ellipsoid point with altitude and uncertainty Ellipsoid</i>				
>>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)	The uncertainty altitude "h" expressed in metres is derived from the "Uncertainty Altitude" k, by: $h=45x(1.025^{k-1})$
>>Confidence	M		INTEGER (0..100)	In percentage
> <i>Ellipsoid Arc</i>				
>>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 greater values of (r).
>>Uncertainty radius	M		INTEGER (0..127)	The uncertainty "r" is derived from the "Uncertainty radius" k by $r = 10x(1.1^{k-1})$

IE/Group Name	Presence	Range	IE type and reference	Semantics description
>>Offset angle	M		INTEGER (0..179)	The relation between the value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$
>>Included angle	M		INTEGER (0..179)	The relation between the value (N) and the angle (a) in degrees it describes is $2N < a \leq 2(N+1)$
>>Confidence	M		INTEGER (0..100)	

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	Criticality	Assigned Criticality
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)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>Doppler (0 th order term)	M		INTEGER (-2048..2047)	Scaling factor 2.5Hz	–	
>Extra Doppler		0..1			–	
>>Doppler (1 st 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		ENUMERATED (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	–	
UTRAN GPS Reference Time	O		9.2.2.103	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore

Table 34

Range bound	Explanation
mMaxSat	Maximum number of satellites for which data is included in this IE. The value of maxSat is 16.

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		<i>1..<maxSat Almanac></i>		
>DataID	M		BIT STRING (2)	See [10]
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>e	M		BIT STRING (16)	Eccentricity [10]
>t _{oa}	M		BIT STRING (8)	Reference Time of Almanac [10]
>δi	M		BIT STRING (16)	Correction to Inclination (semi-circles) [10]
>OMEGADOT	M		BIT STRING (16)	Rate of Right Ascension (semi-circles/sec) [10]
>SV Health	M		BIT STRING (8)	[10]
>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 (364)	This enables GPS time recovery and possibly extended GPS correlation intervals

Table 36

Range bound	Explanation
maxSatAlmanac	Maximum number of satellites for which data is included in this IE. The value of maxSatAlmanac is 32.

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)	Eccentricity [10]
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)	Rate of Right Ascension (semi-circles/sec) [10]
ldot	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 α_n are the coefficients of a cubic equation representing the amplitude of the vertical delay [10].

NOTE 2: The parameters β_n 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	Criticality	Assigned Criticality
GPS TOW msec	M		INTEGER (0..6.048*10 ⁸ -1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). If the <i>UTRAN GPS reference time Result</i> is present, this IE shall be set to 0 by the transmitter and ignored by the receiver.	–	
Measurement Parameters		1..<maxSat>			–	
>Satellite ID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>C/N ₀	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..1022)	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		INTEGER (0..63)	See NOTE 2	–	
UTRAN GPS Reference Time Result	O		9.2.2.104	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore

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. The value of maxSat is 16.

Table 41

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

Table 42

Value	Mantissa	Exponent	Floating-Point value, x_i	Pseudorange value, P
0	000	000	0.5	$P < 0.5$
1	001	000	0.5625	$0.5 \leq P < 0.5625$
i	X	Y	$0.5 * (1 + x/8) * 2^y$	$x_{i-1} \leq P < x_i$
62	110	111	112	$104 \leq P < 112$
63	111	111	--	$112 \leq P$

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		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>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
<i>Satellite status</i>	The IE shall be present if the <i>Satellite Status</i> 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. The value of maxSat is 16.

9.2.2.14 GPS Real Time Integrity

Table 47

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Bad Satellites Presence</i>				
>Bad Satellites				
>>Satellite information		1..<maxNo Sat>		
>>>BadSatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>No Bad Satellites			NULL	

Table 48

Range bound	Explanation
maxNoSat	Maximum number of satellites for which data is included in this IE. The value of maxNoSat is 16.

9.2.2.15 GPS Reference Time

Table 49

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
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 Assist		0.. <maxSat>			–	
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>TLM Message	M		BIT STRING (14)		–	
>Anti-Spoof	M		BOOLEAN		–	
>Alert	M		BOOLEAN		–	
>TLM Reserved	M		BIT STRING (2)		–	
UTRAN GPS Reference Time	O		9.2.2.103	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
SFN-TOW Uncertainty	O		GPS-UTRAN Time Relationship Uncertainty 9.2.2.18	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
T _{UTRAN-GPS} Drift Rate	O		9.2.2.105	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore

Table 50

Range bound	Explanation
maxSat	Maximum number of satellites for which data is included in this IE. The value of maxSat is 16.

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 or SAS 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

Void.

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, ...)	
CHOICE <i>Information Report Periodicity</i>	C-Periodic			Indicates the frequency with which the SAS shall send broadcast data reports.
>Min				
>>Minutes	M		INTEGER (1..60, ...)	
>Hour				
>>Hours	M		INTEGER (1..24, ...)	

Table 57

Condition	Explanation
Periodic	This IE shall be present if the <i>Information Report Characteristics Type</i> 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 <i>Information Type</i>				
>Implicit				
>>Method Type	M		9.2.2.25	
>Explicit				
>>Explicit Information		1..<maxnoofExplInfo>		
>>>CHOICE <i>Explicit Information Item</i>	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>		
>>>>>>>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>>>>>>>IODE	M		INTEGER (0..255)	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	
>>>>>Reference Location			NULL	This IE may only be present if SAS operates in SAS-centric mode.
>>>> GANSS Common Data				
>>>>>>GANSS Reference Time	O		ENUMERATED(Requested, Not-Requested)	
>>>>>>GANSS Ionosphere Model	O		ENUMERATED(Requested, Not-Requested)	
>>>>>>GANSS	O		ENUMERATED(

Reference Location			Requested, Not- Requested)	
>>>>GANSS Generic Data				
>>>>>GANSS Generic Data Item		1..<maxGANSS>		
>>>>>>GANSS ID	O		INTEGER(0..7)	Identifies the GANSS Coded as defined in [4].
>>>>>>GANSS Real Time Integrity	O			
>>>>>>>GANSS Time Indicator	O		9.2.2.127	
>>>>>>>DGANSS Corrections	O			
>>>>>>>GANSS Time Indicator	O		9.2.2.127	
>>>>>>>GANSS Almanac and Satellite Health	O			
>>>>>>>>GANSS Time Indicator	O		9.2.2.127	
>>>>>>>>GANSS Reference Measurement Information	O			
>>>>>>>>>GANSS Time Indicator	O		9.2.2.127	
>>>>>>>>>GANSS UTC Model	O			
>>>>>>>>>>GANSS Time Indicator	O		9.2.2.127	
>>>>>>>>>>GANSS Time Model	O			
>>>>>>>>>>>GNSS-GNSS Time ext	M		BIT STRING(9)	Defines the time model required. Bit 1 is the MSB and bit 9 is the LSB (see 9.2.1). Bit 1 stands for GPS, Bit 2 stands for Galileo. Other bits are reserved.
>>>>>>>>>>>GANSS Time Indicator	O		9.2.2.127	
>>>>>>>>>>>GANSS Navigation Model	O			
>>>>>>>>>>>>GANSS Week	M		INTEGER(0..4095)	
>>>>>>>>>>>>>GANSS Toe	M		INTEGER(0..167)	
>>>>>>>>>>>>>>GANSS T-Toe Limit	M		INTEGER(0..10)	
>>>>>>>>>>>>>>>Satellite Related Data		0..<maxGANSSSat>		
>>>>>>>>>>>>>>>>Sat ID	M		INTEGER(0..63)	
>>>>>>>>>>>>>>>>>IOD	M		BIT STRING(10)	

Table 59

Range Bound	Explanation
maxnoofExplInfo	Maximum number of Explicit Information supported in one Information Exchange. The value of maxnoofExplInfo is 32.
maxSat	Maximum number of satellites for which data is included in this IE. The value of maxSat is 16.
maxGANSS	Maximum number of GANSS systems for which data is included in this IE. The value of maxGANSS is 8.
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 32.

9.2.2.23 Message Structure

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

Table 60

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Message structure		<i>1..<maxnooflevels></i>		The first repetition of the <i>Message Structure</i> IE corresponds to the top level of the message. The last repetition of the <i>Message Structure</i> IE corresponds to the level above the reported level for the occurred error of the message.
>IE ID	M		INTEGER (0..65535)	The IE ID of this level's IE containing the not understood or missing IE.
>Repetition Number	O		INTEGER (1..256)	The <i>Repetition Number</i> IE gives, if applicable, the number of occurrences of this level's reported IE up to and including the occurrence containing the not understood or missing IE. Note: All the counted occurrences of the reported IE must have the same top-down hierarchical 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		INTEGER(0..255)	"1" = Position Calculation "2" = Information Exchange Initiation "3" = Information Reporting "4" = Information Exchange Termination, "5" = Information Exchange Failure "6" = Error Indication "8" = Position Parameter Modification "9" = Position Initiation "10" = Position Activation "11" = Abort
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, or positioning event.

Table 64

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS Almanac and Satellite Health	O		9.2.2.9		–	
GPS UTC Model	O		9.2.2.17		–	
GPS Ionospheric Model	O		9.2.2.11		–	
GPS Navigation Model	O		9.2.2.13		–	
DGPS Corrections	O		9.2.2.5		–	
GPS Reference Time	O		9.2.2.15		–	
GPS Acquisition Assistance	O		9.2.2.8		–	
GPS 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		–	
GPS Reference Location	O		Geo-graphical Area 9.2.2.6	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GANSS Common Assistance Data	O				YES	ignore
>GANSS Reference Time	O		9.2.2.124		–	
>GANSS Ionospheric Model	O		9.2.2.116		–	
>GANSS Reference Location	O		Geo-graphical Area 9.2.2.6		–	
GANSS Generic Assistance Data		0..<max GANSS >			GLOBAL	ignore
>GANSS ID	O		INTEGER(0..7)	Identifies the GANSS. Coded as defined in [4].	–	
>GANSS Real Time Integrity	O		9.2.2.122		–	
>DGANSS Corrections	O		9.2.2.113		–	
>GANSS Almanac and Satellite Health	O		9.2.2.114		–	
>GANSS Reference Measurement Information	O		9.2.2.123		–	
>GANSS UTC Model	O		9.2.2.126		–	
>GANSS Time Model	O		9.2.2.125		–	
>GANSS Navigation Model	O		9.2.2.118		–	

Table 64A

Range Bound	Explanation
maxGANSS	Maximum number of GANSS systems for which data is included in this IE. The value of maxGANSS is 8.

9.2.2.27 Requested Data Value Information

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

In case of "Periodic" and "On Modification" reporting, "Information Not Available" shall be used when at least one part of the requested information was not available at the moment of initiating the Information Reporting procedure.

Table 65

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE <i>Information Availability Indicator</i>	M				–	
> <i>Information Available</i>					–	
>>Requested Data Value	M		9.2.2.26		–	
> <i>Information not Available</i>			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
CHOICE <i>Transaction ID Length</i>				The Transaction ID shall be interpreted for its integer value, not for the type of encoding ("short" or "long").
> <i>Short</i>				
>>Transaction ID Value	M		INTEGER (0..127)	
> <i>Long</i>				
>>Transaction ID Value	M		INTEGER (0..32767)	

9.2.2.29 Transmission TOW Indicator

Table 67

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Transmission TOW Indicator			ENUMERATE D (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..89)	The relation between the IE value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$

9.2.2.31 Cell-ID Measured Results Info List

This IE contains the Cell-ID measurements of signals associated with one or more cells.

Table 69

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Cell-ID Measured Results Info		<i>1..<maxNoOfMeasNC ell></i>			–	
>UC-ID	M		9.2.2.37	The identifier of the measured cell.	–	
>UTRAN Access Point Position with Altitude	M		9.2.2.36	Exact geographical position of the base station antenna. If the SAS operates in SAS-centric mode, the values of this IE shall be set to 0 by the transmitter and shall be ignored by the receiver.	–	
>Geographical Area	O		9.2.2.6	May only be present if the SAS operates in RNC-centric mode.	–	
>Round Trip Time Info		<i>0..1</i>		FDD only	–	
>>UE Rx-Tx Time Difference Type 2	M		INTEGER (0..8191)	According to mapping in [13].	–	
>>UE Positioning Measurement Quality	M		9.2.2.35	Quality of the UE Rx-Tx time difference measurement.	–	
>>Round Trip Time	M		INTEGER (0..32766)	According to mapping in [13].	–	
>>Extended Round Trip Time	O		INTEGER (32767..103041)	Continuation of intervals as mapped in [13]. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the <i>Round Trip Time</i> IE	YES	ignore
>Rx Timing Deviation Info		<i>0..1</i>		3.84Mcps TDD only	–	
>>Rx Timing Deviation	M		INTEGER (0..8191)	According to mapping in [14].	–	
>>Timing Advance	M		INTEGER (0..63)	According to [4].	–	
>Rx Timing Deviation LCR Info		<i>0..1</i>		1.28Mcps TDD only	–	
>>Rx Timing Deviation LCR	M		INTEGER (0..511)	According to mapping in [14].	–	
>>Timing Advance LCR	M		INTEGER (0..2047)	According to mapping in [14].	–	

>Pathloss	O		INTEGER (46..158)	Unit: dB downlink pathloss as defined in [4] subclause 10.3.7.3	–	
>Rx Timing Deviation 768Info		0..1		7.68Mcps TDD only	YES	reject
>>Rx Timing Deviation 7.68Mcps	M		INTEGER (0.. 65535)	According to mapping in [14].	–	
>>Timing Advance 7.68Mcps	M		INTEGER (0.. 511)	According to [4].	–	
>Rx Timing Deviation 384ext Info		0..1		3.84Mcps TDD only	YES	reject
>>Rx Timing Deviation	M		INTEGER (0.. 32767)	According to mapping in [14].	–	
>>Timing Advance	M		INTEGER (0.. 255)	According to [4].	–	
>Round Trip Time Info With Type 1		0..1		FDD only	YES	ignore
>>UE Rx-Tx Time Difference Type 1	M		INTEGER (768..1280)	According to mapping in [13].	–	
>>Round Trip Time	M		INTEGER (0..32766)	According to mapping in [13].	–	
>>Extended Round Trip Time	O		INTEGER (32767..103041)	Continuation of intervals as mapped in [13]. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the <i>Round Trip Time</i> IE	–	
>Additional UE Measurement Info		0..1		FDD only	YES	ignore
>>CPICH RSCP	O		INTEGER (-5..91)	According to CPICH_RSCP in [13].	–	
>>CPICH Ec/N0	O		INTEGER (0..49)	According to CPICH_Ec/No in [13].	–	

Table 70

Range bound	Explanation
maxNoOfMeasNCell	Maximum number of neighbour cells on which information can be reported. The value of maxNoOfMeasNCell is 32.

9.2.2.32 OTDOA Measured Results Info List

This IE contains the OTDOA measurements of signals sent from the reference and neighbour cells.

Table 71

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
OTDOA Measured Results Info		<i>1..<Maxno ofMeasNCel></i>			–	
>UC-ID	M		9.2.2.37	The identifier of the neighbour cell.	–	
>UE SFN-SFN Observed Time Difference Type 2 Info		<i>1</i>			–	
>>SFN-SFN Observed Time Difference Type 2	M		INTEGER (0..40961)	Gives the observed timing of the neighbour cell relative to the reference cell.	–	
>>UE Positioning Measurement Quality	M		9.2.2.35	Quality of the observed time difference measurement.	–	
>>Measurement Delay	M		INTEGER (0..65535)	<p>The interval of time, in units of 10ms frames, spanning the following two events:</p> <p>1) Time of applicability of the SFN-SFN Value or TUTRAN-GPS/SFN relationship provided for the corresponding neighbour cell in 9.2.2.33 or TUTRAN-GANSS/SFN relationship provided for the corresponding neighbour cell in 9.2.2.33.</p> <p>2) The point in time when this corresponding SFN-SFN observed time difference measurement was captured by the UE.</p> <p>If the SAS operates in SAS-centric mode, 1) above shall be set to zero. I.e., in SAS-centric mode this IE</p>	–	

				indicates the SFN during which the corresponding SFN-SFN observed time difference measurement was captured by the UE.		
>Additional OTDOA Measured Results	O			This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
>>Primary CPICH Info	M		Primary Scrambling Code 9.2.2.46	The identifier of the neighbour cell.	–	

Table 72

Range bound	Explanation
MaxNoOfMeasNCell	Maximum number of neighbouring cells on which information can be reported. The value of MaxNoOfMeasNCell is 32.

9.2.2.33 OTDOA Neighbour Cell Info

Table 73

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UC-ID	M		9.2.2.37	The identifier of the neighbour cell.
UTRAN Access Point Position with Altitude	M		9.2.2.36	Exact geographical position of the base station antenna.
CHOICE <i>Relative Timing Difference Info</i>	M			
> <i>SFN-SFN Measurement Value Information</i>				
>>SFN-SFN Value	M		INTEGER (0..614399)	
>>SFN-SFN Quality	O		INTEGER (0..255)	Indicates the standard deviation (std) of the SFN-SFN otd (observed time difference) measurements in 1/16 chip. SFN-SFN Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported SFN-SFN Value, where x is the reported SFN-SFN Value and $\mu = E[x]$ is the expectation value of x.
>>SFN-SFN Drift Rate	M		INTEGER (-100..+100)	Indicates the SFN-SFN drift rate in 1/256 chip per second. A positive value indicates that the Reference cell clock is running at a greater frequency than the measured neighbouring cell.
>>SFN-SFN Drift Rate Quality	O		INTEGER (0..100)	Indicates the standard deviation (std) of the SFN-SFN drift rate measurements in 1/256 chip per second. SFN-SFN Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported SFN-SFN Drift Rate, where x is the reported SFN-SFN Drift Rate and $\mu = E[x]$ is the expectation value of x.
> <i>T_{UTRAN-GPS} Measurement Value Information</i>				
>>SFN	M		INTEGER (0..4095)	SFN during which the T _{UTRAN-GPS} measurement was performed
>>T _{UTRAN-GPS}		1		Indicates the UTRAN GPS Timing of Cell Frame for LCS.
>>>MS	M		INTEGER (0..16383)	Most significant part
>>>LS	M		INTEGER (0..4294967295)	Least significant part
>>T _{UTRAN-GPS} Quality	O		INTEGER (0..255)	Indicates the standard deviation (std) of the T _{UTRAN-GPS} measurements in 1/16 chip. T _{UTRAN-GPS} Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GPS} Value, where x is the reported T _{UTRAN-GPS} Value and $\mu = E[x]$ is the expectation value of x.
>>T _{UTRAN-GPS} Drift Rate	M		INTEGER (-50..+50)	Indicates the T _{UTRAN-GPS} drift rate in 1/256 chip per second. A positive value indicates that

				the UTRAN clock is running at a lower frequency than GPS clock.
>>T _{UTRAN-GPS} Drift Rate Quality	O		INTEGER (0..50)	Indicates the standard deviation (std) of the T _{UTRAN-GPS} drift rate measurements in 1/256 chip per second. T _{UTRAN-GPS} Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GPS} Drift Rate, where x is the reported T _{UTRAN-GPS} Drift Rate and $\mu = E[x]$ is the expectation value of x.
>T _{UTRAN-GANSS} Measurement Value Information				
>>GANSS ID	O		INTEGER (0..7)	Identifies a GANSS Coded as defined in [4].
>>SFN	M		INTEGER (0..4095)	SFN during which the T _{UTRAN-GANSS} measurement was performed
>>T _{UTRAN-GANSS}		1		Indicates the UTRAN GANSS Timing of Cell Frame for LCS.
>>>MS	M		INTEGER(0..16383)	Most significant part
>>>LS	M		INTEGER(0..4294967295)	Least significant part
>>T _{UTRAN-GANSS} Quality	O		INTEGER(0..255)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} measurements in 1/16 chip. T _{UTRAN-GANSS} Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Value, where x is the reported T _{UTRAN-GANSS} Value and $\mu = E[x]$ is the expectation value of x.
>>T _{UTRAN-GANSS} Drift Rate	M		INTEGER(-50..50)	Indicates the T _{UTRAN-GANSS} drift rate in 1/256 chip per second. A positive value indicates that the UTRAN clock is running at a lower frequency than GANSS clock.
>>T _{UTRAN-GANSS} Drift Rate Quality	O		INTEGER(0..50)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} drift rate measurements in 1/256 chip per second. T _{UTRAN-GANSS} Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Drift Rate, where x is the reported T _{UTRAN-GANSS} Drift Rate and $\mu = E[x]$ is the expectation value of x.

9.2.2.34 OTDOA Reference Cell Info

Table 74

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
UC-ID	M		9.2.2.37	The identifier of the reference cell.	–	
UTRAN Access Point Position with Altitude	M		9.2.2.36	Exact geographical position of the base station antenna.	–	
T_{UTRAN-GPS} Measurement Value Information		0..1			–	
>SFN	M		INTEGER (0..4095)	SFN during which the T _{UTRAN-GPS} measurement was performed	–	
>T _{UTRAN-GPS}		1		Indicates the UTRAN GPS Timing of Cell Frame for LCS.	–	
>>MS	M		INTEGER (0..16383)	Most significant part	–	
>>LS	M		INTEGER (0..4294967295)	Least significant part	–	
>T _{UTRAN-GPS} Quality	O		INTEGER (0..255)	Indicates the standard deviation (std) of the T _{UTRAN-GPS} measurements in 1/16 chip. T _{UTRAN-GPS} Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GPS} Value, where x is the reported T _{UTRAN-GPS} Value and $\mu = E[x]$ is the expectation value of x.	–	
>T _{UTRAN-GPS} Drift Rate	M		INTEGER (-50..+50)	Indicates the T _{UTRAN-GPS} drift rate in 1/256 chip per second. A positive value indicates that the UTRAN clock is running at a lower frequency than GPS clock.	–	
>T _{UTRAN-GPS} Drift Rate Quality	O		INTEGER (0..50)	Indicates the standard deviation (std) of the T _{UTRAN-GPS} drift rate measurements in 1/256 chip per second. T _{UTRAN-GPS} Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GPS} Drift Rate, where x is the reported T _{UTRAN-GPS} Drift Rate and $\mu = E[x]$ is the expectation value of	–	

				x.		
T_{UTRAN-GANSS} Measurement Value Information		0..1			GLOBAL	ignore
>GANSS ID	O		INTEGER(0..7)	Identifies a GANSS Coded as defined in [4]	–	
>SFN	M		INTEGER(0..4095)	SFN during which the T _{UTRAN-GANSS} measurement was performed	–	
>T _{UTRAN-GANSS}		1		Indicates the UTRAN GANSS Timing of Cell Frame for LCS.	–	
>>MS	M		INTEGER(0..16383)	Most significant part	–	
>>LS	M		INTEGER(0..4294967295)	Least significant part	–	
>T _{UTRAN-GANSS} Quality	O		INTEGER(0..255)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} measurements in 1/16 chip. T _{UTRAN-GANSS} Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Value, where x is the reported T _{UTRAN-GANSS} Value and $\mu = E[x]$ is the expectation value of x.	–	
>T _{UTRAN-GANSS} Drift Rate	M		INTEGER(-50..50)	Indicates the T _{UTRAN-GANSS} drift rate in 1/256 chip per second. A positive value indicates that the UTRAN clock is running at a lower frequency than GANSS clock.	–	
>T _{UTRAN-GANSS} Drift Rate Quality	O		INTEGER(0..50)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} drift rate measurements in 1/256 chip per second. T _{UTRAN-GANSS} Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Drift Rate, where x is the reported T _{UTRAN-GANSS} Drift Rate and $\mu = E[x]$ is the expectation value of x.	–	

9.2.2.35 UE Positioning Measurement Quality

Table 75

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Std Resolution	M		BIT STRING (2)	Std Resolution field includes the resolution used in Std of Measurements field. Encoding on two bits as follows: '00' 10 meters '01' 20 meters '10' 30 meters '11' Reserved
Number of Measurements	M		BIT STRING (3)	The 'Number of Measurements' field indicates how many measurements have been used in the UE to determine the sample standard deviation of the measurements. Following 3 bit encoding is used: '001' 5-9 '010' 10-14 '011' 15-24 '100' 25-34 '101' 35-44 '110' 45-54 '111' 55 or more Special case: '000': In this case the field 'Std of Measurements' contains the std of the reported measurement value = $\sqrt{E[(x-\mu)^2]}$, where x is the reported value and $\mu = E[x]$ is the expectation value (i.e. the true value) of x. This std can be used irrespective of the number of measurements and reporting of the number of measurements is not needed. Also other measurements such as Ec/No or Rx levels can be utilised in this case to evaluate the 'Std of Measurements' reported in this IE.
Std of Measurements	M		BIT STRING (5)	Std of Measurements field includes sample standard deviation of measurements (when number of measurements is reported in 'Number of Measurements' field) or standard deviation of the reported measurement value = $\sqrt{E[(x-\mu)^2]}$, where x is the reported value and $\mu = E[x]$ is the expectation value (i.e. the true value) of x (when '000' is given in 'Number of Measurements' field). Following linear 5 bit encoding is used: '00000' 0 - (R*1-1) meters '00001' R*1 - (R*2-1) meters

				'00010' R*2 – (R*3-1) meters ... '11111' R*31 meters or more where R is the resolution defined by Std Resolution field. E.g. R=20 m corresponds to 0-19 m, 20-39 m,...,620+ m.
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9.2.2.36 UTRAN Access Point Position with Altitude

The UTRAN Access Point Position with Altitude indicates the exact geographical position of the base station antenna. The altitude shall be included when available.

Table 76

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Geographical Coordinates	M		9.2.2.7	
Altitude and direction	O		9.2.2.2	

9.2.2.37 UTRAN Cell Identifier (UC-ID)

The UC-ID (UTRAN Cell identifier) is the identifier of a cell in one UTRAN.

Table 77

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
RNC-ID	M		INTEGER (0..4095)	The identifier of one RNC in UTRAN. If the <i>Extended RNC-ID</i> IE is included in the <i>UC-ID</i> IE, the <i>RNC-ID</i> IE shall be ignored.	–	–
C-ID	M		INTEGER (0..65535)	The identifier of a cell in one RNS.	–	–
Extended RNC-ID	O		9.2.2.37A	The <i>Extended RNC-ID</i> IE shall be used if the RNC identity has a value larger than 4095.	YES	reject

9.2.2.37A Extended RNC-ID

This is the identifier of one RNC in UTRAN.

Table 77A

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Extended RNC-ID			INTEGER(4096..65535)	Note: Application of the <i>Extended RNC-ID</i> IE to very large networks is FFS.

9.2.2.38 Horizontal Accuracy Code

Table 78

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Horizontal Accuracy Code	M		INTEGER(0..127)	The requested accuracy "r" is derived from the "Horizontal Accuracy Code" k by $r = 10 \times (1.1^k - 1)$

9.2.2.39 Vertical Accuracy Code

Table 79

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

9.2.2.40 Accuracy Fulfilment Indicator

This IE indicates whether the returned position estimate satisfies the requested accuracy or not.

Table 80

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Accuracy Fulfilment Indicator	M		ENUMERATED (requested accuracy fulfilled, requested accuracy not fulfilled, ...)	

9.2.2.41 Uplink DPCH information

This IE indicates the Uplink DPCH information used in the U-TDOA positioning method.

Table 81

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Choice <i>mode</i>	M			
> <i>FDD</i>				
>>Scrambling code type	M		ENUMERATED (short, long)	
>>Scrambling code number	M		INTEGER(0..16 777215)	
>>TFCI existence	M		BOOLEAN	TRUE means existence.
>>Number of FBI bits	M		INTEGER(0..2)	In bits.
> <i>TDD</i>				
>>Cell Parameter ID	M		9.2.2.81	
>>TFCI Coding	M		9.2.2.82	
>>Puncture Limit	M		9.2.2.76	
>>Repetition Period	M		9.2.2.84	
>>Repetition Length	M		9.2.2.83	
>>TDD DPCH Offset	M		9.2.2.85	
>>UL Timeslot Information	M		9.2.2.86	
>>Frame Offset	M		9.2.2.64	
>>Special Burst Scheduling	M		9.2.2.92	

9.2.2.42 Frequency information

This IE indicates the Frequency information used for the U-TDOA positioning method.

Table 82

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE <i>mode</i>	M			
> <i>FDD</i>				
>>UARFCN uplink (Nu)	O		INTEGER (0..16383)	If this IE is not present, the default duplex distance defined for the operating frequency band shall be used [20]
>>UARFCN downlink (Nd)	M		INTEGER (0 .. 16383)	[20]
> <i>TDD</i>				
>>UARFCN	M		INTEGER (0 .. 16383)	[21]

9.2.2.43 PRACH parameters

This IE indicates the PRACH parameter used for the U-TDOA positioning method.

Table 83

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
PRACH parameters		1 .. <maxP RACH>		
>PRACH information	M		9.2.2.47	
>TFS	M		9.2.2.48	
> TFCS		1..<max TFC>		
>>CTFC	M		9.2.2.49	

Table 84

Range bound	Explanation
maxPRACH	Maximum number of PRACHs in a cell. The value is 16.
maxTFC	Maximum number of TFC. Value is 1024.

9.2.2.44 Compressed Mode Assistance Data

This IE provides the assistance data used for the U-TDOA positioning method when the UE is operating in the compressed mode.

Table 85

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE <i>mode</i>	M			
> <i>FDD</i>				
>>Downlink information		1		
>>>Primary Scrambling Code	M		9.2.2.65	
>>>Chip Offset	M		9.2.2.63	
>>>Frame Offset	M		9.2.2.64	
>>Uplink information		1		
>>>Transmission Gap Pattern Sequence Information	M		9.2.2.66	
>>>Active Pattern Sequence Information	M		9.2.2.67	
>>>CFN	M		9.2.2.68	

9.2.2.45 C-RNTI

The cell RNTI (C-RNTI) identifies a UE having a RRC connection within a cell that is used for the U-TDOA positioning method.

Table 86

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
C-RNTI			BIT STRING(16)	

9.2.2.46 Primary Scrambling Code

This IE gives the DL scrambling code of a cell.

Table 87

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Primary Scrambling Code			INTEGER(0..511)	

9.2.2.47 PRACH information

This IE contains the PRACH information used for the U-TDOA positioning method.

Table 88

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE mode	M			
>FDD				
>>Available Signature	M		BIT STRING (16)	Each bit indicates availability for a signature, where the signatures are numbered "signature 0" up to "signature 15". The value 1 of a bit indicates that the corresponding signature is available and the value 0 that it is not available.
>>Available SF	M		ENUMERATED (32,64,128,256, ...)	In chips per symbol Defines the minimum allowed SF (i.e. the maximum rate)
>>Preamble scrambling code number	M		INTEGER(0..15)	Identification of scrambling code see [17]
>>Puncturing Limit	M		9.2.2.76	
>>Available Sub Channel Number	M		BIT STRING (12)	Each bit indicates availability for a subchannel, where the subchannels are numbered "subchannel 0" to "subchannel 11". The value 1 of a bit indicates that the corresponding subchannel is available and the value 0 indicates that it is not available.
>TDD				
>>Time Slot	M		9.2.2.87	
>>TDD Channelisation Code	M		9.2.2.91	
>>Max PRACH Midamble Shifts	M		9.2.2.93	
>>PRACH Midamble	M		9.2.2.94	

9.2.2.48 TFS

This IE contains the TFS parameters used for the U-TDOA positioning method.

Table 89

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Dynamic Transport Format Information		1.. <maxT F>		
>RLC Size	M		INTEGER(129..5055)	Unit is bits
>Number of TBs and TTI List		1.. <maxT F>		Present for every valid number of TB's (and TTI) for this RLC Size.
>>Transmission time interval	C-dynamicTTI		ENUMERATED(10, 20, 40, 80, dynamic,...)	In ms. The value dynamic is only used in TDD mode.
>>Number of Transport blocks	M		INTEGER(0..512)	
Semi-static Transport Format Information	M		9.2.2.61	

Table 90

Range bound	Explanation
maxTF	Maximum number of Transport Formats. The value is 32.

Table 91

Condition	Explanation
dynamicTTI	This IE shall be present if TTI IE in Semi-static Transport Format Information IE is set to dynamic.

9.2.2.49 CTFC

This IE identifies the TFC used for the U-TDOA positioning method.

Table 92

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
<i>CHOICE CTFC Size</i>				
<i>>2 bit CTFC</i>				
>>CTFC information	M		INTEGER(0..3)	
<i>>4 bit CTFC</i>				
>>CTFC information	M		INTEGER(0..15)	
<i>>6 bit CTFC</i>				
>>CTFC information	M		INTEGER(0..63)	
<i>>8 bit CTFC</i>				
>>CTFC information	M		INTEGER(0..255)	
<i>>12 bit CTFC</i>				
>>CTFC information	M		INTEGER(0..4095)	
<i>>16 bit CTFC</i>				
>>CTFC information	M		INTEGER(0..65535)	
<i>>24 bit CTFC</i>				
>>CTFC information	M		INTEGER(0..16777215)	

9.2.2.50 Request Type

This IE contains the Request Type parameters used for SAS centric positioning method selection.

Table 93

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Event	M		ENUMERATED(S top Change of service area, Direct, Change of service area, Stop Direct, ..., Periodic, Stop Periodic)	Requests related to service area reporting are not supported in the current version of this specification.
Report Area	M		ENUMERATED(S ervice Area, Geographical Area, ...)	
Horizontal Accuracy Code	O		INTEGER(0..127)	The requested accuracy "r" is derived from the "accuracy code" k by $r = 10 \times (1.1^k - 1)$.

9.2.2.51 UE Positioning Capability

This IE contains the UE Positioning Capability information used for SAS centric positioning method selection.

Table 94

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Standalone location method(s) supported	M		BOOLEAN	Defines if a UE can measure its location by some means unrelated to UTRAN. TRUE means supported	–	
UE based OTDOA supported	M		BOOLEAN	TRUE means supported	–	
Network Assisted GPS support	M		ENUMERATED (Network based, UE based, Both, None,...)	Defines if the UE supports network based or UE based GPS methods.	–	
Support for GPS timing of cell frames measurement	M		BOOLEAN	Defines if a UE has the capability to perform the UE GPS timing of cell frames measurement [4]. TRUE means capable	–	
Support for IPDL	M		BOOLEAN	Defines if a UE has the capability to use IPDL to enhance its 'SFN-SFN observed time difference –type 2' measurement. TRUE means supported	–	
Support for Rx-Tx time difference type2 measurement	M		BOOLEAN	TRUE means supported	–	
Support for UE assisted GPS measurement validity in CELL_PCH and URA_PCH states	M		BOOLEAN	TRUE means supported	–	
Support for SFN-SFN observed time difference type 2 measurement	M		BOOLEAN	TRUE means supported	–	
Network Assisted GANSS Support		<i>0..<max GANSS></i>			GLOBAL	ignore
>GANSS ID	O		INTEGER (0..7)	Identifies a GANSS Coded as defined in [4]	–	
>GANSS mode	M		ENUMERATED ('Network based', 'UE based', 'Both', 'None')	Defines if the UE supports network based or UE based GANSS methods	–	
>GANSS Signal ID	O		INTEGER(0..3, ...)	Coded as defined in [4]	–	
>Support for GANSS timing of cell frames	M		BOOLEAN	Defines if a UE has the	–	

measurement				capability to perform the UE GANSS timing of cell frames measurement [4]. TRUE means capable		
>Support for GANSS Carrier-Phase Measurement	O		BOOLEAN	Defines if a UE has the capability to perform the UE GANSS Carrier-Phase Measurement. TRUE means capable	–	

Table 94A

Range Bound	Explanation
maxGANSS	Maximum number of GANSS systems for which data is included in this IE. The value of maxGANSS is 8.

9.2.2.52 Response Time

This IE contains the Response Time used for SAS centric mode.

Table 95

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Response Time			ENUMERATED(Low Delay, Delay Tolerant,...)	The value refers to [15].

9.2.2.53 Positioning Priority

This IE contains the Positioning Priority used for SAS centric mode.

Table 96

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Positioning Priority			ENUMERATED(High Priority, Normal Priority, ...)	The value refers to [15]

9.2.2.54 Client Type

This IE contains the Client Type used for SAS centric mode.

Table 97

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

9.2.2.55 Positioning Method

This IE contains the Positioning Method used for SAS centric positioning method selection.

Table 98

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Additional Method Type	M		9.2.2.58		-	
Selected Position Method	M		ENUMERATED(OTDOA, GPS, OTDOA or GPS, Cell ID, UTDOA, ..., GNSS, OTDOA or GNSS)		-	
GNSS Positioning Method	C-GNSS		BIT STRING(9)	For each bit, if set to '1', indicates that respective GNSS is allowed. Bit 1 is the MSB and bit 9 is the LSB (see 9.2.1). bit 1: GPS bit 2: Galileo bits 3-9: reserved for future GNSSes Note: Bit 1 cannot be the only one set to 1.	YES	ignore

Table 98A

Condition	Explanation
GNSS	This IE shall be present if the <i>Selected Position Method</i> IE value is set to "GNSS" or "OTDOA or GNSS"

9.2.2.56 U-TDOA Bit Count

This IE contains the recommended number of pre-coded bits to be transmitted by the UE when the U-TDOA positioning method is selected.

Table 99

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
U-TDOA Bit Count			INTEGER (0..5000)	Number of bits to be transmitted by the target UE

9.2.2.57 U-TDOA Time Interval

This IE contains the recommended maximum time interval for transmission of the U-TDOA Bit Count number of bits for U-TDOA positioning.

Table 100

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
U-TDOA Time Interval			INTEGER (0..3000)	Time in ms in which the U-TDOA Bit Count is to be transmitted by the UE

9.2.2.58 Additional Method Type

This IE contains the selected positioning method type for SAS-centric mode.

Table 101

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Additional Method Type			ENUMERATED (UE_Assisted, UE_Based, UE_Based is preferred but UE_assisted is allowed, UE_Assisted is preferred but UE_Based is allowed, ...)	

9.2.2.59 UE Positioning OTDOA Assistance Data

This IE contains the UE Positioning OTDOA Assistance Data used in the SAS centric mode.

Table 102

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
UE Positioning OTDOA Reference Cell Info	O				–	
>SFN	O		INTEGER (0..4095)	Time stamp (SFN of Reference Cell) of the SFN-SFN relative time differences and SFN-SFN drift rates. Included if any SFN-SFN drift value is included in IE <i>UE positioning OTDOA neighbour cell info</i> .	–	
>CHOICE mode					–	
>>Fdd					–	
>>>Primary CPICH Information	M		Primary scrambling code 9.2.2.46		–	
>>Tdd					–	
>Frequency Info	O		9.2.2.42	Default value is the existing value of frequency information. This IE shall always be set to default value	–	
>CHOICE positioning mode					–	
>>UE Based					–	
>>> Cell position	O		Reference Cell Position 9.2.2.70	The position of the antenna that defines the cell.	–	
>>> Round Trip Time	O		INTEGER (0..32766)	According to mapping in [13].	–	
>>UE Assisted					–	
>UE positioning IPDL parameters	O		9.2.2.71	If this element is not included there are no idle periods present	–	
>Extended Round Trip Time	O		INTEGER (32767..103041)	According to mapping in [13]. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the the <i>Round Trip Time</i> IE.	YES	ignore
UE Positioning OTDOA Neighbour Cell List	O				–	
>UE positioing OTDOA Neighbour cell info		1..max CellMeas			–	
>>CHOICE mode					–	
>>>FDD					–	
>>>>Primary CPICH Information	M		Primary scrambling code 9.2.2.46		–	
>>>TDD					–	
>>Frequency Info	O		9.2.2.42	Default value is the existing value of frequency information	–	

>>UE positioning IPDL parameters	O		9.2.2.71		–	
>>SFN-SFN Relative Time difference1	M		9.2.2.73		–	
>>SFN Offset Validity	O		ENUMERATE D (false)	Absence of this element means SFN offset is valid. False means SFN offset is not valid.	–	
>>SFN-SFN Drift	O		ENUMERATE D (0,1,2,3,4,5,8,10,15,25,35,50,65,80,100,-1,-2,-3,-4,-5,-8,-10,-15,-25,-35,-50,-65,-80,-100,...)	Indicates the SFN-SFN drift rate in 1/256 chip per second.	–	
>>Search Window Size	M		ENUMERATE D (c20, c40, c80, c160, c320, c640, c1280, moreThan1280, ...)	In chips. If the value is X then the expected SFN-SFN observed time difference is in the range [RTD-X, RTD+X] where RTD is the value of the field SFN-SFN relative time difference.	–	
>>CHOICE positioning mode					–	
>>>UE Based					–	
>>>>Relative North	O		INTEGER (-20000..20000)	Seconds of angle, scale factor 0.03. Relative position compared to reference cell.	–	
>>>>Relative East	O		INTEGER (-20000..20000)	Seconds of angle, scale factor 0.03. Relative position compared to reference cell.	–	
>>>>Relative Altitude	O		INTEGER (-4000..4000)	Relative altitude in meters compared to ref. cell.	–	
>>>>Fine SFN-SFN	O		INTEGER (0..15)	Gives finer resolution	–	
>>>>Round Trip Time	O		INTEGER (0..32766)	In chips. Included if cell is in active set	–	
>>> UE assisted					–	
>>Extended Round Trip Time	O		INTEGER (32767..103041)	In chips. Included if cell is in active set. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the the <i>Round Trip Time</i> IE.	YES	ignore

Table 103

Range bound	Explanation
maxCellMeas	Maximum number of cells to measure. The value is 32.

9.2.2.60 UL TrCH information

This IE contains the UL TrCH information used for the U-TDOA positioning method.

Table 104

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Uplink transport channel type	M		ENUMERATED (DCH,USCH,...)	USCH is TDD only
TFS	M		9.2.2.48	

9.2.2.61 Semi-static Transport Format Information

This IE contains the Semi-static Transport Format information used for the U-TDOA positioning method.

Table 105

IE/Group Name	Presence	Range	IE Type and Reference	Semantics description
Transmission time interval	M		ENUMERATED(5, 10, 20, 40, 80, dynamic, ...)	In ms. The value dynamic is only used in TDD mode
Type of channel coding	M		ENUMERATED(No coding, Convolutional, Turbo, ...)	The option "No coding" is only valid for TDD.
Coding Rate	<i>C-Coding</i>		ENUMERATED(1/2, 1/3, ...)	
Rate matching attribute	M		INTEGER(1..hiRM)	
CRC size	M		ENUMERATED(0, 8, 12, 16, 24, ...)	In bits

Table 106

Condition	Explanation
Coding	This IE shall be present if Type of channel coding IE is "Convolutional".

Table 107

Constant	Explanation	Value
HiRM	Maximum number that could be set as rate matching attribute for a transport channel	256

9.2.2.62 Environment Characterisation

This IE contains the Environment Characterisation information used for the SAS centric mode.

Table 108

IE/Group Name	Presence	Range	IE Type and Reference	Semantics description
Environment Characterisation			ENUMERATED(heavy multipath and NLOS conditions, no or light multipath and usually LOS conditions, not defined or mixed environment, ...)	

9.2.2.63 Chip Offset

This IE contains the Chip Offset information used for the U-TDOA positioning method.

The Chip Offset is defined as the radio timing offset inside a radio frame. The Chip offset is used as offset relative to the Primary CPICH timing for the DL DPCH or for the F-DPCH.

Table 109

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Chip Offset			INTEGER(0..38399)	Unit: chips

9.2.2.64 Frame Offset

This IE contains the Frame Offset information used for the U-TDOA positioning method.

The Frame Offset is the required offset between the dedicated channel downlink transmission frames (CFN, Connection Frame Number) and the broadcast channel frame offset (Cell Frame Number). The Frame Offset is used in the translation between Connection Frame Number (CFN) on Iub/Iur and the least significant 8 bits of SFN (System Frame Number) on Uu. The Frame Offset is UE and cell specific

Table 110

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Frame Offset			INTEGER(0..255)	Unit: Frames

9.2.2.65 Position Data

This IE provides data related to the positioning methods used and reported in the SAS centric mode.

Table 111

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Position Data					–	
>Positioning Data Discriminator	M		BIT STRING (4)	<p>The positioning data discriminator defines the type of data provided for each positioning method:</p> <p>0000 indicates the presence of the <i>Positioning Data Set</i> IE (that reports the usage of each non-GANSS method that was successfully used to obtain the location estimate)</p> <p>0001 indicates the presence of the <i>GANSS Positioning Data Set</i> IE (that reports the usage of each GANSS method that was successfully used to obtain the location estimate) and the absence of the <i>Positioning Data Set</i> IE</p> <p>1 octet of data is provided for each positioning method included.</p> <p>All other values are reserved.</p>	–	
>Positioning Data Set	C- ifDiscriminator=0				–	

>>Positioning Method and Usage		1 ..<max Set>	OCTET STRING (1)	<p>Coding of positioning method (bits 8-4): 00000 Reserved 00001 Reserved 00010 Reserved 00011 Reserved 00100 Reserved 00101 Mobile Assisted GPS 00110 Mobile Based GPS 00111 Conventional GPS 01000 U-TDOA 01001 OTDOA 01010 IPDL 01011 RTT 01100 Cell ID 01101 to 01111 reserved for other location technologies 10000 to 11111 reserved for network specific positioning methods</p> <p>Coding of usage (bits 3-1): 000 Attempted unsuccessfully due to failure or interruption - not used. 001 Attempted successfully: results not used to generate location - not used. 010 Attempted successfully: results used to verify but not generate location - not used. 011 Attempted successfully: results used to generate location 100 Attempted successfully: case where MS supports multiple mobile based positioning methods and the actual method or methods used by the MS cannot be determined.</p>	-	
>GANSS Positioning Data Set	O				YES	ignore
>> GANSS Positioning Method and Usage		1.. ..<max GANSS Set>	OCTET STRING (1)	<p>Coding of Method (Bits 8-7) : 00 : MS-Based 01 : MS-Assisted 10 : Conventional 11 : Reserved</p> <p>Coding of GANSS ID (Bits 6-4) : 000 : Galileo other values reserved</p> <p>Coding of usage (bits 3-1):</p>	-	

				011 Attempted successfully: results used to generate location 100 Attempted successfully: case where MS supports multiple mobile based positioning methods and the actual method or methods used by the MS cannot be determined.		
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Table 112

Condition	Explanation
ifDiscriminator=0	This IE is present if the <i>Positioning Data Discriminator</i> IE is set to "0000"

Table 113

Range bound	Explanation
maxSet	Maximum size of the data set. Value is 9.
MaxGANSSSet	Maximum size of the data. Value is 32.

9.2.2.66 Transmission Gap Pattern Sequence Information

This IE contains the Transmission Gap Pattern Sequence information used for the U-TDOA positioning method when the UE is operating in the compressed mode.

Table 114

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Transmission Gap Pattern Sequence Information		1..<maxTGPS>		
>TGPS Identifier	M		INTEGER(1..maxTGPS)	Transmission Gap Pattern Sequence Identifier: Establish a reference to the compressed mode pattern sequence. Up to <maxTGPS> simultaneous compressed mode pattern sequences can be used.
>TGSN	M		INTEGER(0..14)	Transmission Gap Starting Slot Number: The slot number of the first transmission gap slot within the TGCFN.
>TGL1	M		INTEGER(1..14)	The length of the first Transmission Gap within the transmission gap pattern expressed in number of slots.
>TGL2	O		INTEGER(1..14)	The length of the second Transmission Gap within the transmission gap pattern. If omitted, then TGL2=TGL1.
>TGD	M		INTEGER(0,15..269)	Transmission Gap Distance: indicates the number of slots between the starting slots of two consecutive transmission gaps within a transmission gap pattern. If there is only one transmission gap in the transmission gap pattern, this parameter shall be set to "0" ("0" =undefined).
>TGPL1	M		INTEGER(1..14, ...)	The duration of transmission gap pattern 1 in frames.
>Uplink Compressed Mode Method	M		ENUMERATED(SF/2, Higher Layer Scheduling, ...)	Method for generating uplink compressed mode gap.

Table 115

Range bound	Explanation
maxTGPS	Maximum number of transmission gap pattern sequences. The value is 6.

9.2.2.67 Active Pattern Sequence Information

This IE contains the Active Pattern Sequence information used for the U-TDOA positioning method when the UE is operating in the compressed mode.

Table 116

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CM Configuration Change CFN	M		CFN 9.2.2.68	
Transmission Gap Pattern Sequence Status		<i>0..<maxTGPS></i>		
>TGPS Identifier	M		INTEGER(1..maxTGPS)	If the group is not present, none of the pattern sequences are activated. References an already defined sequence.
>TGPRC	M		INTEGER(0..511)	The number of transmission gap patterns within the Transmission Gap Pattern Sequence. "0"=Infinity
>TGCFN	M		CFN 9.2.2.68	Connection Frame Number of the first frame of the first pattern 1 within the Transmission Gap Pattern Sequence.

Table 117

Range bound	Explanation
maxTGPS	Maximum number of transmission gap pattern sequences. The value is 6.

9.2.2.68 CFN

This IE contains the CFN used for the U-TDOA positioning method when the UE is operating in the compressed mode.

Table 118

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CFN			INTEGER(0..255)	

9.2.2.69 Positioning Response Time

This IE contains the Positioning Response Time information used for SAS centric mode.

Table 119

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Positioning Response Time			ENUMERATED(250, 500, 1000, 2000, 3000, 4000, 6000, 8000, 12000, 16000, 20000, 24000, 28000, 32000, 64000, ...)	Unit: millisecond

9.2.2.70 Reference Cell Position

Reference Cell Position IE is used to identify the position of the reference cell using geographical coordinates. The reference system is the same as the one used in [11].

Table 120

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<i>CHOICE Geographical Area</i>				
> <i>Point</i>				Ellipsoid point
>>Geographical Coordinates	M		9.2.2.7	
> <i>Ellipsoid point with altitude</i>				
>>Geographical Coordinates	M		9.2.2.7	
>>Altitude and direction	M		9.2.2.2	

9.2.2.71 UE Positioning IPDL Parameters

The *UE Positioning IPDL Parameters* IE is used for OTDOA in the SAS centric mode.

Table 121

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<i>CHOICE mode</i>				
> <i>FDD</i>				
>>IP Spacing	M			
>>IP Length	M			
>>IP Offset	M		INTEGER(0..9)	
>>Seed	M		INTEGER(0..63)	
> <i>TDD</i>				
Burst Mode Parameters	O		9.2.2.72	

9.2.2.72 Burst Mode Parameters

Burst Mode Parameters IE is used for OTDOA in the SAS centric mode.

Table 122

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Burst Start	M		INTEGER(0..15)	
Burst Length	M		INTEGER(10..25)	
Burst Frequency	M		INTEGER(1..16)	

9.2.2.73 SFN-SFN Relative Time Difference1

SFN-SFN Relative Time Difference IE is used for OTDOA in the SAS centric mode

Table 123

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SFN Offset	M		INTEGER (0..4095)	
SFN-SFN-Relative Time Difference	M		INTEGER (0..38399)	

9.2.2.74 UTDOA Group

This IE contains information used for the U-TDOA positioning method.

Table 124

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UTRAN Cell Identifier	M		9.2.2.37	
Frequency Information	M		9.2.2.42	
Choice <i>RRC State</i>	M			
> <i>CELL_DCH</i>				
>>Uplink DPCH Information	M		9.2.2.41	
>>Compressed Mode Assistance Data	O		9.2.2.44	FDD only
>> DCH Information	0..1			
>>> TFCS	1..<maxTF C>			
>>>>CTFC	M		9.2.2.49	
>>> TrCH Information List	1..<maxTr CH>			
>>>>UL TrCH Information	M		9.2.2.60	
>> E-DPCH Information	0..1			FDD only
>>>Maximum Set of E-DPDCHs	M		9.2.2.75	
>>>Puncture Limit	M		9.2.2.76	
>>>E-TFCS Information	M		9.2.2.77	
>>>E-TTI	M		9.2.2.79	
>>>E-DPCCH Power Offset	O		9.2.2.80	
> <i>CELL_FACH</i>				
>>PRACH Parameters	M		9.2.2.43	
>>C-RNTI	M		9.2.2.45	
>>USCH parameters	O		9.2.2.95	TDD only

Table 125

Range bound	Explanation
maxTFC	Maximum number of TFC. The value is 1024.
maxTrCH	Maximum number of Transport Channels. The value is 32.

9.2.2.75 Maximum Set of E-DPDCHs

The Maximum Set of E-DPDCHs parameter, as defined in [16], is used in UTDOA positioning method.

Table 126

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Maximum Set of E-DPDCHs			ENUMERATED (vN64, vN32, vN16, vN8, vN4, v2xN4, v2xN2, v2xN2plus2xN4, ...)	

9.2.2.76 Puncture Limit

The Puncture Limit parameter is used in UTDOA positioning method indicating the limit in the amount of puncturing that can be applied in order to minimise the number of dedicated physical channels.

Table 127

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Puncture Limit			INTEGER (0..15)	Unit: % Range: 40..100 % Step: 4 % 100% means no puncturing

9.2.2.77 E-DCH Transport Format Combination Set Information (E-TFCS Information)

This IE is used in UTDOA positioning method. Whereas the related Transport Block sizes are standardised in [ref is FFS] this IE gives details on the referenced Transport Block Size Table and the Reference E-TFCIs.

Table 128

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
E-DCH Transport Format Combination Set Index	M		INTEGER (1..4, ...)	Indicates which standardised E-TFCS Transport Block Size Table shall be used. The related tables are specified in [ref FFS].
Reference E-TFCI Information		<i>0..<maxnoofRefETFCIs></i>		
>Reference E-TFCI	M		INTEGER (0..127)	
>Reference E-TFCI Power Offset	M		9.2.2.78	

Table 129

Range Bound	Explanation
<i>maxnoofRefETFCIs</i>	Maximum number of signalled reference E-TFCIs

9.2.2.78 Reference E-TFCI Power Offset

The Reference E-TFCI Power Offset is used in UTDOA positioning method indicating how to calculate the reference E-TFC gain factor.

Table 130

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Reference E-TFCI Power Offset			INTEGER (0..8)	According to mapping in ref. [17] subclause 4.2.1.3

9.2.2.79 E-TTI

The E-TTI parameter is used in UTDOA positioning method indicating the Transmission Time Interval for E-DPCH operation.

Table 131

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
E-TTI			ENUMERATED (2ms, 10ms, ...)	

9.2.2.80 E-DPCCH Power Offset

The E-DPCCH Power Offset is used in UTDOA positioning method indicating how to calculate the E-DPCCH gain factor.

Table 132

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
E-DPCCH Power Offset			INTEGER (0..8)	According to mapping in ref. [17] subclause 4.2.1.3.

9.2.2.81 Cell Parameter ID

The Cell Parameter ID identifies unambiguously the Code Groups, Scrambling Codes, Midambles and Toffset (see ref. [18]).

Table 133

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Cell Parameter ID			INTEGER (0..127,...)	

9.2.2.82 TFCI Coding

The TFCI Coding describes the way how the TFCI bits are coded. By default 1 TFCI bit is coded with 4 bits, 2 TFCI bits are coded with 8 bits, 3-5 TFCI bits are coded with 16 bits and 6-10 TFCI bits are coded with 32 bits.

Table 134

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
TFCI Coding			ENUMERATED (4, 8, 16, 32,...)	

9.2.2.83 Repetition Length

The Repetition Length represents the number of consecutive Radio Frames inside a Repetition Period in which the same Time Slot is assigned to the same Physical Channel see ref. [4].

Table 135

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Repetition Length			INTEGER (1..63)	

9.2.2.84 Repetition Period

The Repetition Period represents the number of consecutive Radio Frames after which the same assignment scheme of Time Slots to a Physical Channel is repeated. This means that if the Time Slot K is assigned to a physical channel in the Radio Frame J , it is assigned to the same physical channel also in all the Radio Frames $J+n*Repetition\ Period$ (where n is an integer) see ref. [4].

Table 136

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Repetition Period			ENUMERATED (1, 2, 4, 8, 16, 32, 64,...)	

9.2.2.85 TDD DPCH Offset

The Offset represents the phase information for the allocation of a group of dedicated physical channels. The first range is used when a starting offset is not required and the TDD Physical channel offset for each DPCH in the CCTrCH shall be directly determined from the TDD DPCH Offset. The second range is used when a starting offset is required. The TDD DPCH Offset shall map to the CFN and the TDD Physical Channel Offset for each DPCH in this CCTrCH shall be calculated by TDD DPCH Offset *mod* Repetition period, see ref. [4].

Table 137

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Offset Type</i>				
> <i>Initial Offset</i>				
>>TDD DPCH Offset Value	M		INTEGER (0..255)	
> <i>No Initial Offset</i>				
>>TDD DPCH Offset Value	M		INTEGER (0..63)	

9.2.2.86 UL Timeslot Information

The *UL Timeslot Information* IE provides information on the time slot allocation for an UL DPCH.

Table 138

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UL Timeslot Information		1..<maxno ofULts>		
>Time Slot	M		9.2.2.87	
>Midamble Shift And Burst Type	M		9.2.2.88	
>TFCI Presence	M		9.2.2.89	
>UL Code Information	M		9.2.2.90	

9.2.2.87 Time Slot

The Time Slot represents the minimum time interval inside a Radio Frame that can be assigned to a Physical Channel.

Table 139

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Time Slot			INTEGER (0..14)	

9.2.2.88 Midamble Shift And Burst Type

This information element indicates burst type and midamble allocation.

The 256 chip midamble supports 3 different time shifts, the 512 chips midamble may support 8 or even 16 time shifts.

Three different midamble allocation schemes exist:

Default midamble: the midamble shift is selected by layer 1 depending on the associated channelisation code (DL and UL)

Common midamble: the midamble shift is chosen by layer 1 depending on the number of channelisation codes (possible in DL only)

UE specific midamble: a UE specific midamble is explicitly assigned (DL and UL)

Table 140

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Burst Type</i>				
> <i>Type1</i>				
>>Midamble Configuration Burst Type 1 And 3	M		INTEGER (4, 8, 16)	As defined in [19]
>>CHOICE <i>Midamble Allocation Mode</i>	M			
>>>Default <i>Midamble</i>			NULL	
>>>Common <i>Midamble</i>			NULL	
>>>UE Specific <i>Midamble</i>				
>>Midamble Shift Long	M		INTEGER (0..15)	
> <i>Type2</i>				
>>Midamble Configuration Burst Type 2	M		INTEGER (3,6)	As defined in [19]
>>CHOICE <i>Midamble Allocation Mode</i>	M			
>>>Default <i>Midamble</i>			NULL	
>>>Common <i>Midamble</i>			NULL	
>>>UE Specific <i>Midamble</i>				
>>Midamble Shift Short	M		INTEGER (0..5)	
> <i>Type3</i>				UL only
>>Midamble Configuration Burst Type 1 And 3	M		INTEGER (4, 8, 16)	As defined in [19]
>>CHOICE <i>Midamble Allocation Mode</i>	M			
>>>Default <i>Midamble</i>			NULL	
>>>UE Specific <i>Midamble</i>				
>>Midamble Shift Long	M		INTEGER (0..15)	

9.2.2.89 TFCI Presence

The TFCI Presence parameter indicates whether the TFCI shall be included. [TDD - If it is present in the timeslot, it will be mapped to the channelisation code defined by [19].]

Table 141

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
TFCI presence			ENUMERATED (Present, Not Present)	

9.2.2.90 TDD UL Code Information

The *TDD UL Code Information* IE provides information for UL Codes that have been established.

Table 142

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
TDD UL Code Information		1..<maxno ofDPCHs>		
>TDD Channelisation Code	M		9.2.2.91	

Table 143

Range Bound	Explanation
maxnoofDPCHs	Maximum number of DPCHs in one CCTrCH

9.2.2.91 TDD Channelisation Code

The Channelisation Code Number indicates which Channelisation Code is used for a given Physical Channel. In TDD the Channelisation Code is an Orthogonal Variable Spreading Factor code, that can have a spreading factor of 1, 2, 4, 8 or 16.

Table 144

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
TDD Channelisation Code			ENUMERATED ((1/1), (2/1), (2/2), (4/1), .. (4/4), (8/1), .. (8/8), (16/1), .. (16/16),...)	

9.2.2.92 Special Burst Scheduling

This information element expresses the number of frames between special burst transmissions during DTX.

Table 145

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Special Burst Scheduling			INTEGER (1..256)	Number of frames between special burst transmission during DTX

9.2.2.93 Max PRACH Midamble Shift

Indicates the maximum number of Midamble shifts to be used in a cell.

Table 146

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Max PRACH Midamble Shift			ENUMERATED (4, 8,...)	

9.2.2.94 PRACH Midamble

The PRACH Midamble indicates if only the Basic Midamble Sequence or also the time-inverted Midamble Sequence is used.

Table 147

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PRACH Midamble			ENUMERATED (Inverted, Direct, ...)	

9.2.2.95 USCH Parameters

In Cell-FACH state, when the UE supports the USCH, and the CRNC is equal to the SRNC, the UE may be given periodic allocations on the uplink shared channel. Furthermore, the UE may also be configured to generate special bursts instead of uplink shared channel transmissions. This information element defines the uplink shared channel transmissions.

Table 148

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Cell Parameter ID	M		9.2.2.81	
TFCI Coding	M		9.2.2.82	
Puncture Limit	M		9.2.2.76	
Repetition Period	M		9.2.2.84	This is the scheduling interval on the USCH.
USCH Scheduling Offset	M		9.2.2.96	
UL Timeslot Information	M		9.2.2.86	
TFCS	1..<maxTF C>			
>CTFC	M		9.2.2.49	
TrCH Information List	1..<maxTr CH>			
>UL TrCH Information	M		9.2.2.60	

Table 149

Range bound	Explanation
maxTFC	Maximum number of TFC. The value is 1024.
maxTrCH	Maximum number of Transport Channels. The value is 32.

9.2.2.96 USCH Scheduling Offset

This information element indicates the offset relative to CFN=0 that the transmission on the uplink shared channel shall take place.

Table 150

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
USCH scheduling offset			INTEGER(0..255)	

9.2.2.97 Include Velocity

This element indicates that the UE's velocity is requested.

Table 151

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Include Velocity	M		ENUMERATED (requested)	

9.2.2.98 Velocity Estimate

The *Velocity Estimate* IE is used to describe the UE's velocity. The reference system is the same as used in [11].

Table 152

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice <i>Velocity Estimate</i>				
>Horizontal Velocity				Horizontal speed and bearing (the direction of travel).
>>Horizontal Speed and Bearing	M		9.2.2.99	
>Horizontal with Vertical Velocity				Horizontal speed and bearing (the direction of travel) as well as vertical speed and the direction (upward or downward)
>>Horizontal Speed and Bearing	M		9.2.2.99	
>>Vertical Velocity	M		9.2.2.100	
>Horizontal Velocity with Uncertainty				Horizontal speed, bearing (the direction of travel), and the uncertainty of the reported speed.
>>Horizontal Speed and Bearing	M		9.2.2.99	
>>Uncertainty Speed	M		INTEGER (0..255)	Uncertainty speed is encoded in increments of 1 kilometer per hour using an 8 bit binary coded number (N). The value of N gives the uncertainty speed except for N=255 which indicates that the uncertainty is not specified
>Horizontal with Vertical Velocity and Uncertainty				Horizontal speed and bearing (the direction of travel) as well as vertical speed and the direction (upward or downward) and the uncertainty of the reported speed.
>>Horizontal Speed and Bearing	M		9.2.2.99	
>>Vertical Velocity	M		9.2.2.100	
>>Horizontal Uncertainty Speed	M		INTEGER (0..255)	Horizontal Uncertainty Speed is encoded in increments of 1 kilometer per hour using an 8 bit binary coded number (N). The value of N gives the uncertainty speed except for N=255 which indicates that the uncertainty is not specified
>>Vertical Uncertainty Speed	M		INTEGER (0..255)	Vertical Uncertainty Speed is encoded in increments of 1 kilometer per hour using an 8 bit binary coded number (N). The value of N gives the uncertainty speed except for N=255 which indicates that the uncertainty is not specified

9.2.2.99 Horizontal Speed and Bearing

This IE contains the two components of horizontal velocity: speed and bearing

Table 153

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bearing	M		INTEGER (0..359)	The direction of movement is given in degrees where '0' represents North, '90' represents East, etc.
Horizontal Speed	M		INTEGER (0.. $2^{11}-1$)	The relationship between (N) and the horizontal speed (h) in kilometers per hour it describes is: $N \leq h < N + 0.5$ (N=0) $N - 0.5 \leq h < N + 0.5$ (0 < N < $2^{11}-1$) $N - 0.5 \leq h$ (N = $2^{11}-1$)

9.2.2.100 Vertical Velocity

This IE contains the two components of vertical velocity: speed and direction

Table 154

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Vertical Speed	M		INTEGER (0.. 2^8-1)	The relationship between (N) and the vertical speed (v) in kilometers per hour it describes is: $N \leq v < N + 0.5$ (N = 0) $N - 0.5 \leq v < N + 0.5$ (0 < N < 2^8-1) $N - 0.5 \leq v$ (N = 2^8-1)
Vertical Speed Direction			ENUMERATED (upward, downward)	

9.2.2.101 GPS Positioning Instructions

This information element contains positioning instructions for GPS positioning method in SAS-centric mode.

Table 155

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Horizontal Accuracy Code	O		9.2.2.38		–	
Vertical Accuracy Code	O		9.2.2.39		–	
GPS Timing of Cell Wanted	M		BOOLEAN	This IE is set to TRUE if the UE is requested to report SFN-GPS timing of the reference cell.	–	
Additional Assistance Data Request	M		BOOLEAN	TRUE indicates that the UE is requested to send an additional assistance data request if the provided assistance data are not sufficient.	–	
Measurement Validity	O		ENUMERATED(CELL_DCH, all states except CELL_DCH, all states, ...)		YES	ignore

9.2.2.102 UE Position Estimate Info

The UE Position Estimate Info is used in UE-based positioning methods providing the UE position estimate from the RNC to the SAS in SAS-centric mode.

Table 156

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Reference Time</i>	M			
> <i>UTRAN GPS reference time Result</i>			9.2.2.104	
> <i>GPS reference time only</i>				
>>GPS TOW msec	M		INTEGER (0..6.048*10 ⁸ -1, ...)	GPS Time of Week in milliseconds.
> <i>Cell timing</i>				
>>SFN	M		INTEGER (0..4095)	SFN during which the position was calculated.
>>UC-ID	M		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for SFN.
UE Position Estimate	M		Geographical Area 9.2.2.6	

9.2.2.103 UTRAN-GPS Reference Time

Table 157

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UTRAN GPS timing of cell frames	M		INTEGER (0..2322431999999, ...)	GPS timing of cell frames in steps of 1 chip.
UC-ID	O		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GPS TOW-SFN relationship.
SFN	M		INTEGER (0..4095)	The SFN which the UTRAN GPS timing of cell frames time stamps.

9.2.2.104 UTRAN-GPS Reference Time Result

Table 158

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE GPS timing of cell frames	M		INTEGER(0..37158911999999, ...)	GPS Time of Week in units of 1/16 th UMTS chips according to [13].
UC-ID	M		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GPS TOW-SFN relationship
SFN	M		INTEGER(0..4095)	This IE indicates the SFN at which the UE timing of cell frame is captured.

9.2.2.105 $T_{\text{UTRAN-GPS}}$ Drift Rate

Table 159

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
$T_{\text{UTRAN-GPS}}$ Drift Rate	O		ENUMERATED (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50, ...)	In 1/256 chips per sec.

9.2.2.106 Periodic Position Calculation Info

The Periodic Position Calculation Info contains information required for periodic location in RNC-centric mode.

Table 160

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Reference Number	M		INTEGER(0..32767, ...)	This IE is used to uniquely associate all periodic Position Calculation procedures belonging to the location of the same target UE for periodic location. Position Calculation procedures belonging to the same target UE for periodic location shall use the same Reference Number.
Amount of Outstanding Requests	M		INTEGER(1..8639999,...)	This IE indicates the amount of outstanding periodic requests. This IE shall be set to the total number of periodic requests in the first Position Calculation Request message, and decrement by 1 for each new Position Calculation Request for periodic location. When the number reaches 1, the SAS will know that the periodic location is complete.
Reporting Interval	M		INTEGER(1..8639999,...)	This IE indicates the reporting interval in seconds when the SAS can expect a next Position Calculation Request associated to the same target UE in periodic location.

9.2.2.107 Periodic Location Info

The Periodic Location Info contains the periodic reporting interval and reporting amount for periodic location.

Table 161

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Reporting Amount	M		INTEGER(1..8639999,...)	This IE indicates the amount of periodic reports.
Reporting Interval	M		INTEGER(1..8639999,...)	This IE indicates the reporting interval in seconds.

9.2.2.108 Amount of Reporting

The Amount of Reporting together with the *RNC Response Time IE* in a POSITION ACTIVATION REQUEST message defines the periodical reporting criteria.

Table 162

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Amount of Reporting	M		ENUMERATED(2, 4, 8, 16, 32, 64, Infinity, ...)	Amount of reporting for a periodic location procedure.

9.2.2.109 Measurement Instructions Used

This information element contains measurement instructions used by the SRNC upon reception of a POSITION ACTIVATION REQUEST message.

Table 163

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Measurement Validity	M		ENUMERATED(CELL_DCH, all states except CELL_DCH, all states, ...)	

9.2.2.110 RRC State Change

Table 164

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
New RRC State	M		ENUMERATED(CELL_DCH, CELL_FACH, CELL_PCH, URA_PCH, ...)	

9.2.2.111 Periodic Position Termination Cause

The Position Periodic Termination Cause element indicates the reason for termination of a periodic reporting procedure in SAS-centric mode.

Table 165

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Periodic Position Termination Cause	M		ENUMERATED(RRC State Transition, Cancelled by SRNC, Cancelled by SAS, Undefined, ...)	

9.2.2.112 Requested Cell-ID Measurements

This information element contains a list of requested measurements for Cell-ID positioning method in SAS-centric mode.

Table 166

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Choice <i>mode</i>	M			
> <i>FDD</i>				
>>Round Trip Time Info	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Round Trip Time Info</i> IE in the Cell-ID Measured Results Info List.
>>Pathloss	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Pathloss</i> IE in the Cell-ID Measured Results Info List.
>>Round Trip Time Info With Type 1	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Round Trip Time Info With Type 1</i> IE in the Cell-ID Measured Results Info List.
>>CPICH RSCP	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>CPICH RSCP</i> IE in the Cell-ID Measured Results Info List.
>>CPICH Ec/N0	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>CPICH Ec/N0</i> IE in the Cell-ID Measured Results Info List.
> <i>TDD</i>				
>>Rx Timing Deviation Info	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Rx Timing Deviation Info</i> IE in the Cell-ID Measured Results Info List.
>>Pathloss	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Pathloss</i> IE in the Cell-ID Measured Results Info List.
>>Rx Timing Deviation LCR Info	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Rx Timing Deviation LCR Info</i> IE in the Cell-ID Measured Results Info List.
>>Rx Timing Deviation 768Info	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Rx Timing Deviation 768Info</i> IE in the Cell-ID Measured Results Info List.
>>Rx Timing Deviation 384ext Info	M		BOOLEAN	If set to TRUE, the RNC is requested to include the <i>Rx Timing Deviation 384ext Info</i> IE in the Cell-ID Measured Results Info List.

9.2.2.113 DGANSS Corrections

This IE contains DGANSS corrections to be used by the UE.

Table 167

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
DGANSS Reference Time	M		INTEGER(0..3570 by step of 30)	Seconds. Time in GNSS system time (modulo 3600 s) when the DGANSS corrections were calculated
DGANSS Information		1 to <maxSgnType>		
>GANSS Signal ID	O		INTEGER(0..3, ...)	Coded as defined in [4].

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>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)	
>DGANSS Signal Information	C- Status/Health	1 to <maxGANSSSat>		If the Cipher information is included these fields are ciphered.
>>SatID	M		INTEGER(0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>>IOD	M		BIT STRING(10)	
>>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
>>RRC	M		INTEGER(-127..127)	Scaling factor 0.032 meters/sec

Table 167A

Range bound	Explanation
<i>maxSgnType</i>	Maximum number of additional signals in GNSS to measure. The value of <i>maxSgnType</i> is 4
<i>maxGANSSSat</i>	Maximum number of satellites for which data is included in this IE. The value of <i>maxGANSSSat</i> is 32

Table 167B

Condition	Explanation
<i>Status/Health</i>	This IE shall be present if the Status/Health IE value is not equal to "no data" or "invalid data".

9.2.2.114 GANSS Almanac and Satellite Health

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

Table 168

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
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IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Week Number	M		INTEGER(0..255)	Almanac reference week , number of weeks since the beginning of GANSS specific system time (mod 256)
SV ID Mask	M		BIT STRING(36)	Defines the SV IDs of the satellites included [22].
<i>CHOICE Almanac Model</i>	M			
<i>>Keplerian Parameters</i>				
<i>>>T_{oa}</i>	M		INTEGER(0..255)	Scaling factor 2 ¹² s Reference time of almanac within week in GANSS TOD time base
<i>>>IOD_a</i>	M		INTEGER(0..3)	Issue-Of –Data, common to all satellites
<i>>>>Satellite Information KP</i>		1 to <maxGANSSSat>		Almanacs are in the order of the SV IDs, the smallest ID first.
<i>>>>e</i>	M		BIT STRING(11)	Eccentricity, dimensionless [22]
<i>>>>δi</i>	M		BIT STRING(11)	semi-circles [22]
<i>>>>OMEGADOT</i>	M		BIT STRING(11)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [22]
<i>>>>SV Health KP</i>	M		BIT STRING(4)	dimensionless
<i>>>>delta A^{1/2}</i>	M		BIT STRING(17)	Semi-Major Axis delta (meters) ^{1/2} [22]
<i>>>>OMEGA₀</i>	M		BIT STRING(16)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [22]
<i>>>>M₀</i>	M		BIT STRING(16)	Mean Anomaly at Reference Time (semi-circles) [22]
<i>>>>ω</i>	M		BIT STRING(16)	Argument of Perigee (semi-circles) [22]
<i>>>>af₀</i>	M		BIT STRING(14)	Seconds [22]
<i>>>>af₁</i>	M		BIT STRING(11)	sec/sec [22]

Table 168A

Range bound	Explanation
<i>maxGANSSSat</i>	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 32

9.2.2.115 GANSS Clock Model

The IE contains fields needed to model the GANSS clock parameters.

Table 169

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
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IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Satellite Clock Model		1 to <4>		There may be more than one clock model included if defined in SIS ICD (e.g. two for Galileo)
>t _{oc} _LSB	M		INTEGER(0..511)	Least significant bits of Time-of-Clock in seconds
>a _{i2}	M		BIT STRING(12)	defined in [22]
>a _{i1}	M		BIT STRING(18)	defined in [22]
>a _{i0}	M		BIT STRING(28)	defined in [22]
>T _{GD}	M		BIT STRING(10)	defined in [22]
>Model ID	O		INTEGER(0..1)	Coded as defined in [4].

9.2.2.116 GANSS Ionospheric Model

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

Table 170

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
a _{i0}	M		BIT STRING(12)	This parameter is used as defined in [22]
a _{i1}	M		BIT STRING(12)	This parameter is used as defined in [22]
a _{i2}	M		BIT STRING(12)	This parameter is used as defined in [22]
GANSS Ionosphere Regional Storm Flags	O			
>Storm Flag 1	M		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 2	M		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 3	M		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 4	M		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 5	M		BOOLEAN	This parameter is used as defined in [22]

9.2.2.117 GANSS Measured Results

Table 171

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
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IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE <i>Reference Time</i>	M			
> <i>UTRAN Reference Time</i>				
>>UE GANSS Timing of Cell Frames	M		INTEGER(0..86399999999750 by step of 250)	GANSS Time of Day (TOD) in ns
>>GANSS Time ID	O		INTEGER(0..7)	Coded as defined in [4].
>>GANSS TOD Uncertainty	O		INTEGER(0..127)	See note 1.
>>CHOICE <i>mode</i>	M			
>>>FDD				
>>>>Primary CPICH Info	M		Primary Scrambling Code 9.2.2.46	Identifies the reference cell for the GANSS TOD-SFN relationship.
>>>TDD				
>>>>Cell Parameters ID	M		Cell Parameter ID 8.2.2.81	Identifies the reference cell for the GANSS TOD-SFN relationship.
>>Reference SFN	M		INTEGER(0..4095)	The SFN for which the location is valid. This IE indicates the SFN at which the UE timing of cell frames is captured.
> <i>GANSS Reference Time Only</i>				
>>GANSS TOD msec	M		INTEGER(0..3599999)	GANSS Time of Day (modulo 1 hour) in milliseconds (rounded down to the nearest millisecond unit).
>>GANSS Time ID	O		INTEGER(0..7)	Coded as defined in [4].
>>GANSS TOD Uncertainty	O		INTEGER(0..127)	See note 1.
GANSS Generic Measurement Information	M	1 to <maxGANSS>		
>GANSS ID	O		INTEGER(0..7)	Coded as defined in [4].
>GANSS Signal ID	O		INTEGER(0..3, ...)	Coded as defined in [4].
> GANSS Measurement Parameters	M	1 to <maxGANSSSat>		
>>Satellite ID	M		INTEGER(0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>>C/N ₀	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).
>>Multipath Indicator	M		ENUMERATED(NM, low, medium, high)	Coding as in 9.2.2.12
>>Carrier Quality Indicaton	O		BIT STRING(2)	Coded as defined in [4].
>>Code Phase	M		INTEGER(0..2 ²¹ -1)	Scale factor 2 ²¹ Code phase for the particular satellite signal at the time of

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
				measurement in the units of milliseconds. Increasing binary values of the field signify increasing measured pseudoranges. GNSS specific code phase measurements (e.g. chips) are converted into unit of ms by dividing the measurements by the nominal values of the measured signal chipping rate.
>>Integer Code Phase	O		INTEGER(0..63)	In ms Indicates the integer millisecond difference of the code phase measurement made by the UE with respect to the first satellite signal measurement in the GANSS Measurement Parameters list only if the UE has information of the absolute integer millisecond difference.
>>Code Phase RMS Error	M		INTEGER(0..63)	Coding as Pseudorange RMS Error in section 9.2.2.12
>>Doppler	M		INTEGER(-32768..32767)	m/s, scale factor 0.04. Doppler measured by the UE for the particular satellite signal
>>ADR	O		INTEGER(0..33554431)	Meters, scale factor 2^{-10} ADR measurement measured by the UE for the particular satellite signal.

Table 171A

Range bound	Explanation
maxGANSS	Maximum number of GANSS. The value of maxGANSS is 8.
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 32

NOTE 1: GANSS TOD Uncertainty

This parameter provides the accuracy of the relation between GANSS TOD and UTRAN time if UTRAN GANSS timing of cell frames is provided. Its coding is defined in [4].

9.2.2.118 GANSS Navigation Model

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

Table 172

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Non-Broadcast Indication	O		ENUMERATED(true)	If this IE is present, GANSS navigation model is not derived from satellite broadcast. See NOTE 1
T _{oe/c} MSB	<i>C-Orbit model</i>		INTEGER(0..31)	The most significant bits of parameters Time-of-Ephemeris and Time-of-Clock in seconds, scale factor 21600

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
e MSB	<i>C-Orbit model</i>		INTEGER(0..127)	The most significant bits of eccentricity, scale factor 2^{-8}
SqrtA MSB	<i>C-Orbit model</i>		INTEGER(0..63)	The most significant bits of Semi-Major Axis in (meters) ^{1/2} , scale factor 2^7
Satellite Information	M	1 to <maxGANSSSat>		
>SatID	M		INTEGER(0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>SV Health	M		BIT STRING(5)	Coded as defined in [4].
>IOD	M		BIT STRING(10)	
>GANSS Clock Model	M		GANSS clock model 9.2.2.115	
>GANSS Orbit Model	M		GANSS orbit model 9.2.2.119	

Table 172A

Range bound	Explanation
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 32

Table 172B

Condition	Explanation
<i>Orbit model</i>	The IE shall be present if the <i>GANSS Orbit Model</i> IE indicates "Keplerian Parameters"

NOTE 1 : The Non-Broadcast Indication allows to inform that the navigation model is bit-to-bit the one broadcast by the satellite. If it is set to 1, the UE is informed that techniques such as data wiping off applied to the navigation model may not work for instance.

9.2.2.119 GANSS Orbit Model

This IE contains information for GANSS orbit model parameters.

Table 173

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
<i>CHOICE Orbit Model</i>	M			
> <i>Keplerian Parameters</i>				
>>t _{oe} _LSB	M		INTEGER(0..511)	Least significant bits of Time-of-Ephemeris in seconds, scale factor 60
>> ω	M		BIT STRING(32)	Argument of Perigee (semi-circles) [22]
>> Δn	M		BIT STRING(16)	Mean Motion Difference From Computed Value (semi-circles/sec) [22]
>>M ₀	M		BIT STRING(32)	Mean Anomaly at Reference Time (semi-circles) [22]

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>>OMEGAdot	M		BIT STRING(24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [22]
>>e_LSB	M		INTEGER(0. .33554431)	Least significant bits of eccentricity, scale factor 2^{-33}
>>ldot	M		BIT STRING(14)	Rate of Inclination Angle (semi-circles/sec) [22]
>>sqrtA_LSB	M		INTEGER(0. .67108863)	Least significant bits of Semi-Major Axis in (meters) ^{1/2} , scale factor 2^{-19}
>>i ₀	M		BIT STRING(32)	Inclination Angle at Reference Time (semi-circles) [22]
>>OMEGA ₀	M		BIT STRING(32)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [22]
>>C _{rs}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) [22]
>>C _{is}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) [22]
>>C _{us}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) [22]
>>C _{rc}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) [22]
>>C _{ic}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) [22]
>>C _{uc}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) [22]

9.2.2.120 GANSS Positioning Instructions

This information element contains positioning instructions for GANSS positioning method in SAS-centric mode.

Table 174

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Horizontal Accuracy Code	O		9.2.2.38	
Vertical Accuracy Code	O		9.2.2.39	
GANSS Timing of Cell Wanted	M		BOOLEAN	This IE is set to TRUE if the UE is requested to report SFN-GANSS timing of the reference cell.
Additional Assistance Data Request	M		BOOLEAN	TRUE indicates that the UE is requested to send an additional assistance data request if the provided assistance data are not sufficient.
Measurement Validity	O		ENUMERATED(CELL_DCH, all states except CELL_DCH, all states, ...)	

9.2.2.121 GANSS-UTRAN Time Relationship Uncertainty

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

Table 175

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS-UTRAN Time Relationship Uncertainty	M		ENUMERATED (50ns, 500ns, 1us, 10us, 1ms, 10ms, 100ms, unreliable,...)	RNC estimate of uncertainty in GANSS-UTRAN time relationship
GANSS ID	O		INTEGER (0..7)	Coded as defined in [4].

9.2.2.122 GANSS Real Time Integrity

This IE contains parameters that describe the real-time status of the GANSS constellation.

Table 176

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Satellite Information		1 to <maxGANSSSat>		
>Bad GANSS SatID	M		INTEGER(0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>Bad GANSS Signal ID	O		INTEGER(0..4, ...)	Coded as defined in [4].

Table 176A

Range bound	Explanation
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 32

9.2.2.123 GANSS Reference Measurement Information

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

Table 177

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
GANSS Signal ID	O		INTEGER(0..3, ...)	Coded as defined in [4].
Satellite Information		1 to <maxGANSSSat>		
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>Doppler (0 th order term)	M		INTEGER(-2048..2047)	Scaling factor 0.5 m/s Conversion between m/s and Hz shall be made by using the <i>nominal</i> wavelength of the assisted signal.
>Extra Doppler	O			
>>Doppler (1 st order term)	M		INTEGER (-42..21)	Scaling factor 1/210 m/s ²
>>Doppler Uncertainty	M		ENUMERATED (40,20,10,5,2.5)	m/s. The Doppler experienced by a stationary UE is in the range "Doppler – Doppler Uncertainty" to "Doppler + Doppler Uncertainty".
>Code Phase	M		INTEGER(0..1023)	ms, scaling factor 2 ⁻¹⁰ <i>Nominal</i> chipping rate of the GNSS signal shall be used in conversion. Increasing binary values of the field signify increasing predicted pseudoranges.
>Integer Code Phase	M		INTEGER(0..127)	ms. Integer code phase (expressed modulo 128 ms) currently being transmitted at the GANSS Reference Time, as seen by a receiver at the Reference Location
>Code Phase Search Window	M		INTEGER(0..31)	Expected code-phase is in the range "Code Phase – Code Phase Search Window" to "Code Phase + Code Phase Search Window". Coded as defined in [4].
>Azimuth and Elevation	O			
>>Azimuth	M		INTEGER(0..31)	Scaling factor 11.25 Degrees An angle of x degrees means the satellite azimuth a is in the range $x \leq a < x+11.25$ degrees.
>>Elevation	M		INTEGER(0..7)	Scaling factor 11.25 Degrees An angle of y degrees means the satellite elevation e is in the range $y \leq e < y+11.25$ degrees except for y=78.75 where the range is extended to include 90 degrees.

Table 177A

Range bound	Explanation
<i>maxGANSSSat</i>	Maximum number of satellites for which data is included in this IE. The value of <i>maxGANSSSat</i> is 32

9.2.2.124 GANSS Reference Time

Table 178

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
GANSS Day	O		INTEGER(0..8191)	The number of days from the beginning of GNSS system time (mod 8192)
GANSS TOD	M		INTEGER(0..86399)	GANSS Time of Day in seconds
GANSS TOD Uncertainty	O		INTEGER(0..127)	Note
GANSS Time ID	O		INTEGER(0..7)	Coded as defined in [4].
UTRAN GANSS Reference Time	O			
>UTRAN GANSS Timing of Cell Frames	M		INTEGER(0..863999997 50 by step of 250)	UTRAN GANSS timing of cell frames in steps of 250 ns. Indicates sub-second part of GANSS TOD See [4]
>CHOICE <i>mode</i>	O			
>> <i>FDD</i>				
>>>Primary CPICH Info	M		Primary Scrambling Code 9.2.2.46	Identifies the reference cell for the GANSS TOD-SFN relationship
>> <i>TDD</i>				
>>>Cell Parameters ID	M		Cell Parameter ID 9.2.2.81	Identifies the reference cell for the GANSS TOD-SFN relationship.
>SFN	M		Integer(0..4095)	The SFN which the UTRAN GANSS timing of cell frames time stamps.
T _{UTRAN-GANSS} Drift Rate	O		ENUMERATED (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50,...)	in 1/256 chips per sec.

Note: GANSS TOD Uncertainty

This parameter provides the accuracy of the relation between GANSS TOD and UTRAN time if UTRAN GANSS timing of cell frames is provided. Its coding is defined in [4].

9.2.2.125 GANSS Time Model

The *GANSS Time Model* IE contains a set of parameters needed to relate GANSS time to selected time reference indicated by *GNSS_TO_ID*.

Table 179

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
---------------	----------	-------	-----------------------	-----------------------

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
GANSS Time Model Reference Time	M		INTEGER(0..65535)	GANSS reference time (modulo 1 week) in seconds
T _{A0}	M		INTEGER(-2147483648..2147483647)	Seconds, scale factor 2 ⁻³⁵
T _{A1}	O		INTEGER(-8388608..8388607)	sec/sec, scale factor 2 ⁻⁵¹
T _{A2}	O		INTEGER(-64..63)	sec/sec ² , scale factor 2 ⁻⁶⁸
GNSS_Time Offset_ID	M		INTEGER(0..7)	Coded as defined in [4].
Week Number	O		INTEGER(0..8191)	Reference week of GANSS Time Model

9.2.2.126 GANSS UTC Model

The *GANSS UTC Model* IE contains a set of parameters needed to relate GANSS time to Universal Time Coordinate (UTC).

Table 180

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
A ₁	M		BIT STRING(24)	sec/sec [22]
A ₀	M		BIT STRING(32)	seconds [22]
t _{tot}	M		BIT STRING(8)	seconds [22]
WN _t	M		BIT STRING(8)	weeks [22]
Δt _{LS}	M		BIT STRING(8)	seconds [22]
WN _{LSF}	M		BIT STRING(8)	weeks [22]
DN	M		BIT STRING(8)	days [22]
Δt _{LSF}	M		BIT STRING(8)	seconds [22]

9.2.2.127 GANSS Time Indicator

Table 181

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

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,
    PositionInitiationRequest,
    PositionInitiationResponse,
    PositionInitiationFailure,
    PositionActivationRequest,
    PositionActivationResponse,
    PositionActivationFailure,
    PositionParameterModification,
    Abort,
    PositionPeriodicReport,
    PositionPeriodicResult,
    PositionPeriodicTermination

FROM PCAP-PDU-Contents

    id-PositionCalculation,
    id-InformationExchangeInitiation,
    id-InformationReporting,
    id-InformationExchangeTermination,
    id-InformationExchangeFailure,
    id-ErrorIndication,
    id-privateMessage,
    id-PositionInitiation,
    id-PositionActivation,
    id-PositionParameterModification,
    id-Abort,
    id-PositionPeriodicReport,
    id-PositionPeriodicResult,
    id-PositionPeriodicTermination

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,
    ...,
    positionInitiation |
    positionActivation
}

PCAP-ELEMENTARY-PROCEDURES-CLASS-2 PCAP-ELEMENTARY-PROCEDURE ::= {
    informationReporting |
    informationExchangeTermination |
    informationExchangeFailure |
    errorIndication |
    privateMessage,
    ...,
    positionParameterModification |
    abort
}

```

```

    positionPeriodicReport      |
    positionPeriodicResult     |
    positionPeriodicTermination
}

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

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

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

positionInitiation PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositionInitiationRequest
    SUCCESSFUL OUTCOME      PositionInitiationResponse
    UNSUCCESSFUL OUTCOME    PositionInitiationFailure
    PROCEDURE CODE          id-PositionInitiation
    CRITICALITY              reject
}

positionActivation PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositionActivationRequest
    SUCCESSFUL OUTCOME      PositionActivationResponse
    UNSUCCESSFUL OUTCOME    PositionActivationFailure
    PROCEDURE CODE          id-PositionActivation
    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
}

```

```

positionParameterModification PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositionParameterModification
    PROCEDURE CODE          id-PositionParameterModification
    CRITICALITY             ignore
}

abort PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      Abort
    PROCEDURE CODE          id-Abort
    CRITICALITY             ignore
}

positionPeriodicReport PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositionPeriodicReport
    PROCEDURE CODE          id-PositionPeriodicReport
    CRITICALITY             ignore
}

positionPeriodicResult PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositionPeriodicResult
    PROCEDURE CODE          id-PositionPeriodicResult
    CRITICALITY             ignore
}

positionPeriodicTermination PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositionPeriodicTermination
    PROCEDURE CODE          id-PositionPeriodicTermination
    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,
    CellId-MeasuredResultsSets,
    OTDOA-MeasurementGroup,
    AccuracyFulfilmentIndicator,
    HorizontalAccuracyCode,
    VerticalAccuracyCode,
    RequestType,
    UE-PositioningCapability,
    UC-ID,
    ResponseTime,
    PositioningPriority,
    ClientType,

```


PositioningMethod,
 UTDOAPositioning,
 GPSPositioning,
 OTDOAAssistanceData,
 UTDOA-Group,
 Positioning-ResponseTime,
 EnvironmentCharacterisation,
 PositionData,
 IncludeVelocity,
 VelocityEstimate,
 UE-PositionEstimateInfo,
 OTDOA-MeasuredResultsSets,
 PeriodicPosCalcInfo,
 PeriodicLocationInfo,
 AmountOfReporting,
 MeasInstructionsUsed,
 RRCstateChange,
 PeriodicTerminationCause,
 CellIDPositioning,
 GANSS-MeasuredResultsList,
 GANSSPositioning,
 GANSS-UTRAN-TRU

FROM PCAP-IEs

TransactionID

FROM PCAP-CommonDataTypes

ProtocolExtensionContainer{},
 ProtocolIE-ContainerList{},
 ProtocolIE-Container{},
 ProtocolIE-Single-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-GPS-MeasuredResultsList,
 id-RequestedDataValue,
 id-RequestedDataValueInformation,
 id-TransactionID,
 id-UE-PositionEstimate,
 id-CellId-MeasuredResultsSets,
 id-OTDOA-MeasurementGroup,
 id-AccuracyFulfilmentIndicator,
 id-HorizontalAccuracyCode,
 id-VerticalAccuracyCode,
 id-RequestType,
 id-UE-PositioningCapability,
 id-UC-id,
 id-ResponseTime,
 id-PositioningPriority,
 id-ClientType,
 id-PositioningMethod,
 id-UTDOAPositioning,
 id-GPSPositioning,
 id-OTDOAAssistanceData,
 id-UTDOA-Group,
 id-Positioning-ResponseTime,
 id-EnvironmentCharacterisation,
 id-PositionData,
 id-IncludeVelocity,
 id-VelocityEstimate,
 id-UE-PositionEstimateInfo,
 id-UC-ID-InfEx-Rqst,
 id-OTDOA-MeasuredResultsSets,
 id-PeriodicPosCalcInfo,
 id-PeriodicLocationInfo,

```

    id-AmountOfReporting,
    id-MeasInstructionsUsed,
    id-RRCstateChange,
    id-PeriodicTerminationCause,
    id-CellIDPositioning,
    id-GANSS-MeasuredResultsList,
    id-GANSSPositioning,
    id-GANSS-UTRAN-TRU

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 optional } |
    { ID id-GPS-MeasuredResultsList      CRITICALITY reject  TYPE MeasuredResultsList
      PRESENCE optional },
    ...
}

PositionCalculationRequestExtensions PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-CellId-MeasuredResultsSets   CRITICALITY reject  EXTENSION CellId-MeasuredResultsSets
      PRESENCE optional } |
    { ID id-OTDOA-MeasurementGroup       CRITICALITY reject  EXTENSION OTDOA-MeasurementGroup
      PRESENCE optional } |
    { ID id-HorizontalAccuracyCode       CRITICALITY ignore  EXTENSION HorizontalAccuracyCode
      PRESENCE optional } |
    { ID id-VerticalAccuracyCode         CRITICALITY ignore  EXTENSION VerticalAccuracyCode
      PRESENCE optional } |
    { ID id-UTDOA-Group                  CRITICALITY reject  EXTENSION UTDOA-Group
      PRESENCE optional } |
    { ID id-Positioning-ResponseTime     CRITICALITY ignore  EXTENSION Positioning-ResponseTime
      PRESENCE optional } |
    { ID id-IncludeVelocity               CRITICALITY ignore  EXTENSION IncludeVelocity
      PRESENCE optional } |
    { ID id-PeriodicPosCalcInfo           CRITICALITY ignore  EXTENSION PeriodicPosCalcInfo
      PRESENCE optional } |
    { ID id-GANSS-MeasuredResultsList     CRITICALITY reject  EXTENSION GANSS-MeasuredResultsList
      PRESENCE optional },
    ...
}

-- *****
--
-- 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 ::= {

```

```

    { ID id-AccuracyFulfilmentIndicator CRITICALITY ignore EXTENSION AccuracyFulfilmentIndicator
      PRESENCE optional } |
    { ID id-VelocityEstimate CRITICALITY ignore EXTENSION VelocityEstimate
      PRESENCE optional },
    ...
  }

-- *****
--
-- 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 ::= {
  { ID id-GANSS-UTRAN-TRU CRITICALITY reject EXTENSION GANSS-UTRAN-TRU
    PRESENCE conditional },
  -- This IE shall be present if the information requested in the Information Type IE contains
  GANSS-related data
  ...
}

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

```

```

}

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

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

Extension-InformationExchangeObjectType-InfEx-Rqst ::= ProtocolIE-Single-Container {{ Extension-
InformationExchangeObjectType-InfEx-RqstIE }}

Extension-InformationExchangeObjectType-InfEx-RqstIE PCAP-PROTOCOL-IES ::= {
    { ID id-UC-ID-InfEx-Rqst          CRITICALITY reject  TYPE UC-ID-InfEx-Rqst          PRESENCE
mandatory } |
    { ID id-CellId-MeasuredResultsSets CRITICALITY ignore TYPE CellId-MeasuredResultsSets PRESENCE
optional }
}

UC-ID-InfEx-Rqst ::= SEQUENCE {
    referenceUC-ID                UC-ID,
    iE-Extensions                ProtocolExtensionContainer { { UCIDItem-InfEx-Rqst-ExtIEs} }
OPTIONAL,
    ...
}

UCIDItem-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 optional } |
    { 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 ::= {
    ...
}

-- *****
--
-- POSITION INITIATION REQUEST
--
-- *****

PositionInitiationRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    { {PositionInitiationRequestIEs} },
    protocolExtensions   ProtocolExtensionContainer { {PositionInitiationRequestExtensions} }
    OPTIONAL,
    ...
}

PositionInitiationRequestIEs PCAP-PROTOCOL-IES ::= {
    { ID id-RequestType          CRITICALITY reject TYPE RequestType          PRESENCE
  mandatory }|
    { ID id-UE-PositioningCapability CRITICALITY reject TYPE UE-PositioningCapability PRESENCE
  mandatory }|
    { ID id-UC-id                CRITICALITY reject TYPE UC-ID                PRESENCE
  mandatory }|
    { ID id-VerticalAccuracyCode CRITICALITY ignore TYPE VerticalAccuracyCode PRESENCE
  optional }|
    { ID id-ResponseTime         CRITICALITY ignore TYPE ResponseTime         PRESENCE
  optional }|
    { ID id-PositioningPriority   CRITICALITY ignore TYPE PositioningPriority   PRESENCE
  optional }|
    { ID id-ClientType           CRITICALITY ignore TYPE ClientType           PRESENCE
  optional },
    ...
}

PositionInitiationRequestExtensions PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-IncludeVelocity        CRITICALITY ignore EXTENSION IncludeVelocity
  PRESENCE optional }|
    { ID id-PeriodicLocationInfo   CRITICALITY ignore EXTENSION PeriodicLocationInfo
  PRESENCE optional },
    ...
}

-- *****
--
-- POSITION INITIATION RESPONSE
--
-- *****

PositionInitiationResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    { {PositionInitiationResponseIEs} },
    protocolExtensions   ProtocolExtensionContainer { {PositionInitiationResponseExtensions} }
    OPTIONAL,

```

```

}
...
}

PositionInitiationResponseIEs PCAP-PROTOCOL-IES ::= {
  { ID id-UE-PositionEstimate          CRITICALITY reject  TYPE UE-PositionEstimate
  PRESENCE mandatory } |
  { ID id-PositionData                 CRITICALITY ignore  TYPE PositionData
  PRESENCE mandatory } |
  { ID id-AccuracyFulfilmentIndicator   CRITICALITY ignore  TYPE AccuracyFulfilmentIndicator
  PRESENCE optional },
  ...
}

PositionInitiationResponseExtensions PCAP-PROTOCOL-EXTENSION ::= {
  { ID id-VelocityEstimate              CRITICALITY ignore  EXTENSION VelocityEstimate  PRESENCE
optional },
  ...
}

-- *****
--
-- POSITION INITIATION FAILURE
--
-- *****

PositionInitiationFailure ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    { {PositionInitiationFailureIEs} },
  protocolExtensions  ProtocolExtensionContainer { {PositionInitiationFailureExtensions} }
OPTIONAL,
  ...
}

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

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

-- *****
--
-- POSITION ACTIVATION REQUEST
--
-- *****

PositionActivationRequest ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    { {PositionActivationRequestIEs} },
  protocolExtensions  ProtocolExtensionContainer { {PositionActivationRequestExtensions} }
OPTIONAL,
  ...
}

PositionActivationRequestIEs PCAP-PROTOCOL-IES ::= {
  { ID id-PositioningMethod          CRITICALITY reject  TYPE PositioningMethod
  PRESENCE mandatory } |
  { ID id-Positioning-ResponseTime   CRITICALITY ignore  TYPE Positioning-ResponseTime
  PRESENCE mandatory } |
  { ID id-PositioningPriority         CRITICALITY ignore  TYPE PositioningPriority
  PRESENCE optional } |
  { ID id-EnvironmentCharacterisation CRITICALITY ignore  TYPE EnvironmentCharacterisation
  PRESENCE optional } |
  { ID id-UTDOAPositioning           CRITICALITY reject  TYPE UTDOAPositioning
  PRESENCE optional } |
  { ID id-GPSPositioning             CRITICALITY reject  TYPE GPSPositioning
  PRESENCE optional } |
  { ID id-OTDOAAssistanceData        CRITICALITY reject  TYPE OTDOAAssistanceData
  PRESENCE optional },
  ...
}

PositionActivationRequestExtensions PCAP-PROTOCOL-EXTENSION ::= {

```

```

    { ID id-IncludeVelocity          CRITICALITY ignore  EXTENSION IncludeVelocity
    PRESENCE optional } |
    { ID id-AmountOfReporting        CRITICALITY ignore  EXTENSION AmountOfReporting
    PRESENCE optional } |
    { ID id-CellIDPositioning        CRITICALITY ignore  EXTENSION CellIDPositioning
    PRESENCE optional } |
    { ID id-GANSSPositioning         CRITICALITY reject  EXTENSION GANSSPositioning
    PRESENCE optional },
    ...
}

-- *****
--
-- POSITION ACTIVATION RESPONSE
--
-- *****

PositionActivationResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {PositionActivationResponseIEs} },
    protocolExtensions   ProtocolExtensionContainer { {PositionActivationResponseExtensions} }
    OPTIONAL,
    ...
}

PositionActivationResponseIEs PCAP-PROTOCOL-IES ::= {
    { ID id-UE-PositionEstimateInfo    CRITICALITY ignore  TYPE UE-PositionEstimateInfo
    PRESENCE optional } |
    { ID id-GPS-MeasuredResultsList    CRITICALITY reject  TYPE MeasuredResultsList
    PRESENCE optional } |
    { ID id-CellId-MeasuredResultsSets CRITICALITY reject  TYPE CellId-MeasuredResultsSets
    PRESENCE optional } |
    { ID id-OTDOA-MeasuredResultsSets  CRITICALITY reject  TYPE OTDOA-MeasuredResultsSets
    PRESENCE optional } |
    { ID id-UTDOA-Group                CRITICALITY reject  TYPE UTDOA-Group
    PRESENCE optional },
    ...
}

PositionActivationResponseExtensions PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-VelocityEstimate           CRITICALITY ignore  EXTENSION VelocityEstimate
    PRESENCE optional } |
    { ID id-MeasInstructionsUsed       CRITICALITY ignore  EXTENSION MeasInstructionsUsed
    PRESENCE optional } |
    { ID id-GANSS-MeasuredResultsList  CRITICALITY reject  EXTENSION GANSS-MeasuredResultsList
    PRESENCE optional },
    ...
}

-- *****
--
-- POSITION ACTIVATION FAILURE
--
-- *****

PositionActivationFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {PositionActivationFailureIEs} },
    protocolExtensions   ProtocolExtensionContainer { {PositionActivationFailureExtensions} }
    OPTIONAL,
    ...
}

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

PositionActivationFailureExtensions 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 ::= {
  ...
}

-- *****
--
-- POSITION PARAMETER MODIFICATION
--
-- *****

PositionParameterModification ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container          { {PositionParameterModificationIEs} },
  protocolExtensions  ProtocolExtensionContainer { {PositionParameterModificationExtensions} }
OPTIONAL,
  ...
}

PositionParameterModificationIEs PCAP-PROTOCOL-IES ::= {
  { ID id-UC-id          CRITICALITY reject  TYPE UC-ID          PRESENCE
optional } |
  { ID id-UTDOA-Group    CRITICALITY reject  TYPE UTDOA-Group      PRESENCE
optional },
  ...
}

PositionParameterModificationExtensions PCAP-PROTOCOL-EXTENSION ::= {
  { ID id-RRCstateChange  CRITICALITY ignore  EXTENSION RRCstateChange  PRESENCE
optional},
  ...
}

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

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

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

```

```

}
...
}
-- *****
--
-- ABORT
--
-- *****

Abort ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {AbortIEs} },
    protocolExtensions  ProtocolExtensionContainer { {AbortExtensions} }    OPTIONAL,
    ...
}

AbortIEs PCAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore  TYPE Cause          PRESENCE mandatory },
    ...
}

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

-- *****
--
-- POSITION PERIODIC REPORT
--
-- *****

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

PositionPeriodicReport-IEs PCAP-PROTOCOL-IES ::= {
    { ID id-UE-PositionEstimateInfo          CRITICALITY ignore  TYPE UE-PositionEstimateInfo
    PRESENCE optional } |
    { ID id-VelocityEstimate                  CRITICALITY ignore  TYPE VelocityEstimate
    PRESENCE optional } |
    { ID id-GPS-MeasuredResultsList          CRITICALITY ignore  TYPE MeasuredResultsList
    PRESENCE optional } |
    { ID id-CellId-MeasuredResultsSets       CRITICALITY ignore  TYPE CellId-MeasuredResultsSets
    PRESENCE optional } |
    { ID id-OTDOA-MeasuredResultsSets        CRITICALITY ignore  TYPE OTDOA-MeasuredResultsSets
    PRESENCE optional } |
    { ID id-Cause                             CRITICALITY ignore  TYPE Cause
    PRESENCE optional } ,
    ...
}

PositionPeriodicReport-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-GANSS-MeasuredResultsList          CRITICALITY ignore  EXTENSION GANSS-MeasuredResultsList
    PRESENCE optional },
    ...
}

-- *****
--
-- POSITION PERIODIC RESULT
--
-- *****

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

PositionPeriodicResult-IEs PCAP-PROTOCOL-IES ::= {
    { ID id-UE-PositionEstimate                CRITICALITY ignore  TYPE UE-PositionEstimate
    PRESENCE optional } |

```

```

    { ID id-VelocityEstimate          CRITICALITY ignore  TYPE VelocityEstimate
    PRESENCE optional } |
    { ID id-PositionData              CRITICALITY ignore  TYPE PositionData
    PRESENCE optional } |
    { ID id-AccuracyFulfilmentIndicator CRITICALITY ignore  TYPE AccuracyFulfilmentIndicator
    PRESENCE optional } |
    { ID id-Cause                      CRITICALITY ignore  TYPE Cause
    PRESENCE optional },
    ...
}

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

-- *****
--
-- POSITION PERIODIC TERMINATION
--
-- *****

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

PositionPeriodicTermination-IEs PCAP-PROTOCOL-IES ::= {
    { ID id-PeriodicTerminationCause          CRITICALITY ignore  TYPE PeriodicTerminationCause
    PRESENCE optional },
    ...
}

PositionPeriodicTermination-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
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,
    maxSatAlmanac,
    maxNrOfLevels,
    maxNrOfMeasNCell,
    maxNrOfMeasurements,
    maxNrOfPoints,
    maxNrOfExpInfo,
    maxNrOfSets,
    maxRateMatching,
    maxNrOfTFs,
    maxTTI-count,
    maxTS-1,
    maxCCTrCH,
    maxTF,
    maxTFC,
    maxPRACH,
    maxTrCH,

```

```

maxTGPS,
maxNoOfMeasurements,
maxCellMeas,
maxNrOfEDPCCH-PO-QUANTSTEPS,
maxNrOfRefETFCI-PO-QUANTSTEPS,
maxNrOfRefETFCIs,
maxSet,
maxGANSS,
maxGANSSSat,
maxGANSSSet,
maxSgnType,

id-UTRAN-GPSReferenceTime,
id-UTRAN-GPSReferenceTimeResult,
id-GPS-UTRAN-TRU,
id-UTRAN-GPS-DriftRate,
id-OTDOA-AddMeasuredResultsInfo,
id-GPS-ReferenceLocation,
id-rxTimingDeviation768Info,
id-rxTimingDeviation384extInfo,
id-MeasurementValidity,
id-ExtendedRoundTripTime,
id-roundTripTimeInfoWithType1,
id-AddMeasurementInfo,
id-Extended-RNC-ID,
id-GANSS-CommonAssistanceData,
id-GANSS-GenericAssistanceDataList,
id-GANSS-PositioningDataSet,
id-GNSS-PositioningMethod,
id-NetworkAssistedGANSSSupport,
id-TUTRANGANSSMeasurementValueInfo

```

FROM PCAP-Constants

```

Criticality,
ProcedureCode,
ProtocolIE-ID,
TransactionID,
TriggeringMessage

```

FROM PCAP-CommonDataTypes

```

ProtocolExtensionContainer{ },
PCAP-PROTOCOL-EXTENSION

```

FROM PCAP-Containers;

```

-- *****
--
-- Accuracy Fulfilment Indicator
--
-- *****

```

```

AccuracyFulfilmentIndicator ::= ENUMERATED{
    requested-Accuracy-Fulfilled,
    requested-Accuracy-Not-Fulfilled,
    ...
}

```

```

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

```

```

AdditionalMethodType ::= ENUMERATED {
    ue-assisted,
    ue-based,
    ue-based-preferred-but-ue-assisted-allowed,
    ue-assisted-preferred-but-ue-based-allowed,
    ...
}

```

```

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

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

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

-- *****
--
-- 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,
    ...,
    position-calculation-error-invalid-CellID-measured-results,
    position-calculation-error-invalid-OTDOA-measured-results,
    position-calculation-error-AGPS-positioning-method-not-supported,
    position-calculation-error-CellID-positioning-method-not-supported,
    position-calculation-error-OTDOA-positioning-method-not-supported,
    initial-UE-position-estimate-missing,
    position-caclulation-error-invalid-UTDOA-measured-results,
    position-calculation-error-UTDOA-positioning-method-not-supported,
    position-calculation-error-UTDOA-not-supported-UTRAN-cell,
    positioning-method-not-supported,
    loss-of-contact-with-UE,
    sAS-unable-to-perform-UTDOA-positioning-within-response-time,
    location-measurement-failure,
    ue-positioning-error-Not-enough-OTDOA-cells,
    ue-positioning-error-Not-enough-GPS-Satellites,
    ue-positioning-error-Reference-Cell-not-serving-cell,
    ue-positioning-error-Not-Accomplished-GPS-Timing-of-Cell-Frames,
    ue-positioning-error-Undefined-Error,
    position-calculation-error-invalid-Galileo-measured-results,
    position-calculation-error-AGalileo-positioning-method-not-supported,
    ue-positioning-error-Not-enough-Galileo-Satellites,
    ue-positioning-error-Not-Accomplished-Galileo-Timing-of-Cell-Frames
}

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,
    ...
}

-- *****
--
-- Cell Id Measured Results Sets
--
-- *****

CellId-MeasuredResultsSets ::=          SEQUENCE (SIZE (1..maxNrOfMeasurements)) OF
    CellId-MeasuredResultsInfoList

CellId-MeasuredResultsInfoList ::=      SEQUENCE (SIZE (1..maxNrOfMeasNCell)) OF
    CellId-MeasuredResultsInfo

CellId-MeasuredResultsInfo ::=          SEQUENCE {
    uC-ID                                UC-ID,
    uTRANAccessPointPositionAltitude     UTRANAccessPointPositionAltitude,
    ue-PositionEstimate                   UE-PositionEstimate           OPTIONAL,
    roundTripTimeInfo                     RoundTripTimeInfo           OPTIONAL, -- FDD only
    rxTimingDeviationInfo                  RxTimingDeviationInfo       OPTIONAL, -- 3.84Mcps TDD only
    rxTimingDeviationLCRInfo               RxTimingDeviationLCRInfo    OPTIONAL, -- 1.28Mcps TDD only
    pathloss                               Pathloss                     OPTIONAL,
    iE-Extensions                          ProtocolExtensionContainer { { CellId-MeasuredResultsInfo-
ExtIEs } }          OPTIONAL,
    ...
}

CellId-MeasuredResultsInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-rxTimingDeviation768Info       CRITICALITY reject   EXTENSION RxTimingDeviation768Info
    PRESENCE optional } | -- 7.68Mcps TDD only
    { ID id-rxTimingDeviation384extInfo    CRITICALITY reject   EXTENSION RxTimingDeviation384extInfo
    PRESENCE optional } | -- 3.84Mcps TDD only
    { ID id-roundTripTimeInfoWithType1     CRITICALITY ignore   EXTENSION RoundTripTimeInfoWithType1
    PRESENCE optional } | -- FDD only
    { ID id-AddMeasurementInfo             CRITICALITY ignore   EXTENSION AddMeasurementInfo
    PRESENCE optional },
    ...
}

RoundTripTimeInfo ::=                   SEQUENCE {
    ue-RxTxTimeDifferenceType2             UE-RxTxTimeDifferenceType2,
    ue-PositioningMeasQuality              UE-PositioningMeasQuality,
    roundTripTime                          RoundTripTime,
    iE-Extensions                          ProtocolExtensionContainer { { RoundTripTimeInfo-ExtIEs } }
    OPTIONAL,
    ...
}

RoundTripTimeInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-ExtendedRoundTripTime          CRITICALITY ignore   EXTENSION ExtendedRoundTripTime
    PRESENCE optional }, -- FDD only
    ...
}

RoundTripTimeInfoWithType1 ::=          SEQUENCE {
    ue-RxTxTimeDifferenceType1             UE-RxTxTimeDifferenceType1,
    roundTripTime                          RoundTripTime,
    extendedRoundTripTime                  ExtendedRoundTripTime     OPTIONAL, -- FDD only
    iE-Extensions                          ProtocolExtensionContainer { { RoundTripTimeInfoWithType1-
ExtIEs } }          OPTIONAL,
    ...
}

RoundTripTimeInfoWithType1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

UE-RxTxTimeDifferenceType2 ::= INTEGER (0..8191)
UE-RxTxTimeDifferenceType1 ::= INTEGER (768..1280)
UE-PositioningMeasQuality ::= SEQUENCE {
    stdResolution                BIT STRING (SIZE (2)),
    numberOfMeasurements        BIT STRING (SIZE (3)),
    stdOfMeasurements           BIT STRING (SIZE (5)),
    iE-Extensions               ProtocolExtensionContainer { { UE-PositioningMeasQuality-
ExtIEs } } OPTIONAL,
    ...
}

UE-PositioningMeasQuality-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

RoundTripTime ::= INTEGER (0..32766)
-- Actual value RoundTripTime = IE value * 0.0625 + 876

ExtendedRoundTripTime ::= INTEGER (32767..103041)
-- Actual value RoundTripTime = IE value * 0.0625 + 876

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

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

RxTimingDeviationInfo ::= SEQUENCE {
    rxTimingDeviation           RxTimingDeviation,
    timingAdvance               TimingAdvance,
    iE-Extensions               ProtocolExtensionContainer { { RxTimingDeviationInfo-ExtIEs
} } OPTIONAL,
    ...
}

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

RxTimingDeviationLCRInfo ::= SEQUENCE {
    rxTimingDeviationLCR        RxTimingDeviationLCR,
    timingAdvanceLCR           TimingAdvanceLCR,
    iE-Extensions               ProtocolExtensionContainer { { RxTimingDeviationLCRInfo-
ExtIEs } } OPTIONAL,
    ...
}

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

RxTimingDeviation768Info ::= SEQUENCE {
    rxTimingDeviation768        RxTimingDeviation768,
    timingAdvance768           TimingAdvance768,
    iE-Extensions               ProtocolExtensionContainer { { RxTimingDeviation768Info-
ExtIEs } } OPTIONAL,
    ...
}

RxTimingDeviation768Info-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

RxTimingDeviation384extInfo ::= SEQUENCE {
    rxTimingDeviation384ext      RxTimingDeviation384ext,
    timingAdvance384ext         TimingAdvance384ext,
    iE-Extensions               ProtocolExtensionContainer { { RxTimingDeviation384extInfo-
ExtIEs } } OPTIONAL,

```

```

}
...
RxTimingDeviation384extInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
}
...
AddMeasurementInfo ::= SEQUENCE {
    cpich-RSCP          CPICH-RSCP                                OPTIONAL,
    cpich-EcNo          CPICH-EcNo                              OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { { AddMeasurementInfo-ExtIEs } } OPTIONAL,
    ...
}
AddMeasurementInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
}
...
RxTimingDeviation ::= INTEGER (0..8191)
RxTimingDeviationLCR ::= INTEGER (0..511)
RxTimingDeviation768 ::= INTEGER (0..65535)
RxTimingDeviation384ext ::= INTEGER (0..32767)
TimingAdvance ::= INTEGER (0..63)
TimingAdvanceLCR ::= INTEGER (0..2047)
TimingAdvance768 ::= INTEGER (0..511)
TimingAdvance384ext ::= INTEGER (0..255)
Pathloss ::= INTEGER (46..158)
-- Unit: dB; as defined in [4] subclause 10.3.7.3
CPICH-EcNo ::= INTEGER (0..49)
-- According to CPICH_Ec/No in [13]
CPICH-RSCP ::= INTEGER (-5..91)
-- According to CPICH_RSCP in [13]

-- *****
--
-- Cell-ID Positioning (Position Activation Request Message)
--
-- *****

CellIDPositioning ::= SEQUENCE {
    requestedCellIDMeasurements RequestedCellIDMeasurements,
    iE-Extensions               ProtocolExtensionContainer { { CellIDPositioning-ExtIEs } }
OPTIONAL,
    ...
}
CellIDPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
}
...

RequestedCellIDMeasurements ::= CHOICE {
    fdd SEQUENCE {
        roundTripTimeInfoWanted    BOOLEAN,
        pathlossWanted             BOOLEAN,
        roundTripTimeInfoWithType1Wanted    BOOLEAN,
        cpichRSCPWanted            BOOLEAN,
        cpicEcNoWanted             BOOLEAN,
        iE-Extensions              ProtocolExtensionContainer { {
RequestedCellIDMeasurementsFDD-ExtIEs } } OPTIONAL,
        ...
    },
    tdd SEQUENCE {
        rxTimingDeviationInfoWanted    BOOLEAN,
        pathlossWanted                 BOOLEAN,
        rxTimingDeviationLCRInfoWanted  BOOLEAN,

```



```

        rxTimingDeviation768InfoWanted          BOOLEAN,
        rxTimingDeviation384extInfoWanted      BOOLEAN,
        iE-Extensions                          ProtocolExtensionContainer { {
RequestedCellIDMeasurementsTDD-ExtIEs } } OPTIONAL,
        ...
    },
    ...
}

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

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

-- *****
--
-- Client Type
--
-- *****

ClientType ::= ENUMERATED {
    emergency-services,
    value-added-services,
    plmn-operator-services,
    lawful-intercept-services,
    plmn-operator-broadcast-services,
    plmn-operator-oam,
    plmn-operator-anonymous-statistics,
    plmn-operator-target-ms-service-support,
    ...
}

-- *****
--
-- 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      CriticalityDiagnosticsRepetition
        OPTIONAL,
        messageStructure       MessageStructure
        OPTIONAL,
        typeOfError           TypeOfError,
        iE-Extensions         ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs}
    } OPTIONAL,
    ...
}

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

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

```

```

CriticalityDiagnosticsRepetition ::= INTEGER (0..255)

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..255),
        udre                  UDRE,
        prc                    PRC,
        rrc                    RRC,
        iE-Extensions          ProtocolExtensionContainer { { DGPS-CorrectionSatInfo-ExtIEs } }
        OPTIONAL,
        ...
    }

DGPS-CorrectionSatInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

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

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

-- *****
--
-- 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..100),
    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..100),
    iE-Extensions              ProtocolExtensionContainer { { GA-
PointWithAltitudeAndUncertaintyEllipsoid-ExtIEs} } OPTIONAL,
    ...
}

```

```

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

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

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

GA-PointWithUnCertaintyEllipse ::= SEQUENCE {
  geographicalCoordinates    GeographicalCoordinates,
  uncertaintyEllipse         GA-UncertaintyEllipse,
  confidence                 INTEGER (0..100),
  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..89),
  ...
}

-- *****
--
-- UE-PositionEstimateInfo
--
-- *****

UE-PositionEstimateInfo ::= SEQUENCE {
  referenceTimeChoice        ReferenceTimeChoice,
  ue-positionEstimate        UE-PositionEstimate,
  iE-Extensions              ProtocolExtensionContainer { { UE-PositionEstimateInfo-ExtIEs } }
OPTIONAL,
  ...
}

UE-PositionEstimateInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

ReferenceTimeChoice ::= CHOICE {
  utran-GPSReferenceTimeResult    UTRAN-GPSReferenceTimeResult,
  gps-ReferenceTimeOnly           INTEGER (0..604799999, ...),
  cell-Timing                     Cell-Timing,
  ...
}

Cell-Timing ::= SEQUENCE {
  sfn                          INTEGER (0..4095),
  uC-ID                        UC-ID,
  iE-Extensions                ProtocolExtensionContainer { { Cell-Timing-ExtIEs } } OPTIONAL,
  ...
}

```

```

    }

Cell-Timing-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Position Data
--
-- *****

PositionData ::= SEQUENCE {
    positioningDataDiscriminator      PositioningDataDiscriminator,
    positioningDataSet                PositioningDataSet          OPTIONAL,
-- This IE shall be present if the PositioningDataDiscriminator IE is set to the value "0000" --
    iE-Extensions                    ProtocolExtensionContainer { {PositionData-ExtIEs} } OPTIONAL,
    ...
}

PositionData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-GANSS-PositioningDataSet      CRITICALITY ignore  EXTENSION GANSS-
PositioningDataSet                      PRESENCE optional },
    ...
}

GANSS-PositioningDataSet ::= SEQUENCE(SIZE(1..maxGANSSSet)) OF GANSS-PositioningMethodAndUsage

GANSS-PositioningMethodAndUsage ::= OCTET STRING (SIZE(1))

PositioningDataDiscriminator ::= BIT STRING (SIZE(4))

PositioningDataSet ::= SEQUENCE(SIZE(1..maxSet)) OF PositioningMethodAndUsage

PositioningMethodAndUsage ::= OCTET STRING (SIZE(1))

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

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

GPS-AcquisitionAssistance-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-UTRAN-GPSReferenceTime      CRITICALITY ignore  EXTENSION  UTRAN-GPSReferenceTime
PRESENCE    optional},
    ...
}

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,
    iE-Extensions                    ProtocolExtensionContainer { { AcquisitionSatInfo-ExtIEs } }
    OPTIONAL,
    ...
}

```

```

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

ExtraDopplerInfo ::= SEQUENCE {
    doppler1stOrder          INTEGER (-42..21),
    dopplerUncertainty       DopplerUncertainty,
    iE-Extensions            ProtocolExtensionContainer { { ExtraDopplerInfo-ExtIEs } }
    OPTIONAL,
    ...
}

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

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),
    iE-Extensions            ProtocolExtensionContainer { { AzimuthAndElevation-ExtIEs } }
    OPTIONAL,
    ...
}

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

-- *****
--
-- GANSS Elements
--
-- *****

DGANSS-Corrections ::= SEQUENCE {
    dGANSS-ReferenceTime     INTEGER(0..119),
    dGANSS-Information        DGANSS-Information,
    ie-Extensions            ProtocolExtensionContainer { { DGANSS-Corrections-ExtIEs } }
    OPTIONAL,
    ...
}

DGANSS-Corrections-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DGANSS-Information ::= SEQUENCE (SIZE (1..maxSgnType)) OF DGANSS-InformationItem

DGANSS-InformationItem ::= SEQUENCE {
    gANSS-SignalId           INTEGER(0..3,...)
    OPTIONAL,
    gANSS-StatusHealth        GANSS-StatusHealth,
    -- The following IE shall be present if the Status/Health IE value is not equal to "no data" or
    "invalid data"
    dGANSS-SignalInformation   DGANSS-SignalInformation
    OPTIONAL,
    ie-Extensions            ProtocolExtensionContainer { { DGANSS-InformationItem-ExtIEs } }
    OPTIONAL,
    ...
}

DGANSS-InformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DGANSS-SignalInformation ::= SEQUENCE (SIZE (1..maxGANSSSat)) OF DGANSS-SignalInformationItem

```

```

DGNSS-SignalInformationItem ::= SEQUENCE {
    satId                INTEGER(0..63),
    gANSS-iod            BIT STRING (SIZE (10)),
    udre                UDRE,
    ganss-prc            INTEGER(-2047..2047),
    ganss-rrc            INTEGER(-127..127),
    ie-Extensions        ProtocolExtensionContainer { { DGNSS-SignalInformationItem-
ExtIEs } } OPTIONAL,
    ...
}

DGNSS-SignalInformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-AlmanacAndSatelliteHealth ::= SEQUENCE {
    weekNumber           INTEGER(0..255),
    ganss-sat-id         BIT STRING (SIZE (36)),
    gANSS-AlmanacModel   GANSS-AlmanacModel,
    ie-Extensions        ProtocolExtensionContainer { { GANSS-AlmanacAndSatelliteHealth-ExtIEs }
}
    OPTIONAL,
    ...
}

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

GANSS-AlmanacModel ::= CHOICE {
    gANSS-keplerianParameters          GANSS-KeplerianParametersAlm,
    ...
}

GANSS-AzimuthAndElevation ::= SEQUENCE {
    azimuth                INTEGER(0..31),
    elevation              INTEGER(0..75),
    ie-Extensions          ProtocolExtensionContainer { { GANSS-AzimuthAndElevation-ExtIEs } }
}
    ...
}

GANSS-AzimuthAndElevation-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Clock-Model ::= SEQUENCE (SIZE (1..4)) OF GANSS-SatelliteClockModelItem

GANSS-CommonAssistanceData ::= SEQUENCE {
    ganss-Reference-Time          GANSS-Reference-Time          OPTIONAL,
    ganss-Ionospheric-Model       GANSS-Ionospheric-Model       OPTIONAL,
    ganss-Reference-Location       GANSS-Reference-Location       OPTIONAL,
    ie-Extensions                  ProtocolExtensionContainer { { GANSS-CommonAssistanceData-
ExtIEs } } OPTIONAL,
    ...
}

GANSS-CommonAssistanceData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-ExtraDoppler ::= SEQUENCE {
    dopplerFirstOrder           INTEGER(-42..21),
    dopplerUncertainty           ENUMERATED{dH40,dH20,dH10,dH5,dH2-5},
    ie-Extensions                ProtocolExtensionContainer { { GANSS-ExtraDoppler-ExtIEs } }
    OPTIONAL,
    ...
}

```

```

GANSS-ExtraDoppler-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-GenericAssistanceDataList ::= SEQUENCE (SIZE (1..maxGANSS)) OF GANSSGenericAssistanceData

GANSSGenericAssistanceData ::= SEQUENCE{
    ganssId                INTEGER(0..7)                OPTIONAL,
    ganss-Real-Time-Integrity    GANSS-Real-Time-Integrity    OPTIONAL,
    dganss-Corrections          DGANSS-Corrections          OPTIONAL,
    ganss-AlmanacAndSatelliteHealth  GANSS-AlmanacAndSatelliteHealth  OPTIONAL,
    ganss-ReferenceMeasurementInfo  GANSS-ReferenceMeasurementInfo  OPTIONAL,
    ganss-UTC-Model             GANSS-UTC-Model             OPTIONAL,
    ganss-Time-Model            GANSS-Time-Model            OPTIONAL,
    ganss-Navigation-Model       GANSS-Navigation-Model       OPTIONAL,
    ie-Extensions               ProtocolExtensionContainer { { GANSSGenericAssistance-ExtIEs
} } OPTIONAL,
    ...
}

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

GANSS-GenericMeasurementInfo ::= SEQUENCE(SIZE(1..maxGANSS)) OF SEQUENCE {
    ganssId                INTEGER(0..7)                OPTIONAL,
    ganssSignalId          INTEGER(0..3,...)              OPTIONAL,
    ganssMeasurementParameters  GANSS-MeasurementParameters,
    ie-Extensions          ProtocolExtensionContainer { { GANSS-GenericMeasurementInfo-ExtIEs }
} OPTIONAL,
    ...
}

GANSS-GenericMeasurementInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Ionospheric-Model ::= SEQUENCE {
    alpha-zero-ionos          BIT STRING (SIZE (12)),
    alpha-one-ionos           BIT STRING (SIZE (12)),
    alpha-two-ionos           BIT STRING (SIZE (12)),
    gANSS-IonosphereRegionalStormFlags  GANSS-IonosphereRegionalStormFlags
    OPTIONAL,
    ie-Extensions             ProtocolExtensionContainer { { GANSS-Ionospheric-Model-
ExtIEs } } OPTIONAL,
    ...
}

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

GANSS-IonosphereRegionalStormFlags ::= SEQUENCE {
    storm-flag-one           BOOLEAN,
    storm-flag-two           BOOLEAN,
    storm-flag-three         BOOLEAN,
    storm-flag-four          BOOLEAN,
    storm-flag-five          BOOLEAN,
    ie-Extensions            ProtocolExtensionContainer { { GANSS-
IonosphereRegionalStormFlags-ExtIEs } } OPTIONAL,
    ...
}

GANSS-IonosphereRegionalStormFlags-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-KeplerianParametersAlm ::= SEQUENCE {
    t-oa                     INTEGER(0..255),
    iod-a                     INTEGER(0..3),
    gANSS-SatelliteInformationKP  GANSS-SatelliteInformationKP,

```



```

    ie-Extensions          ProtocolExtensionContainer { { GANSS-KeplerianParametersAlm-
ExtIes } }              OPTIONAL,
    ...
}

GANSS-KeplerianParametersAlm-ExtIes PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-KeplerianParametersOrb ::= SEQUENCE {
    toe-lsb-nav            INTEGER (0..511),
    ganss-omega-nav       BIT STRING (SIZE (32)),
    delta-n-nav           BIT STRING (SIZE (16)),
    m-zero-nav            BIT STRING (SIZE (32)),
    omegadot-nav         BIT STRING (SIZE (24)),
    ganss-e-lsb-nav       INTEGER(0..33554431),
    idot-nav              BIT STRING (SIZE (14)),
    a-sqrt-lsb-nav        INTEGER(0..67108863),
    i-zero-nav            BIT STRING (SIZE (32)),
    omega-zero-nav        BIT STRING (SIZE (32)),
    c-rs-nav              BIT STRING (SIZE (16)),
    c-is-nav              BIT STRING (SIZE (16)),
    c-us-nav              BIT STRING (SIZE (16)),
    c-rc-nav              BIT STRING (SIZE (16)),
    c-ic-nav              BIT STRING (SIZE (16)),
    c-uc-nav              BIT STRING (SIZE (16)),
    ie-Extensions          ProtocolExtensionContainer { { GANSS-KeplerianParametersOrb-
ExtIes } }              OPTIONAL,
    ...
}

GANSS-KeplerianParametersOrb-ExtIes PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-MeasurementParameters ::= SEQUENCE(SIZE(1..maxGANSSSat)) OF GANSS-MeasurementParametersItem

GANSS-MeasurementParametersItem ::= SEQUENCE {
    satId                  INTEGER(0..63),
    cSurNzero              INTEGER(0..63),
    multipathIndicator     ENUMERATED{nM,low,medium,high},
    carrierQualityIndication BIT STRING(SIZE(2)) OPTIONAL,
    codePhase              INTEGER(0..2097151),
    integerCodePhase       INTEGER(0..63) OPTIONAL,
    codePhaseRmsError      INTEGER(0..63),
    doppler                INTEGER(-32768..32767),
    adr                    INTEGER(0..33554431) OPTIONAL,
    ie-Extensions          ProtocolExtensionContainer { { GANSS-MeasurementParametersItem-
ExtIes } }              OPTIONAL,
    ...
}

GANSS-MeasurementParametersItem-ExtIes PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-MeasuredResultsList ::= SEQUENCE (SIZE (1..maxNrOfSets)) OF GANSS-MeasuredResults

GANSS-MeasuredResults ::= SEQUENCE {
    referenceTime CHOICE {
        utranReferenceTime UTRAN-GANSSReferenceTimeUL,
        ganssReferenceTimeOnly GANSS-ReferenceTimeOnly,
        ...
    },
    ganssGenericMeasurementInfo GANSS-GenericMeasurementInfo,
    ie-Extensions          ProtocolExtensionContainer { { GANSS-MeasuredResults-ExtIes } }
OPTIONAL,
    ...
}

GANSS-MeasuredResults-ExtIes PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}

GANSS-Navigation-Model ::= SEQUENCE {
    non-broadcastIndication    ENUMERATED{true}          OPTIONAL,
    -- The three following IEs shall be present if the GANSS Orbit Model IE indicates "Keplerian
Parameters
    toe-c-msb                  INTEGER(0..31)          OPTIONAL,
    e-msb                       INTEGER(0..127)         OPTIONAL,
    sqrtA-msb                   INTEGER(0..63)          OPTIONAL,
    ganssSatInfoNav             GANSS-Sat-Info-Nav,
    ie-Extensions               ProtocolExtensionContainer { { GANSS-Navigation-Model-ExtIEs } }
OPTIONAL,
    ...
}

GANSS-Navigation-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Orbit-Model ::= CHOICE {
    gANSS-keplerianParameters    GANSS-KeplerianParametersOrb,
    ...
}

GANSS-Real-Time-Integrity ::= SEQUENCE (SIZE (1..maxGANSSSat)) OF GANSS-RealTimeInformationItem

GANSS-RealTimeInformationItem ::= SEQUENCE {
    bad-ganss-satId              INTEGER(0..63),
    bad-ganss-signalId           INTEGER(0..4,...)
OPTIONAL,
    ie-Extensions                ProtocolExtensionContainer { { GANSS-
RealTimeInformationItem-ExtIEs } } OPTIONAL,
    ...
}

GANSS-RealTimeInformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Reference-Location ::= SEQUENCE {
    ue-PositionEstimate          UE-PositionEstimate,
    ie-Extensions                ProtocolExtensionContainer { { GANSS-Reference-Location-
ExtIEs } } OPTIONAL,
    ...
}

GANSS-Reference-Location-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-ReferenceMeasurementInfo ::= SEQUENCE {
    ganssSignalId                INTEGER(0..3,...)          OPTIONAL,
    satelliteInformation          GANSS-SatelliteInformation,
    ie-Extensions                ProtocolExtensionContainer { { GANSS-ReferenceMeasurementInfo-ExtIEs
} } OPTIONAL,
    ...
}

GANSS-ReferenceMeasurementInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Reference-Time ::= SEQUENCE {
    ganssDay                      INTEGER(0..8191)          OPTIONAL,
    ganssTod                      INTEGER(0..86399),
    ganssTodUncertainty           INTEGER(0..127)          OPTIONAL,
    ganssTimeId                   INTEGER(0..7)            OPTIONAL,
}

```

```

    utran-ganssreferenceTime      UTRAN-GANSSReferenceTimeDL  OPTIONAL,
    tutran-ganss-driftRate        TUTRAN-GANSS-DriftRate        OPTIONAL,
    ie-Extensions                 ProtocolExtensionContainer { { GANSS-Reference-Time-ExtIEs } }
    OPTIONAL,
    ...
}

GANSS-Reference-Time-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-ReferenceTimeOnly ::= SEQUENCE {
    gANSS-tod                    INTEGER(0..3599999),
    gANSS-timeId                 INTEGER(0..7)    OPTIONAL,
    gANSS-TimeUncertainty        INTEGER(0..127)  OPTIONAL,
    ie-Extensions                ProtocolExtensionContainer { { GANSS-ReferenceTimeOnly-ExtIEs } }
    OPTIONAL,
    ...
}

GANSS-ReferenceTimeOnly-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SatelliteClockModelItem ::= SEQUENCE {
    t-oc-lsb                     INTEGER(0..511),
    a-i2                         BIT STRING (SIZE(12)),
    a-i1                         BIT STRING (SIZE(18)),
    a-i0                         BIT STRING (SIZE(28)),
    t-gd                         BIT STRING (SIZE(10)),
    model-id                     INTEGER(0..1)          OPTIONAL,
    ie-Extensions                ProtocolExtensionContainer { { GANSS-
SatelliteClockModelItem-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SatelliteClockModelItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SatelliteInformation ::= SEQUENCE(SIZE(1..maxGANSSSat)) OF GANSS-SatelliteInformationItem

GANSS-SatelliteInformationItem ::= SEQUENCE {
    ganssSatId                   INTEGER(0..63),
    dopplerZeroOrder             REAL(-2048..2047),
    extraDoppler                 GANSS-ExtraDoppler          OPTIONAL,
    codePhase                    INTEGER(0..1023),
    integerCodePhase             INTEGER(0..127),
    codePhaseSearchWindow        INTEGER(0..31),
    azimuthAndElevation          GANSS-AzimuthAndElevation    OPTIONAL,
    ie-Extensions                ProtocolExtensionContainer { { GANSS-SatelliteInformationItem-ExtIEs
} } OPTIONAL,
    ...
}

GANSS-SatelliteInformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SatelliteInformationKP ::= SEQUENCE (SIZE (1..maxGANSSSat)) OF GANSS-
SatelliteInformationKPIItem

GANSS-SatelliteInformationKPIItem ::= SEQUENCE {
    ganss-e-alm                  BIT STRING (SIZE (11)),
    ganss-delta-I-alm            BIT STRING (SIZE (11)),
    ganss-omegadot-alm          BIT STRING (SIZE (11)),
    ganss-svhealth-alm          BIT STRING (SIZE (4)),
    ganss-delta-a-sqrt-alm      BIT STRING (SIZE (17)),
    ganss-omegazer-alm          BIT STRING (SIZE (16)),
    ganss-m-zero-alm            BIT STRING (SIZE (16)),

```

```

    ganss-omega-alm                BIT STRING (SIZE (16)),
    ganss-af-zero-alm              BIT STRING (SIZE (14)),
    ganss-af-one-alm              BIT STRING (SIZE (11)),
    ie-Extensions                  ProtocolExtensionContainer { { GANSS-
SatelliteInformationKPIItem-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SatelliteInformationKPIItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Sat-Info-Nav ::= SEQUENCE (SIZE(1..maxGANSSSat)) OF SEQUENCE {
    satId                          INTEGER(0..63),
    svHealth                       BIT STRING (SIZE(5)),
    iod                            BIT STRING (SIZE(10)),
    ganssClockModel                GANSS-Clock-Model,
    ganssOrbitModel                GANSS-Orbit-Model,
    ie-Extensions                  ProtocolExtensionContainer { { GANSS-Sat-Info-Nav-ExtIEs } }
OPTIONAL,
    ...
}

GANSS-Sat-Info-Nav-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-StatusHealth ::= ENUMERATED {
    udre-scale-1dot0,
    udre-scale-0dot75,
    udre-scale-0dot5,
    udre-scale-0dot3,
    udre-scale-0dot2,
    udre-scale-0dot1,
    no-data,
    invalid-data
}

GANSS-Time-Model ::= SEQUENCE {
    ganss-time-model                INTEGER(0..65535),
    ganss-t-a0                      INTEGER(-2147483648..2147483647),
    ganss-t-a1                      INTEGER(-8388608..8388607)
    ganss-t-a2                      INTEGER(-64..63)
    ganss-to-id                    INTEGER(0..7),
    ganss-wk-number                 INTEGER(0..8191)
    ie-Extensions                  ProtocolExtensionContainer { { GANSS-Time-Model-ExtIEs } }
    ...
}

GANSS-Time-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-UTRAN-TimeRelationshipUncertainty ::= ENUMERATED {
    gANSS-UTRAN-TRU-50nano,
    gANSS-UTRAN-TRU-500nano,
    gANSS-UTRAN-TRU-1micro,
    gANSS-UTRAN-TRU-10micro,
    gANSS-UTRAN-TRU-1milli,
    gANSS-UTRAN-TRU-10milli,
    gANSS-UTRAN-TRU-100milli,
    gANSS-UTRAN-TRU-unreliable,
    ...
}

GANSS-UTRAN-TRU ::= SEQUENCE {
    gANSS-UTRAN-TimeRelationshipUncertainty GANSS-UTRAN-TimeRelationshipUncertainty,
    ganssId                                INTEGER(0..7) OPTIONAL,

```

```

    ie-Extensions                                ProtocolExtensionContainer { { GANSS-UTRAN-TRU-
ExtIEs } } OPTIONAL,
    ...
}

GANSS-UTRAN-TRU-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-UTC-Model ::= SEQUENCE {
    a-one-utc                                BIT STRING (SIZE (24)),
    a-zero-utc                               BIT STRING (SIZE (32)),
    t-ot-utc                                 BIT STRING (SIZE (8)),
    w-n-t-utc                                BIT STRING (SIZE (8)),
    delta-t-ls-utc                           BIT STRING (SIZE (8)),
    w-n-lsf-utc                               BIT STRING (SIZE (8)),
    dn-utc                                    BIT STRING (SIZE (8)),
    delta-t-lsf-utc                           BIT STRING (SIZE (8)),
    ie-Extensions                            ProtocolExtensionContainer { { GANSS-UTC-Model-ExtIEs } }
    ...
}

GANSS-UTC-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TUTRAN-GANSS-DriftRate ::= ENUMERATED {
    uTRAN-GANSSDrift0,      uTRAN-GANSSDrift1,      uTRAN-GANSSDrift2,
    uTRAN-GANSSDrift5,      uTRAN-GANSSDrift10,     uTRAN-GANSSDrift15,
    uTRAN-GANSSDrift25,     uTRAN-GANSSDrift50,     uTRAN-GANSSDrift-1,
    uTRAN-GANSSDrift-2,     uTRAN-GANSSDrift-5,     uTRAN-GANSSDrift-10,
    uTRAN-GANSSDrift-15,    uTRAN-GANSSDrift-25,    uTRAN-GANSSDrift-50,
    ...
}

UTRAN-GANSSReferenceTimeDL ::= SEQUENCE {
    ue-GANSSTimingOfCellFrames INTEGER(0..34559999999),
    mode CHOICE {
        fdd SEQUENCE {
            primary-CPICH-Info PrimaryScramblingCode
        },
        tdd SEQUENCE {
            cellParameters CellParameterID
        }
    } OPTIONAL,
    referenceSfn INTEGER(0..4095),
    ie-Extensions ProtocolExtensionContainer { { UTRAN-GANSSReferenceTimeDL-ExtIEs
} } OPTIONAL,
    ...
}

UTRAN-GANSSReferenceTimeDL-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UTRAN-GANSSReferenceTimeUL ::= SEQUENCE {
    ue-GANSSTimingOfCellFrames INTEGER(0..34559999999),
    gANSS-TimeId INTEGER(0..7) OPTIONAL,
    gANSS-TimeUncertainty INTEGER(0..127) OPTIONAL,
    mode CHOICE {
        fdd SEQUENCE {
            primary-CPICH-Info PrimaryScramblingCode
        },
        tdd SEQUENCE {
            cellParameters CellParameterID
        }
    },
    referenceSfn INTEGER(0..4095),
    ie-Extensions ProtocolExtensionContainer { { UTRAN-GANSSReferenceTimeUL-ExtIEs
} } OPTIONAL,
    ...
}

```

```

UTRAN-GANSSReferenceTimeUL-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

GPS-AlmanacAndSatelliteHealth ::= SEQUENCE {
    wn-a BIT STRING (SIZE (8)),
    almanacSatInfoList AlmanacSatInfoList,
    svGlobalHealth BIT STRING (SIZE (364)) OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { GPS-
AlmanacAndSatelliteHealth-ExtIEs } }
    OPTIONAL,
    ...
}

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

AlmanacSatInfoList ::= SEQUENCE (SIZE (1..maxSatAlmanac)) 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)),
    iE-Extensions ProtocolExtensionContainer { { AlmanacSatInfo-ExtIEs } }
    OPTIONAL,
    ...
}

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

-- *****
--
-- 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)),
    sflRevd 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 (1..maxNrOfSets)) OF
GPS-MeasuredResults

GPS-MeasuredResults ::= SEQUENCE {
gps-TOW-lmsec INTEGER (0..604799999),
gps-MeasurementParamList GPS-MeasurementParamList,
iE-Extensions ProtocolExtensionContainer { { GPS-MeasuredResults-ExtIEs }
} OPTIONAL,
...
}

GPS-MeasuredResults-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
{ID id-UTRAN-GPSReferenceTimeResult CRITICALITY ignore EXTENSION UTRAN-GPSReferenceTimeResult
PRESENCE optional},

```

```

...
}

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..1022),
  fractionalGPS-Chips                INTEGER (0..1023),
  multipathIndicator                 MultipathIndicator,
  pseudorangeRMS-Error               INTEGER (0..63),
  iE-Extensions                      ProtocolExtensionContainer { { GPS-MeasurementParam-ExtIEs }
} OPTIONAL,
...
}

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

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

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

GPS-NavigationModel ::=              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,
                                       rev2,
                                       rev }

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

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

```



```

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

NoBadSatellites ::= NULL

-- *****
--
-- GPS Reference Location
--
-- *****

GPS-ReferenceLocation ::=                   SEQUENCE {
  ue-PositionEstimate                       UE-PositionEstimate,
  iE-Extensions                             ProtocolExtensionContainer { { GPS-ReferenceLocation-ExtIEs
} } OPTIONAL,
  ...
}

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

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

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

GPS-ReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  {ID id-UTRAN-GPSReferenceTime             CRITICALITY ignore EXTENSION  UTRAN-GPSReferenceTime
  PRESENCE optional}|
  {ID id-GPS-UTRAN-TRU                      CRITICALITY ignore EXTENSION  GPS-UTRAN-TRU
  PRESENCE optional}|
  {ID id-UTRAN-GPS-DriftRate               CRITICALITY ignore EXTENSION  UTRAN-GPS-DriftRate
  PRESENCE optional},
  ...
}

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                                 BOOLEAN,
  alert                                     BOOLEAN,
  tlm-Reserved                             BIT STRING (SIZE (2)),
  iE-Extensions                             ProtocolExtensionContainer { { GPS-TOW-Assist-ExtIEs } }
  OPTIONAL,
  ...
}

GPS-TOW-Assist-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

UTRAN-GPS-DriftRate ::=                   ENUMERATED {
  utran-GPSDrift0, utran-GPSDrift1, utran-GPSDrift2,
  utran-GPSDrift5, utran-GPSDrift10, utran-GPSDrift15,
  utran-GPSDrift25, utran-GPSDrift50, utran-GPSDrift-1,
  utran-GPSDrift-2, utran-GPSDrift-5, utran-GPSDrift-10,
  utran-GPSDrift-15, utran-GPSDrift-25, utran-GPSDrift-50,
  ...}

```

```

-- *****
--
-- 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
        OPTIONAL,
        ProtocolExtensionContainer { { GPS-UTCmodel-ExtIEs } }
        ...
    }

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 lmin
    hour        INTEGER (1..24, ...),
-- Unit hour, Step lhour
    ...
}

-- *****
--
-- 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,
    ... ,
    referenceLocation              ReferenceLocation,
    ganss-Common-DataReq           GANSSCommonDataReq,
    ganss-Generic-DataList         GANSSGenericDataList
}

DganssCorrectionsReq ::= SEQUENCE {
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { DganssCorrectionsReq-ExtIEs } }
OPTIONAL,
    ...
}

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

Ganss-almanacAndSatelliteHealthReq ::= SEQUENCE {
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { Ganss-almanacAndSatelliteHealthReq-
ExtIEs } } OPTIONAL,
    ...
}

Ganss-almanacAndSatelliteHealthReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSSCommonDataReq ::= SEQUENCE{
    ganss-ReferenceTime           ENUMERATED {requested, not-requested} OPTIONAL,
    ganss-IonosphericModel        ENUMERATED {requested, not-requested} OPTIONAL,
    ganss-ReferenceLocation       ENUMERATED {requested, not-requested} OPTIONAL,
    ie-Extensions                ProtocolExtensionContainer { { GANSSCommonDataReq-ExtIEs } }
    ...
}

```

```

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

GANSSGenericDataList ::= SEQUENCE (SIZE(1..maxGANSS)) OF GANSSGenericDataReq

GANSSGenericDataReq ::= SEQUENCE {
    ganssID                INTEGER(0..7)                OPTIONAL,
    ganss-realTimeIntegrity Ganss-realTimeIntegrityReq    OPTIONAL,
    dganssCorrections       DganssCorrectionsReq          OPTIONAL,
    ganss-almanacAndSatelliteHealth Ganss-almanacAndSatelliteHealthReq OPTIONAL,
    ganss-referenceMeasurementInfo Ganss-referenceMeasurementInfoReq  OPTIONAL,
    ganss-utcModel          Ganss-utcModelReq              OPTIONAL,
    ganss-TimeModel-Ganss-Ganss Ganss-TimeModel-Ganss-Ganss  OPTIONAL,
    navigationModel         NavigationModelGANSS           OPTIONAL,
    ...
}

Ganss-utcModelReq ::= SEQUENCE {
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { Ganss-utcModelReq-ExtIEs } } OPTIONAL,
    ...
}

Ganss-utcModelReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Ganss-realTimeIntegrityReq ::= SEQUENCE {
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { Ganss-realTimeIntegrityReq-ExtIEs } }
OPTIONAL,
    ...
}

Ganss-realTimeIntegrityReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Ganss-referenceMeasurementInfoReq ::= SEQUENCE {
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { Ganss-referenceMeasurementInfoReq-
ExtIEs } } OPTIONAL,
    ...
}

Ganss-referenceMeasurementInfoReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Ganss-TimeModel-Ganss-Ganss ::= SEQUENCE{
    ganssTimeModelGnssGnssExt    BIT STRING (SIZE(9)),
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { Ganss-TimeModel-Ganss-Ganss-
ExtIEs } } OPTIONAL,
    ...
}

Ganss-TimeModel-Ganss-Ganss-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TransmissionGanssTimeIndicator ::= INTEGER(0..7)

AlmanacAndSatelliteHealth ::= NULL

UtcModel ::= SEQUENCE {
    transmissionTOWIndicator      TransmissionTOWIndicator,
    iE-Extensions                ProtocolExtensionContainer { { UtcModel-ExtIEs } } OPTIONAL,
    ...
}

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

```

```

IonosphericModel ::= SEQUENCE {
    transmissionTOWIndicator    TransmissionTOWIndicator,
    iE-Extensions              ProtocolExtensionContainer { { IonosphericModel-ExtIEs } } OPTIONAL,
    ...
}

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

NavigationModel ::= SEQUENCE {
    transmissionTOWIndicator    TransmissionTOWIndicator,
    navModelAdditionalData      NavModelAdditionalData OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { NavigationModel-ExtIEs } }
    OPTIONAL,
    ...
}

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

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

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

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

SatelliteRelatedData ::= SEQUENCE {
    satID                       INTEGER (0..63),
    iode                        INTEGER (0..255),
    iE-Extensions              ProtocolExtensionContainer { { SatelliteRelatedData-ExtIEs } }
    OPTIONAL,
    ...
}

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

NavigationModelGANSS ::= SEQUENCE {
    ganssWeek                   INTEGER(0..4095),
    ganssTOE                    INTEGER(0..167),
    t-toe-limit                INTEGER(0..10),
    satRelatedDataListGANSS     SatelliteRelatedDataListGANSS,
    iE-Extensions              ProtocolExtensionContainer { { NavigationModelGANSS-ExtIEs } }
    OPTIONAL,
    ...
}

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

SatelliteRelatedDataListGANSS ::= SEQUENCE (SIZE (0..maxGANSSSat)) OF SatelliteRelatedDataGANSS

SatelliteRelatedDataGANSS ::= SEQUENCE {
    satID                       INTEGER (0..63),
    iod                         BIT STRING (SIZE(10)),
    iE-Extensions              ProtocolExtensionContainer { { SatelliteRelatedDataGANSS-ExtIEs } }
    OPTIONAL,
    ...
}

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

```

```

DgpsCorrections ::= NULL

ReferenceTime ::= NULL

AcquisitionAssistance ::= NULL

RealTimeIntegrity ::= NULL

AlmanacAndSatelliteHealthSIB-InfoType ::= SEQUENCE {
    transmissionTOWIndicator      TransmissionTOWIndicator,
    iE-Extensions                 ProtocolExtensionContainer { { AlmanacAndSatelliteHealthSIB-
InfoType-ExtIEs } } OPTIONAL,
    ...
}

AlmanacAndSatelliteHealthSIB-InfoType-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

ReferenceLocation ::= NULL

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

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

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

MessageStructureRepetition ::= INTEGER (1..256)

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

-- *****
--
-- Measurement Instructions Used
--
-- *****

MeasInstructionsUsed ::= SEQUENCE {
    measurementValidity           MeasurementValidity,
    iE-Extensions                 ProtocolExtensionContainer { { MeasInstructionsUsed-ExtIEs } }
    OPTIONAL,
    ...
}

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

-- *****
--
-- Measurement Validity
--
-- *****

MeasurementValidity ::= SEQUENCE {
    ue-State                      ENUMERATED { cell-DCH, all-States-Except-Cell-DCH, all-States, ... },
    iE-Extensions                 ProtocolExtensionContainer { { MeasurementValidity-ExtIEs } }
    OPTIONAL,
    ...
}

```

```

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

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

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

-- *****
--
-- OTDOA Measurement Group
--
-- *****

OTDOA-MeasurementGroup ::= SEQUENCE {
  otdoa-ReferenceCellInfo          OTDOA-ReferenceCellInfo,
  otdoa-NeighbourCellInfoList     OTDOA-NeighbourCellInfoList,
  otdoa-MeasuredResultsSets      OTDOA-MeasuredResultsSets,
  iE-Extensions                   ProtocolExtensionContainer { { OTDOA-MeasurementGroup-ExtIEs
} } OPTIONAL,
  ...
}

OTDOA-MeasurementGroup-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

OTDOA-ReferenceCellInfo ::= SEQUENCE {
  uC-ID                           UC-ID,
  uTRANAccessPointPositionAltitude UTRANAccessPointPositionAltitude,
  tUTRANGPSMeasurementValueInfo   TUTRANGPSMeasurementValueInfo
  OPTIONAL,
  iE-Extensions                   ProtocolExtensionContainer { { OTDOA-ReferenceCellInfo-
ExtIEs } } OPTIONAL,
  ...
}

OTDOA-ReferenceCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  { ID id-TUTRANGANSSMeasurementValueInfo CRITICALITY ignore EXTENSION
TUTRANGANSSMeasurementValueInfo PRESENCE optional },
  ...
}

OTDOA-NeighbourCellInfoList ::= SEQUENCE (SIZE (1..maxNrOfMeasNCell)) OF
  OTDOA-NeighbourCellInfo

OTDOA-NeighbourCellInfo ::= SEQUENCE {
  uC-ID                           UC-ID,
  uTRANAccessPointPositionAltitude UTRANAccessPointPositionAltitude,
  relativeTimingDifferenceInfo     RelativeTimingDifferenceInfo,
  iE-Extensions                   ProtocolExtensionContainer { { OTDOA-NeighbourCellInfo-
ExtIEs } } OPTIONAL,
  ...
}

OTDOA-NeighbourCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

OTDOA-MeasuredResultsSets ::= SEQUENCE (SIZE (1..maxNrOfMeasurements)) OF
  OTDOA-MeasuredResultsInfoList

OTDOA-MeasuredResultsInfoList ::= SEQUENCE (SIZE (1..maxNrOfMeasNCell)) OF
  OTDOA-MeasuredResultsInfo

OTDOA-MeasuredResultsInfo ::= SEQUENCE {
  uC-ID                           UC-ID,
  ue-SFN SFNTimeDifferenceType2Info UE-SFN SFNTimeDifferenceType2Info,
  iE-Extensions                   ProtocolExtensionContainer { { OTDOA-MeasuredResultsInfo-
ExtIEs } } OPTIONAL,

```

```

}
...
}
OTDOA-MeasuredResultsInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  {ID id-OTDOA-AddMeasuredResultsInfo CRITICALITY ignore EXTENSION OTDOA-AddMeasuredResultsInfo
  PRESENCE optional},
  ...
}
OTDOA-AddMeasuredResultsInfo ::= SEQUENCE {
  primaryCPICH-Info PrimaryScramblingCode,
  iE-Extensions ProtocolExtensionContainer { { OTDOA-AddMeasuredResultsInfo-ExtIEs } }
  OPTIONAL,
  ...
}
OTDOA-AddMeasuredResultsInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
UE-SFNSFNTimeDifferenceType2Info ::= SEQUENCE {
  ue-SFNSFNTimeDifferenceType2 INTEGER (0..40961),
  ue-PositioningMeasQuality UE-PositioningMeasQuality,
  measurementDelay INTEGER (0..65535),
  iE-Extensions ProtocolExtensionContainer { { UE-SFNSFNTimeDifferenceInfo-
  ExtIEs } } OPTIONAL,
  ...
}
UE-SFNSFNTimeDifferenceInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
UC-ID ::= SEQUENCE {
  rNC-ID INTEGER (0..4095),
  c-ID INTEGER (0..65535),
  iE-Extensions ProtocolExtensionContainer { { UC-ID-ExtIEs } }
  OPTIONAL,
  ...
}
UC-ID-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  { ID id-Extended-RNC-ID CRITICALITY reject EXTENSION Extended-RNC-ID PRESENCE
  optional},
  ...
}
Extended-RNC-ID ::= INTEGER (4096..65535)
RelativeTimingDifferenceInfo ::= CHOICE {
  sFNSFNMeasurementValueInfo SFNSFNMeasurementValueInfo,
  tUTRANGPSMeasurementValueInfo TUTRANGPSMeasurementValueInfo,
  ...,
  tUTRANGANSSMeasurementValueInfo TUTRANGANSSMeasurementValueInfo
}
SFNSFNMeasurementValueInfo ::= SEQUENCE {
  sFNSFNValue SFNSFNValue,
  sFNSFNQuality SFNSFNQuality
  OPTIONAL,
  sFNSFNDriftRate SFNSFNDriftRate,
  sFNSFNDriftRateQuality SFNSFNDriftRateQuality
  OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { SFNSFNMeasurementValueInfo-
  ExtIEs } } OPTIONAL,
  ...
}
SFNSFNMeasurementValueInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
SFNSFNValue ::= INTEGER (0..614399)
SFNSFNQuality ::= INTEGER (0..255)
-- Unit chip, Step 1/16 chip, Range 0.. 255/16 chip

```



```

SFNSFNDriftRate ::=                               INTEGER (-100..100)
-- Unit chip/s, Step 1/256 chip/s, Range -100/256..+100/256 chip/s

SFNSFNDriftRateQuality ::=                       INTEGER (0..100)
-- Unit chip/s, Step 1/256 chip/s, Range 0..100/256 chip/s

TUTRANGPSMeasurementValueInfo ::= SEQUENCE {
    sFN                                           SFN,
    tUTRANGPS                                    TUTRANGPS,
    tUTRANGPSQuality                             TUTRANGPSQuality
        OPTIONAL,
    tUTRANGPSDriftRate                           TUTRANGPSDriftRate,
    tUTRANGPSDriftRateQuality                   TUTRANGPSDriftRateQuality
        OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { {
TUTRANGPSMeasurementValueInfo-ExtIEs } }      OPTIONAL,
    ...
}

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

SFN ::=                                           INTEGER (0..4095)

TUTRANGPS ::=                                     SEQUENCE {
    ms-part                                       INTEGER (0..16383),
    ls-part                                       INTEGER (0..4294967295)
}

TUTRANGPSQuality ::=                             INTEGER (0..255)
-- Unit chip, Step 1/16 chip, Range 0.. 255/16 chip

TUTRANGPSDriftRate ::=                           INTEGER (-50..50)
-- Unit chip/s, Step 1/256 chip/s, Range -50/256..+50/256 chip/s

TUTRANGPSDriftRateQuality ::=                   INTEGER (0..50)
-- Unit chip/s, Step 1/256 chip/s, Range 0..50/256 chip/s

TUTRANGANSSMeasurementValueInfo ::= SEQUENCE {
    ganssID                                       INTEGER(0..7)           OPTIONAL,
    sFN                                           SFN,
    tUTRANGANSS                                   TUTRANGANSS,
    tUTRANGANSSQuality                           INTEGER(0..255)        OPTIONAL,
    tUTRANGANSSDriftRate                         INTEGER(-50..50),
    tUTRANGANSSDriftRateQuality                 INTEGER(0..50)         OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { {
TUTRANGANSSMeasurementValueInfo-ExtIEs } }    OPTIONAL,
    ...
}

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

TUTRANGANSS ::=                                   SEQUENCE {
    ms-part                                       INTEGER (0..16383),
    ls-part                                       INTEGER (0..4294967295)
}

-- *****
--
-- Periodic Position Calculation Info
--
-- *****

PeriodicPosCalcInfo ::= SEQUENCE {
    referenceNumber                               INTEGER (0..32767, ...),
    amountOutstandingRequests                    INTEGER (1..8639999, ...),
    reportingInterval                            INTEGER (1..8639999, ...),
    iE-Extensions                               ProtocolExtensionContainer { { PeriodicPosCalcInfo-ExtIEs } }
    OPTIONAL,
    ...
}

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

```

```

-- *****
--
-- Periodic Location Info
--
-- *****

PeriodicLocationInfo ::= SEQUENCE {
    reportingAmount          INTEGER (1..8639999, ...),
    reportingInterval        INTEGER (1..8639999, ...),
    iE-Extensions            ProtocolExtensionContainer { { PeriodicLocationInfo-ExtIEs } }
    OPTIONAL,
    ...
}

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

-- *****
--
-- Periodic Termination Cause
--
-- *****

PeriodicTerminationCause ::= ENUMERATED {
    rrc-state-transition,
    cancelled-by-srnc,
    cancelled-by-sas,
    undefined,
    ...
}

-- *****
--
-- Positioning Method
--
-- *****

PositioningMethod ::= SEQUENCE {
    additionalMethodType      AdditionalMethodType,
    selectedPositionMethod    SelectedPositionMethod,
    iE-Extensions            ProtocolExtensionContainer { { PositioningMethod-ExtIEs } }
    OPTIONAL,
    ...
}

PositioningMethod-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
-- The following IE shall be present if the Selected Position Method IE value is set to "GNSS" or
"OTDOA or GNSS"
    { ID id-GNSS-PositioningMethod CRITICALITY ignore EXTENSION GNSS-PositioningMethod PRESENCE
conditional },
    ...
}

GNSS-PositioningMethod ::= BIT STRING (SIZE(9))

SelectedPositionMethod ::= ENUMERATED {
    oTDOA,
    gPS,
    oTDOA-or-GPS,
    cell-id,
    uTDOA,
    ...,
    gNSS,
    oTDOA-or-GNSS
}

-- *****
--
-- Positioning Priority
--
-- *****

PositioningPriority ::= ENUMERATED {
    high-priority,

```

```

    normal-priority,
    ...
}
-- *****
--
-- RRC State Change
--
-- *****

RRCstateChange ::= SEQUENCE {
    new-ue-State      ENUMERATED { cell-DCH, cell-FACH, cell-PCH, ura-PCH, ... },
    iE-Extensions     ProtocolExtensionContainer { { RRCstateChange-ExtIEs } }    OPTIONAL,
    ...
}

RRCstateChange-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
-- *****
--
-- 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 ::= {
    { ID id-GPS-ReferenceLocation  CRITICALITY ignore  EXTENSION GPS-ReferenceLocation PRESENCE
optional }|
    { ID id-GANSS-CommonAssistanceData  CRITICALITY ignore  EXTENSION GANSS-CommonAssistanceData
PRESENCE optional }|
    { ID id-GANSS-GenericAssistanceDataList  CRITICALITY ignore  EXTENSION GANSS-
GenericAssistanceDataList  PRESENCE optional },
    ...
}
-- *****
--
-- 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

-- *****
--
-- Request Type
--
-- *****
RequestType ::= SEQUENCE {
    event          RequestTypeEvent,
    reportArea     RequestTypeReportArea,
    horizontalaccuracyCode RequestTypeAccuracyCode    OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { RequestType-ExtIEs } }    OPTIONAL,
    ...
}

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

RequestTypeEvent ::= ENUMERATED {
    stop-change-of-service-area,
    direct,
    change-of-service-area,
    stop-direct,
    ...,
    periodic,
    stop-periodic
}

RequestTypeReportArea ::= ENUMERATED {
    service-area,
    geographical-area,
    ...
}

RequestTypeAccuracyCode ::= INTEGER (0..127)

-- *****
--
-- Response Time
--
-- *****
ResponseTime ::= ENUMERATED {
    low-delay,
    delay-tolerant,
    ...
}

-- *****
--
-- Horizontal Accuracy Code
--
-- *****

HorizontalAccuracyCode ::= INTEGER (0..127)

-- *****
--
-- UE Positioning Capability
--
-- *****
UE-PositioningCapability ::= SEQUENCE {
    standAloneLocationMethodsSupported    BOOLEAN,
    ueBasedOTDOASupported                 BOOLEAN,
    networkAssistedGPSSupport             NetworkAssistedGPSSuport,
    supportGPSTimingOfCellFrame           BOOLEAN,
    supportForIPDL                        BOOLEAN,
    supportForRxTxTimeDiff                 BOOLEAN,
    supportForUEAGPSinCellPCH             BOOLEAN,

```

```

    supportForSFNSFNTimeDiff          BOOLEAN,
    iE-Extensions                      ProtocolExtensionContainer { {UE-PositioningCapability-
ExtIEs} } OPTIONAL,
    ...
}

UE-PositioningCapability-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  { ID id-NetworkAssistedGANSSSupport          CRITICALITY ignore  EXTENSION
NetworkAssistedGANSSSupport          PRESENCE optional },
  ...
}

NetworkAssistedGANSSSupport ::= SEQUENCE (SIZE (1..maxGANSS)) OF SEQUENCE {
  ganssID                                INTEGER(0..7)  OPTIONAL,
  ganssMode                                ENUMERATED {
    networkBased,
    ue-Based,
    both,
    none
  },
  ganssSignalID                          INTEGER(0..3,...)  OPTIONAL,
  supportGANSSTimingOfCellFrame          BOOLEAN,
  supportGANSSCarrierPhaseMeasurement    BOOLEAN,
  iE-Extensions  ProtocolExtensionContainer { { NetworkAssistedGANSSSupport-ExtIEs} } OPTIONAL,
  ...
}

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

NetworkAssistedGPSSupport ::= ENUMERATED {
  network-based,
  ue-based,
  both,
  none,
  ...
}

-- *****
--
-- UTDOA Positioning (Position Activation Request Message)
--
-- *****

UTDOAPositioning ::= SEQUENCE {
  utdoa-BitCount          UTDOA-BitCount,
  utdoa-timeInterval      UTDOA-TimeInterval,
  iE-Extensions          ProtocolExtensionContainer { { UTDOAPositioning-ExtIEs } } OPTIONAL,
  ...
}

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

UTDOA-BitCount ::= INTEGER (0..5000)

UTDOA-TimeInterval ::= INTEGER (0..3000)

EnvironmentCharacterisation ::= ENUMERATED { heavyMultipathandNLOSconditions,
  noOrLightMultipathAndUsuallyLOSconditions,
  notDefinedOrMixedEnvironment,
  ...
}

-- *****
--
-- GPS and GANSS Positioning (Position Activation Request Message)
--
-- *****

GPSPositioning ::= SEQUENCE {
  gpsPositioningInstructions          GPSPositioningInstructions,
  requestedDataValue                  RequestedDataValue          OPTIONAL,

```

```

        iE-Extensions          ProtocolExtensionContainer { { GPSPositioning-ExtIEs } }
OPTIONAL,
    ...
}

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

GPSPositioningInstructions ::= SEQUENCE {
    horizontalAccuracyCode      HorizontalAccuracyCode          OPTIONAL,
    verticalAccuracyCode        VerticalAccuracyCode            OPTIONAL,
    gpsTimingOfCellWanted      BOOLEAN,
    additionalAssistanceDataRequest  BOOLEAN,
    iE-Extensions              ProtocolExtensionContainer { { GPSPositioningInstructions-
ExtIEs } } OPTIONAL,
    ...
}

GPSPositioningInstructions-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-MeasurementValidity CRITICALITY ignore EXTENSION MeasurementValidity PRESENCE
optional},
    ...
}

GANSSPositioning ::= SEQUENCE {
    ganSSPositioningInstructions  GANSS-PositioningInstructions,
    requestedDataValue            RequestedDataValue          OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { GANSSPositioning-ExtIEs } }
OPTIONAL,
    ...
}

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

GANSS-PositioningInstructions ::= SEQUENCE {
    horizontalAccuracyCode      HorizontalAccuracyCode          OPTIONAL,
    verticalAccuracyCode        VerticalAccuracyCode            OPTIONAL,
    ganSSTimingOfCellWanted     BIT STRING (SIZE (16)),
    additionalAssistanceDataRequest  BIT STRING (SIZE (16)),
    measurementValidity         GANSSMeasurementValidity        OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { GANSS-
PositioningInstructions-ExtIEs } } OPTIONAL,
    ...
}

GANSS-PositioningInstructions-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSSMeasurementValidity ::= ENUMERATED {
    cellDCH,
    allStatesExceptDCH,
    allStates,
    ...
}

-- *****
--
-- OTDOA Assistance Data
--
-- *****
OTDOAAssistanceData ::= SEQUENCE {
    uE-Positioning-OTDOA-AssistanceData  UE-Positioning-OTDOA-AssistanceData,
    iE-Extensions                ProtocolExtensionContainer { { OTDOAAssistanceData-ExtIEs } }
} OPTIONAL,
    ...
}

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

-- *****
--
-- UE Positioning OTDOA Assistance Data
--

```

```

-- *****
UE-Positioning-OTDOA-AssistanceData ::= SEQUENCE {
    ue-positioning-OTDOA-ReferenceCellInfo      UE-Positioning-OTDOA-ReferenceCellInfo
    OPTIONAL,
    ue-positioning-OTDOA-NeighbourCellList      UE-Positioning-OTDOA-NeighbourCellList
    OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { { UE-Positioning-
OTDOAAssistanceData-ExtIEs } } OPTIONAL,
    ...
}

UE-Positioning-OTDOAAssistanceData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UE-Positioning-OTDOA-ReferenceCellInfo ::= SEQUENCE {
    sfn                                           SFN                                           OPTIONAL,
    modeSpecificInfo CHOICE {
        fdd                                       SEQUENCE {
            primaryCPICH-Info                    PrimaryScramblingCode,
            ...
        },
        tdd                                       SEQUENCE{
            --- coding is FFS
            ...
        },
        ...
    },
    frequencyInfo                               FrequencyInfo                               OPTIONAL,
    positioningMode CHOICE {
        ueBased                                   SEQUENCE {
            cellPosition                         ReferenceCellPosition  OPTIONAL,
            -- actual value roundTripTime = (IE value * 0.0625) + 876
            roundTripTime                       INTEGER (0..32766)     OPTIONAL,
            ...
        },
        ueAssisted                               SEQUENCE {
            ...
        },
        ...
    },
    ue-positioning-IPDL-Parameters              UE-Positioning-IPDL-Parameters OPTIONAL,
    iE-Extensions                               ProtocolExtensionContainer { { UE-Positioning-
OTDOAReferenceCellInfo-ExtIEs } } OPTIONAL,
    ...
}

UE-Positioning-OTDOAReferenceCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-ExtendedRoundTripTime  CRITICALITY ignore  EXTENSION ExtendedRoundTripTime
PRESENCE optional }, -- FDD only
    ...
}

ReferenceCellPosition ::= CHOICE {
    ellipsoidPoint                             GeographicalCoordinates,
    ellipsoidPointWithAltitude                 GA-PointWithAltitude,
    ...
}

UE-Positioning-IPDL-Parameters ::= SEQUENCE {
    modeSpecificInfo CHOICE {
        fdd                                       SEQUENCE {
            ip-Spacing                            IP-Spacing,
            ip-Length                             IP-Length,
            ip-Offset                             INTEGER (0..9),
            seed                                  INTEGER (0..63),
            ...
        },
        tdd                                       SEQUENCE {
            -- coding is FFS
            ...
        },
        ...
    },
    burstModeParameters                         BurstModeParameters  OPTIONAL,

```

```

    iE-Extensions
Parameters-ExtIEs } } OPTIONAL,
    ...
}

UE-Positioning-IPDL-Parameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

IP-Spacing ::=
    ENUMERATED {
        e5, e7, e10, e15, e20,
        e30, e40, e50, ... }

IP-Length ::=
    ENUMERATED {
        ip15, ip110, ... }

BurstModeParameters ::=
    burstStart
    burstLength
    burstFreq
    iE-Extensions
} OPTIONAL,
    SEQUENCE {
        INTEGER (0..15),
        INTEGER (10..25),
        INTEGER (1..16),
        ProtocolExtensionContainer { { BurstModeParameters-ExtIEs }

    ...
}

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

UE-Positioning-OTDOA-NeighbourCellList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
    UE-Positioning-OTDOA-NeighbourCellInfo

UE-Positioning-OTDOA-NeighbourCellInfo ::= SEQUENCE {
    modeSpecificInfo CHOICE {
        fdd
            primaryCPICH-Info
            ...
        },
        tdd
            -- coding is FFS
            ...
        },
    frequencyInfo
    ue-positioning-IPDL-Parameters
    sfn-SFN-RelTimeDifference
    sfn-Offset-Validity
    sfn-SFN-Drift
    searchWindowSize
    positioningMode CHOICE {
        ueBased
            relativeNorth
            relativeEast
            relativeAltitude
            fineSFN-SFN
            -- actual value roundTripTime = (IE value * 0.0625) + 876
            roundTripTime
            ...
        },
        ueAssisted
            ...
        },
    iE-Extensions
OTDOANeighbourCellInfo-ExtIEs } } OPTIONAL,
    ...
}

UE-Positioning-OTDOANeighbourCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-ExtendedRoundTripTime CRITICALITY ignore EXTENSION ExtendedRoundTripTime
    PRESENCE optional }, -- FDD only
    ...
}

```



```

}

SFN-SFN-RelTimeDifference1 ::= SEQUENCE {
    sfn-Offset                INTEGER (0 .. 4095),
    sfn-sfn-Reltimedifference INTEGER (0.. 38399),
    iE-Extensions             ProtocolExtensionContainer { { SFN-SFN-RelTimeDifference1-
ExtIEs } } OPTIONAL,
    ...
}

SFN-SFN-RelTimeDifference1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SFN-Offset-Validity ::= ENUMERATED { false }

OTDOA-SearchWindowSize ::= ENUMERATED {
    c20, c40, c80, c160, c320,
    c640, c1280, moreThan1280, ... }

SFN-SFN-Drift ::= ENUMERATED {
    sfnsfndrift0, sfnsfndrift1, sfnsfndrift2,
    sfnsfndrift3, sfnsfndrift4, sfnsfndrift5,
    sfnsfndrift8, sfnsfndrift10, sfnsfndrift15,
    sfnsfndrift25, sfnsfndrift35, sfnsfndrift50,
    sfnsfndrift65, sfnsfndrift80, sfnsfndrift100,
    sfnsfndrift-1, sfnsfndrift-2, sfnsfndrift-3,
    sfnsfndrift-4, sfnsfndrift-5, sfnsfndrift-8,
    sfnsfndrift-10, sfnsfndrift-15, sfnsfndrift-25,
    sfnsfndrift-35, sfnsfndrift-50, sfnsfndrift-65,
    sfnsfndrift-80, sfnsfndrift-100, ...}

FineSFNSFN ::= INTEGER (0..15)
-- Range 0..0.9375 step size 0.0625

-- *****
--
-- Vertical Accuracy Code
--
-- *****

VerticalAccuracyCode ::= INTEGER (0..127)

-- *****
--
-- UTDOA Group
--
-- *****

UTDOA-Group ::= SEQUENCE {
    uC-ID                UC-ID,
    frequencyInfo        FrequencyInfo,
    uTDOA-ChannelSettings UTDOA-RRState,
    iE-Extensions        ProtocolExtensionContainer { { UTDOA-Group-ExtIEs } }
    OPTIONAL,
    ...
}

UTDOA-Group-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

FrequencyInfo ::= SEQUENCE {
    modeSpecificInfo     CHOICE {
        fdd                FrequencyInfoFDD,
        tdd                FrequencyInfoTDD,
        ...
    },
    iE-Extensions        ProtocolExtensionContainer { { FrequencyInfo-ExtIEs } }
    OPTIONAL,
    ...
}

```

```

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

FrequencyInfoFDD ::=
  uarfcn-UL          UARFCN          OPTIONAL,
  uarfcn-DL          UARFCN,
  iE-Extensions     ProtocolExtensionContainer { { FrequencyInfoFDD-ExtIEs } }
  OPTIONAL,
  ...
}

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

FrequencyInfoTDD ::=
  uarfcn          UARFCN,
  iE-Extensions  ProtocolExtensionContainer { {FrequencyInfoTDD-ExtIEs} }
  OPTIONAL,
  ...
}

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

UTDOA-RRCState ::= CHOICE {
  uTDOA-CELLDCH  UTDOA-CELLDCH,
  uTDOA-CELLFACH UTDOA-CELLFACH,
  ...
}

-- *****
--
-- UTDOA Cell DCH Information
--
-- *****
UTDOA-CELLDCH ::= SEQUENCE {
  uL-DPCHInfo          UL-DPCHInfo,
  compressedModeAssistanceData  Compressed-Mode-Assistance-Data  OPTIONAL,
  dCH-Information      DCH-Information  OPTIONAL,
  e-DPCH-Information  E-DPCH-Information  OPTIONAL,
  iE-Extensions       ProtocolExtensionContainer { { UTDOA-CELLDCH-ExtIEs } },
  ...
}

UTDOA-CELLDCH-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

UL-DPCHInfo ::=
  fdd CHOICE {
    SEQUENCE {
      scramblingCodeType  ScramblingCodeType,
      scramblingCode      UL-ScramblingCode,
      tfci-Existence      BOOLEAN,
      numberOfFBI-Bits    NumberOfFBI-Bits,
      iE-Extensions       ProtocolExtensionContainer { { UL-DPCHInfoFDD-ExtIEs } },
      ...
    },
    tdd SEQUENCE {
      cellParameterID      CellParameterID,
      tFCI-Coding          TFCI-Coding,
      puncturingLimit      PuncturingLimit,
      repetitionPeriod     RepetitionPeriod,
      repetitionLength     RepetitionLength,
      tdd-DPCHOffset       TDD-DPCHOffset,
      uL-Timeslot-Information  UL-Timeslot-Information,
      frameOffset          FrameOffset,
      specialBurstScheduling  SpecialBurstScheduling,
      iE-Extensions       ProtocolExtensionContainer { { UL-DPCHInfoTDD-ExtIEs } },
      ...
    },
    ...
  },
  ...

```

```

    }
UL-DPCHInfoFDD-ExtIEs      PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
UL-DPCHInfoTDD-ExtIEs     PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
Compressed-Mode-Assistance-Data ::= SEQUENCE {
    dl-information          DL-InformationFDD,
    ul-information         UL-InformationFDD,
    iE-Extensions         ProtocolExtensionContainer { { Compressed-Mode-
Assistance-DataFDD-ExtIEs } },
    ...
}
Compressed-Mode-Assistance-DataFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
DL-InformationFDD ::= SEQUENCE {
    primaryScramblingCode PrimaryScramblingCode,
    chipOffset             ChipOffset,
    frameOffset            FrameOffset,
    iE-Extensions         ProtocolExtensionContainer { { DL-InformationFDD-ExtIEs } },
    ...
}
DL-InformationFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
UL-InformationFDD ::= SEQUENCE {
    transmissionGapPatternSequenceInfo Transmission-Gap-Pattern-Sequence-
Information,
    activePatternSequenceInfo         Active-Pattern-Sequence-Information,
    cFN                                CFN,
    iE-Extensions                     ProtocolExtensionContainer { { UL-InformationFDD-ExtIEs } },
    ...
}
UL-InformationFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
Transmission-Gap-Pattern-Sequence-Information ::= SEQUENCE (SIZE (1..maxTGPS)) OF
SEQUENCE {
    tGPSID          TGPSID,
    tGSN            TGSN,
    tGL1            GapLength,
    tGL2            GapLength OPTIONAL,
    tGD             TGD,
    tGPL1           GapDuration,
    uplink-Compressed-Mode-Method Uplink-Compressed-Mode-Method,
    iE-Extensions  ProtocolExtensionContainer { {Transmission-Gap-Pattern-Sequence-
Information-ExtIEs} } OPTIONAL,
    ...
}
Transmission-Gap-Pattern-Sequence-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
TGD ::= INTEGER (0|15..269)
-- 0 = Undefined, only one transmission gap in the transmission gap pattern sequence
TGPRC ::= INTEGER (0..511)
-- 0 = infinity
TGPSID ::= INTEGER (1.. maxTGPS)
TGSN ::= INTEGER (0..14)

```

```

Uplink-Compressed-Mode-Method ::= ENUMERATED {
    sFdiv2,
    higher-layer-scheduling,
    ...
}

GapDuration ::= INTEGER (1..144,...)
-- Unit frame

GapLength ::= INTEGER (1..14)
-- Unit slot

Active-Pattern-Sequence-Information ::= SEQUENCE {
    cmConfigurationChangeCFN CFN,
    transmission-Gap-Pattern-Sequence-Status Transmission-Gap-Pattern-Sequence-Status-List
    OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { {Active-Pattern-
Sequence-Information-ExtIEs} } OPTIONAL,
    ...
}

Active-Pattern-Sequence-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Transmission-Gap-Pattern-Sequence-Status-List ::= SEQUENCE (SIZE (1..maxTGPS)) OF
SEQUENCE {
    tGPSID TGPSID,
    tGPRC TGPRC,
    tGCFN CFN,
    iE-Extensions ProtocolExtensionContainer { { Transmission-Gap-Pattern-Sequence-Status-
List-ExtIEs } } OPTIONAL,
    ...
}

Transmission-Gap-Pattern-Sequence-Status-List-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DCH-Information ::= SEQUENCE {
    tFCS TFCS,
    trChInfo TrChInfoList,
    iE-Extensions ProtocolExtensionContainer { { DCH-Information-ExtIEs } },
    ...
}

DCH-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TrChInfoList ::= SEQUENCE (SIZE(1..maxTrCH)) OF
UL-TrCHInfo

UL-TrCHInfo ::= SEQUENCE {
    uL-TrCHType UL-TrCHType,
    tfs TransportFormatSet,
    iE-Extensions ProtocolExtensionContainer { { UL-TrCHInfo-ExtIEs } },
    ...
}

UL-TrCHInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-TrCHType ::= ENUMERATED {dch, usch, ...}

E-DPCH-Information ::= SEQUENCE {
    maxSet-E-DPDCHs Max-Set-E-DPDCHs,
    ul-PuncturingLimit PuncturingLimit,
    e-TFCS-Information E-TFCS-Information,
    e-TTI E-TTI,
    e-DPCCH-PO E-DPCCH-PO OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { E-DPCH-Information-
ExtIEs} } OPTIONAL,
    ...
}

```

```

E-DPCH-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Max-Set-E-DPDCHs ::= ENUMERATED {
    vN64, vN32, vN16, vN8, v2xN4, v2xN2, v2xN2plus2xN4,
    ...
}
-- Values related to [16]

E-TFCS-Information ::= SEQUENCE {
    e-DCH-TFCS-Index                E-DCH-TFCS-Index,
    reference-E-TFCI-Information    Reference-E-TFCI-Information OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { {E-TFCS-
Information-ExtIEs} }              OPTIONAL,
    ...
}

E-TFCS-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

E-DCH-TFCS-Index ::= INTEGER (1..4,...)

Reference-E-TFCI-Information ::= SEQUENCE (SIZE (1..maxNrOfRefETFCIs)) OF Reference-E-TFCI-
Information-Item

Reference-E-TFCI-Information-Item ::= SEQUENCE {
    reference-E-TFCI                E-TFCI,
    reference-E-TFCI-PO              Reference-E-TFCI-PO,
    iE-Extensions                  ProtocolExtensionContainer { { Reference-E-TFCI-Information-
Item-ExtIEs} }                    OPTIONAL,
    ...
}

Reference-E-TFCI-Information-Item-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Reference-E-TFCI-PO ::= INTEGER (0.. maxNrOfRefETFCI-PO-QUANTSTEPS)
-- FFS according to mapping in [17]

E-TFCI ::= INTEGER (0..127)

E-TTI ::= ENUMERATED {
    e-TTI-2ms,
    e-TTI-10ms,
    ...
}

E-DPCCH-PO ::= INTEGER (0..maxNrOfEDPCCH-PO-QUANTSTEPS)

CellParameterID ::= INTEGER (0..127,...)

TFCI-Coding ::= ENUMERATED {
    v4,
    v8,
    v16,
    v32,
    ...
}

RepetitionLength ::= INTEGER (1..63)

RepetitionPeriod ::= ENUMERATED {
    v1,
    v2,
    v4,
    v8,
    v16,
    v32,
    v64,
    ...
}

```

```

TDD-DPCHoffset ::= CHOICE {
    initialOffset      INTEGER (0..255),
    noinitialOffset   INTEGER (0..63)
}

UL-Timeslot-Information ::= SEQUENCE (SIZE (1..maxNrOfULTSs)) OF UL-Timeslot-InformationItem

maxNrOfULTSs      INTEGER ::= 15
UL-Timeslot-InformationItem ::= SEQUENCE {
    timeSlot                TimeSlot,
    midambleShiftAndBurstType MidambleShiftAndBurstType,
    tFCI-Presence           BOOLEAN,
    uL-Code-InformationList TDD-UL-Code-Information,
    iE-Extensions          ProtocolExtensionContainer { { UL-Timeslot-
InformationItem-ExtIEs} } OPTIONAL,
    ...
}

UL-Timeslot-InformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TimeSlot ::= INTEGER (0..14)

MidambleShiftAndBurstType ::= CHOICE {
    type1 SEQUENCE {
        midambleConfigurationBurstType1And3 MidambleConfigurationBurstType1And3,
        midambleAllocationMode              CHOICE {
            defaultMidamble      NULL,
            commonMidamble        NULL,
            ueSpecificMidamble    MidambleShiftLong,
            ...
        },
        ...
    },
    type2 SEQUENCE {
        midambleConfigurationBurstType2 MidambleConfigurationBurstType2,
        midambleAllocationMode          CHOICE {
            defaultMidamble      NULL,
            commonMidamble        NULL,
            ueSpecificMidamble    MidambleShiftShort,
            ...
        },
        ...
    },
    type3 SEQUENCE {
        midambleConfigurationBurstType1And3 MidambleConfigurationBurstType1And3,
        midambleAllocationMode              CHOICE {
            defaultMidamble      NULL,
            ueSpecificMidamble    MidambleShiftLong,
            ...
        },
        ...
    },
    ...
}

MidambleShiftLong ::= INTEGER (0..15)

MidambleShiftShort ::= INTEGER (0..5)

MidambleConfigurationBurstType1And3 ::= ENUMERATED {v4, v8, v16}

MidambleConfigurationBurstType2 ::= ENUMERATED {v3, v6}

TDD-UL-Code-Information ::= SEQUENCE (SIZE (1..maxNrOfDPCHs)) OF TDD-UL-Code-InformationItem

maxNrOfDPCHs      INTEGER ::= 240

TDD-UL-Code-InformationItem ::= SEQUENCE {
    tdd-ChannelisationCode TDD-ChannelisationCode,
    iE-Extensions          ProtocolExtensionContainer { { TDD-UL-Code-
InformationItem-ExtIEs} } OPTIONAL,
    ...
}

TDD-UL-Code-InformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {

```

```

    ...
}

TDD-ChannelisationCode ::= ENUMERATED {
    chCode1div1,
    chCode2div1,
    chCode2div2,
    chCode4div1,
    chCode4div2,
    chCode4div3,
    chCode4div4,
    chCode8div1,
    chCode8div2,
    chCode8div3,
    chCode8div4,
    chCode8div5,
    chCode8div6,
    chCode8div7,
    chCode8div8,
    chCode16div1,
    chCode16div2,
    chCode16div3,
    chCode16div4,
    chCode16div5,
    chCode16div6,
    chCode16div7,
    chCode16div8,
    chCode16div9,
    chCode16div10,
    chCode16div11,
    chCode16div12,
    chCode16div13,
    chCode16div14,
    chCode16div15,
    chCode16div16,
    ...
}

SpecialBurstScheduling ::= INTEGER (1..256) -- Number of frames between special burst transmission
during DTX

-- *****
--
-- UTDOA Cell Fach Information
--
-- *****

UTDOA-CELLFACH ::= SEQUENCE {
    prachParameters          PRACHparameters,
    crnti                    C-RNTI,
    uschParameters           UschParameters          OPTIONAL,
    ie-Extensions            ProtocolExtensionContainer { { UTDOA-CELLFACH-ExtIEs } },
    ...
}

UTDOA-CELLFACH-ExtIEs      PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

PRACHparameters ::= SEQUENCE (SIZE (1..maxPRACH)) OF
    PRACH-ChannelInfo

PRACH-ChannelInfo ::= SEQUENCE {
    prach-Info              PRACH-Info,
    tfs                     TransportFormatSet,
    tfcs                    TFCS,
    ie-Extensions           ProtocolExtensionContainer { { PRACH-ChannelInfo-ExtIEs } },
    ...
}

PRACH-ChannelInfo-ExtIEs   PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

PRACH-Info ::=
    CHOICE {

```

```

    fdd
        availableSignatures      SEQUENCE {
            availableSignatures,
            availableSF           SF-PRACH,
            preambleScramblingCodeWordNumber PreambleScramblingCodeWordNumber,
            puncturingLimit      PuncturingLimit,
            availableSubChannelNumbers AvailableSubChannelNumbers,
            iE-Extensions        ProtocolExtensionContainer { { PRACH-Info-FDD-ExtIEs } },
            ...
        },
    tdd
        timeSlot                 SEQUENCE {
            timeSlot,
            tdd-ChannelisationCode TDD-ChannelisationCode,
            maxPRACH-MidambleShifts MaxPRACH-MidambleShifts,
            pRACH-Midamble        PRACH-Midamble,
            iE-Extensions        ProtocolExtensionContainer { { PRACH-Info-TDD-ExtIEs } },
            ...
        },
    ...
}

PRACH-Info-FDD-ExtIEs      PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

PRACH-Info-TDD-ExtIEs     PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SF-PRACH ::=
    ENUMERATED {
        sfpr32, sfpr64, sfpr128, sfpr256, ... }

AvailableSignatures ::=
    BIT STRING {
        signature15(0),
        signature14(1),
        signature13(2),
        signature12(3),
        signature11(4),
        signature10(5),
        signature9(6),
        signature8(7),
        signature7(8),
        signature6(9),
        signature5(10),
        signature4(11),
        signature3(12),
        signature2(13),
        signature1(14),
        signature0(15)
    } (SIZE(16))

PreambleScramblingCodeWordNumber ::= INTEGER (0..15)

PuncturingLimit ::= INTEGER (0..15)
-- 0: 40%; 1: 44%; ... 14: 96%; 15: 100%

AvailableSubChannelNumbers ::=
    BIT STRING {
        subCh11(0),
        subCh10(1),
        subCh9(2),
        subCh8(3),
        subCh7(4),
        subCh6(5),
        subCh5(6),
        subCh4(7),
        subCh3(8),
        subCh2(9),
        subCh1(10),
        subCh0(11)
    } (SIZE(12))

ScramblingCodeType ::=
    ENUMERATED {
        shortSC,
        longSC }

UL-ScramblingCode ::=
    INTEGER (0..16777215)

```



```

NumberOfFBI-Bits ::= INTEGER (0..2)

TransportFormatSet ::= SEQUENCE {
    dynamicPart      TransportFormatSet-DynamicPartList,
    semi-staticPart  TransportFormatSet-Semi-staticPart,
    iE-Extensions    ProtocolExtensionContainer { { TransportFormatSet-ExtIEs} }
    OPTIONAL,
    ...
}

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

TransportFormatSet-DynamicPartList ::= SEQUENCE (SIZE (1..maxNrOfTFs)) OF
SEQUENCE {
    rlc-Size          RLC-Size,
    numberOfTbstTIIList SEQUENCE (SIZE (1..maxNrOfTFs)) OF TbstTIIInfo,
    iE-Extensions    ProtocolExtensionContainer { { TransportFormatSet-
DynamicPartList-ExtIEs} }
    OPTIONAL,
    ...
}

TransportFormatSet-DynamicPartList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TbstTIIInfo ::= SEQUENCE {
    tTIIInfo          TransportFormatSet-TransmissionTimeIntervalDynamic    OPTIONAL,
    numberOfTbs       TransportFormatSet-NrOfTransportBlocks,
    iE-Extensions    ProtocolExtensionContainer { { TbstTIIInfo-ExtIEs} },
    ...
}

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

RLC-Size ::= INTEGER (129..5055)

TransportFormatSet-NrOfTransportBlocks ::= INTEGER (0..512)

TransportFormatSet-Semi-staticPart ::= SEQUENCE {
    transmissionTimeInterval TransportFormatSet-TransmissionTimeIntervalSemiStatic,
    channelCoding            TransportFormatSet-ChannelCodingType,
    codingRate               TransportFormatSet-CodingRate                OPTIONAL,
    -- This IE shall be present if the Type of channel coding IE is set to 'convolutional' or
'turbo'
    rateMatchingAttribute    TransportFormatSet-RateMatchingAttribute,
    crc-Size                 TransportFormatSet-CRC-Size,
    iE-Extensions            ProtocolExtensionContainer { { TransportFormatSet-Semi-
staticPart-ExtIEs} }
    OPTIONAL,
    ...
}

TransportFormatSet-Semi-staticPart-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TransportFormatSet-TransmissionTimeIntervalSemiStatic ::= ENUMERATED {
    msec-5,
    msec-10,
    msec-20,
    msec-40,
    msec-80,
    dynamic,
    ...
}

TransportFormatSet-ChannelCodingType ::= ENUMERATED {
    no-codingTDD,
    convolutional-coding,
    turbo-coding,
    ...
}

```

```

TransportFormatSet-CodingRate ::= ENUMERATED {
    half,
    third,
    ...
}

TransportFormatSet-RateMatchingAttribute ::= INTEGER (1..maxRateMatching)

TransportFormatSet-CRC-Size ::= ENUMERATED {
    v0,
    v8,
    v12,
    v16,
    v24,
    ...
}

TransportFormatSet-TransmissionTimeIntervalDynamic ::= ENUMERATED {
    msec-10,
    msec-20,
    msec-40,
    msec-80,
    dynamic,
    ...
}

TFCS ::= SEQUENCE (SIZE (1..maxTFC)) OF CTFC

CTFC ::= CHOICE{
    ctfc2Bit SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..3),
    ctfc4Bit SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..15),
    ctfc6Bit SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..63),
    ctfc8Bit SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..255),
    ctfc12Bit SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..4095),
    ctfc16Bit SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..65535),
    ctfc24Bit SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..16777215),
    ...
}

C-RNTI ::= BIT STRING (SIZE (16))

UARFCN ::= INTEGER (0..16383)

CFN ::= INTEGER (0..255)

ChipOffset ::= INTEGER (0..38399)
-- Unit Chip

FrameOffset ::= INTEGER (0..255)

PrimaryScramblingCode ::= INTEGER (0..511)

UschParameters ::= SEQUENCE {
    cellParameterID CellParameterID,
    tFCI-Coding TFCI-Coding,
    puncturingLimit PuncturingLimit,
    repetitionPeriod RepetitionPeriod,
    uSCH-SchedulingOffset USCH-SchedulingOffset,
    uL-Timeslot-Information UL-Timeslot-Information,
    tFCS TFCS,
    trChInfo TrChInfoList,
    iE-Extensions ProtocolExtensionContainer { { UschParameters-ExtIEs } },
    ...
}

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

USCH-SchedulingOffset ::= INTEGER (0..255)

MaxPRACH-MidambleShifts ::= ENUMERATED {
    shift4,

```

```

    shift8,
    ...
}

PRACH-Midamble ::= ENUMERATED {
    inverted,
    direct,
    ...
}

--*****
--
-- Positioning Response Time
--
--*****

Positioning-ResponseTime ::=
    ENUMERATED { ms250, ms500, s1, s2, s3, s4, s6,
                 s8, s12, s16, s20, s24, s28, s32, s64,
                 ...
    }

--*****
--
-- Amount of Reporting
--
--*****

AmountOfReporting ::= ENUMERATED { ra2, ra4, ra8, ra16, ra32,
                                   ra64, ra-Infinity, ... }

-- *****
--
-- Include Velocity
--
-- *****

IncludeVelocity ::= ENUMERATED {
    requested
}

-- *****
--
-- VelocityEstimate
--
-- *****

-- VelocityEstimate is based on Description of Velocity in 23.032

VelocityEstimate ::= CHOICE {
    horizontalVelocity                HorizontalVelocity,
    horizontalWithVerticalVelocity    HorizontalWithVerticalVelocity,
    horizontalVelocityWithUncertainty HorizontalVelocityWithUncertainty,
    horizontalWithVerticalVelocityAndUncertainty HorizontalWithVerticalVelocityAndUncertainty,
    ...
}

HorizontalVelocity ::= SEQUENCE {
    horizontalSpeedAndBearing    HorizontalSpeedAndBearing,
    iE-Extensions                ProtocolExtensionContainer { { HorizontalVelocity-ExtIEs} } OPTIONAL,
    ...
}

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

HorizontalWithVerticalVelocity ::= SEQUENCE {
    horizontalSpeedAndBearing    HorizontalSpeedAndBearing,
    verticalVelocity              VerticalVelocity,
    iE-Extensions                ProtocolExtensionContainer { { HorizontalWithVerticalVelocity-ExtIEs} }
OPTIONAL,
    ...
}

HorizontalWithVerticalVelocity-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {

```

```

}
...

HorizontalVelocityWithUncertainty ::= SEQUENCE {
    horizontalSpeedAndBearing          HorizontalSpeedAndBearing,
    uncertaintySpeed                    INTEGER (0..255),
    iE-Extensions                      ProtocolExtensionContainer { { HorizontalVelocityWithUncertainty-ExtIEs} }
OPTIONAL,
    ...
}

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

HorizontalWithVerticalVelocityAndUncertainty ::= SEQUENCE {
    horizontalSpeedAndBearing          HorizontalSpeedAndBearing,
    verticalVelocity                   VerticalVelocity,
    horizontalUncertaintySpeed         INTEGER (0..255),
    verticalUncertaintySpeed           INTEGER (0..255),
    iE-Extensions                      ProtocolExtensionContainer { { HorizontalWithVerticalVelocityAndUncertainty-
ExtIEs} } OPTIONAL,
    ...
}

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

HorizontalSpeedAndBearing ::= SEQUENCE {
    bearing                            INTEGER (0..359),
    horizontalSpeed                     INTEGER (0..2047)
}

VerticalVelocity ::= SEQUENCE {
    verticalSpeed                       INTEGER (0..255),
    verticalSpeedDirection              VerticalSpeedDirection
}

VerticalSpeedDirection ::= ENUMERATED {
    upward,
    downward
}

--*****
--
-- UTRAN-GPS Reference Time
--
--*****

UTRAN-GPSReferenceTime ::= SEQUENCE {
    utran-GPSTimingOfCell              INTEGER (0..2322431999999, ...),
    uC-ID                              UC-ID                                OPTIONAL,
    sfn                                INTEGER (0..4095),
    iE-Extensions                      ProtocolExtensionContainer { { UTRAN-GPSReferenceTime-ExtIEs
} } OPTIONAL,
    ...
}

UTRAN-GPSReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

--*****
--
-- UTRAN-GPS Reference Time Result
--
--*****

UTRAN-GPSReferenceTimeResult ::= SEQUENCE {
    ue-GPSTimingOfCell                 INTEGER (0..37158911999999, ...),
    uC-ID                              UC-ID,
    sfn                                INTEGER (0..4095),

```

```

    iE-Extensions          ProtocolExtensionContainer { { UTRAN-GPSReferenceTimeResult-ExtIEs }
  } OPTIONAL,
  ...
}

UTRAN-GPSReferenceTimeResult-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

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
id-PositionParameterModification ProcedureCode ::= 8
id-PositionInitiation           ProcedureCode ::= 9
id-PositionActivation            ProcedureCode ::= 10
id-Abort                        ProcedureCode ::= 11
id-PositionPeriodicReport       ProcedureCode ::= 12
id-PositionPeriodicResult       ProcedureCode ::= 13
id-PositionPeriodicTermination  ProcedureCode ::= 14

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

maxNrOfErrors           INTEGER ::= 256
maxSat                  INTEGER ::= 16
maxSatAlmanac          INTEGER ::= 32
maxNrOfLevels           INTEGER ::= 256
maxNrOfPoints           INTEGER ::= 15
maxNrOfExpInfo          INTEGER ::= 32
maxNrOfMeasNCell        INTEGER ::= 32
maxNrOfMeasurements     INTEGER ::= 16
maxNrOfSets             INTEGER ::= 3
maxRateMatching         INTEGER ::= 256
maxNrOfTFs              INTEGER ::= 32
maxTTI-count           INTEGER ::= 4
maxTS-1                 INTEGER ::= 13
maxCCTrCH               INTEGER ::= 8
maxTF                   INTEGER ::= 32
maxTFC                  INTEGER ::= 1024
maxPRACH                INTEGER ::= 16
maxTrCH                 INTEGER ::= 32
maxTGPS                 INTEGER ::= 6
maxNoOfMeasurements     INTEGER ::= 16
maxCellMeas             INTEGER ::= 32
maxNrOfEDPCCH-PO-QUANTSTEPS INTEGER ::= 8 -- FFS
maxNrOfRefETFCCI-PO-QUANTSTEPS INTEGER ::= 8 -- FFS
maxNrOfRefETFCCIs      INTEGER ::= 8
maxSet                  INTEGER ::= 9
maxGANSSSat            INTEGER ::= 32
maxSgnType              INTEGER ::= 4
maxGANS                 INTEGER ::= 8
maxGANSSSet            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-GPS-MeasuredResultsList             ProtocolIE-ID ::= 10
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-CellId-MeasuredResultsSets          ProtocolIE-ID ::= 20
id-OTDOA-MeasurementGroup              ProtocolIE-ID ::= 22
id-AccuracyFulfilmentIndicator         ProtocolIE-ID ::= 23
id-HorizontalAccuracyCode               ProtocolIE-ID ::= 24
id-VerticalAccuracyCode                 ProtocolIE-ID ::= 25
id-UTDOA-Group                          ProtocolIE-ID ::= 26
id-RequestType                          ProtocolIE-ID ::= 28
id-UE-PositioningCapability            ProtocolIE-ID ::= 29
id-UC-id                                ProtocolIE-ID ::= 30
id-ResponseTime                         ProtocolIE-ID ::= 31
id-PositioningPriority                  ProtocolIE-ID ::= 32
id-ClientType                           ProtocolIE-ID ::= 33
id-PositioningMethod                   ProtocolIE-ID ::= 34
id-UTDOAPositioning                    ProtocolIE-ID ::= 35
id-GPSPositioning                      ProtocolIE-ID ::= 36
id-OTDOAAssistanceData                  ProtocolIE-ID ::= 37
id-Positioning-ResponseTime            ProtocolIE-ID ::= 38
id-EnvironmentCharacterisation          ProtocolIE-ID ::= 39
id-PositionData                         ProtocolIE-ID ::= 40
id-IncludeVelocity                      ProtocolIE-ID ::= 41
id-VelocityEstimate                    ProtocolIE-ID ::= 42
id-rxTimingDeviation768Info            ProtocolIE-ID ::= 43
id-UC-ID-InfEx-Rqst                    ProtocolIE-ID ::= 44
id-UE-PositionEstimateInfo             ProtocolIE-ID ::= 45
id-UTRAN-GPSReferenceTime              ProtocolIE-ID ::= 46
id-UTRAN-GPSReferenceTimeResult        ProtocolIE-ID ::= 47
id-UTRAN-GPS-DriftRate                  ProtocolIE-ID ::= 48
id-OTDOA-AddMeasuredResultsInfo        ProtocolIE-ID ::= 49
id-GPS-ReferenceLocation                ProtocolIE-ID ::= 50
id-OTDOA-MeasuredResultsSets           ProtocolIE-ID ::= 51
id-rxTimingDeviation384extInfo         ProtocolIE-ID ::= 55
id-ExtendedRoundTripTime               ProtocolIE-ID ::= 56
id-PeriodicPosCalcInfo                  ProtocolIE-ID ::= 57
id-PeriodicLocationInfo                 ProtocolIE-ID ::= 58
id-AmountOfReporting                    ProtocolIE-ID ::= 59
id-MeasInstructionsUsed                  ProtocolIE-ID ::= 60
id-RRCstateChange                       ProtocolIE-ID ::= 61
id-PeriodicTerminationCause             ProtocolIE-ID ::= 62
id-MeasurementValidity                  ProtocolIE-ID ::= 63
id-roundTripTimeInfoWithType1           ProtocolIE-ID ::= 64
id-CellIDPositioning                    ProtocolIE-ID ::= 66
id-AddMeasurementInfo                   ProtocolIE-ID ::= 67
id-Extended-RNC-ID                      ProtocolIE-ID ::= 68
id-GANSS-CommonAssistanceData           ProtocolIE-ID ::= 69
id-GANSS-GenericAssistanceDataList     ProtocolIE-ID ::= 70
id-GANSS-MeasuredResultsList            ProtocolIE-ID ::= 71
id-GANSS-UTRAN-TRU                      ProtocolIE-ID ::= 72
id-GANSSPositioning                     ProtocolIE-ID ::= 73
id-GANSS-PositioningDataSet             ProtocolIE-ID ::= 74
id-GNSS-PositioningMethod               ProtocolIE-ID ::= 75
id-NetworkAssistedGANSSSupport          ProtocolIE-ID ::= 76
id-TUTRANGANSSMeasurementValueInfo     ProtocolIE-ID ::= 77

```

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-Single-Container {PCAP-PROTOCOL-IES : IEsSetParam} ::=
    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].

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.

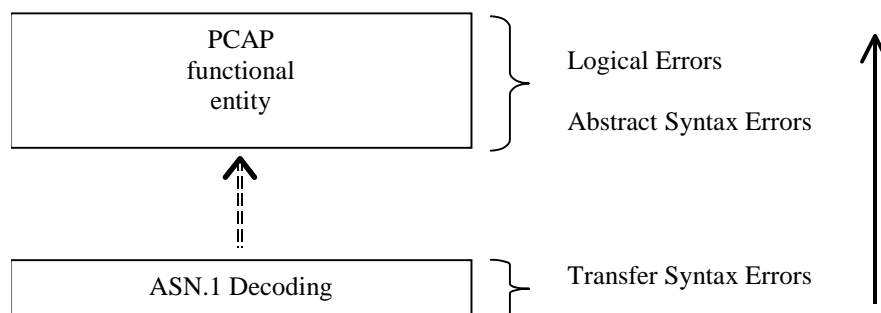


Figure 10: Protocol Errors in PCAP

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

10.3.3 Presence Information

For many IEs/IE groups which are optional according to the ASN.1 transfer syntax, 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 IE/IE group other than the *Procedure Code* IE and *Type of Message* IE according to the following:

Reject IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend; none of the functional requests of the message shall be executed.

The receiving node shall reject the procedure and report the rejection of one or more IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall terminate the procedure and initiate the Error Indication procedure.
- If a *response* message is received containing one or more IEs/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 message to report this unsuccessful outcome, this 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 message to report this unsuccessful outcome, 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 or Error Indication message needs to be returned, but the information necessary to determine the receiver of that message is missing, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.
- If an error that terminates a procedure occurs, the returned cause value shall reflect the error that caused the termination of the procedure even if one or more abstract syntax errors with criticality "ignore and notify" have earlier occurred within the same procedure.

Annex A (informative): 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.

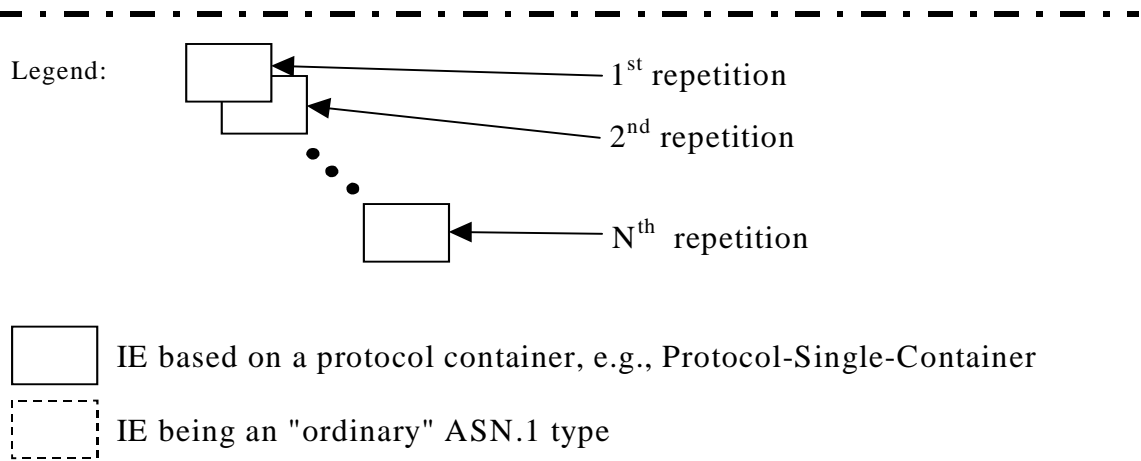
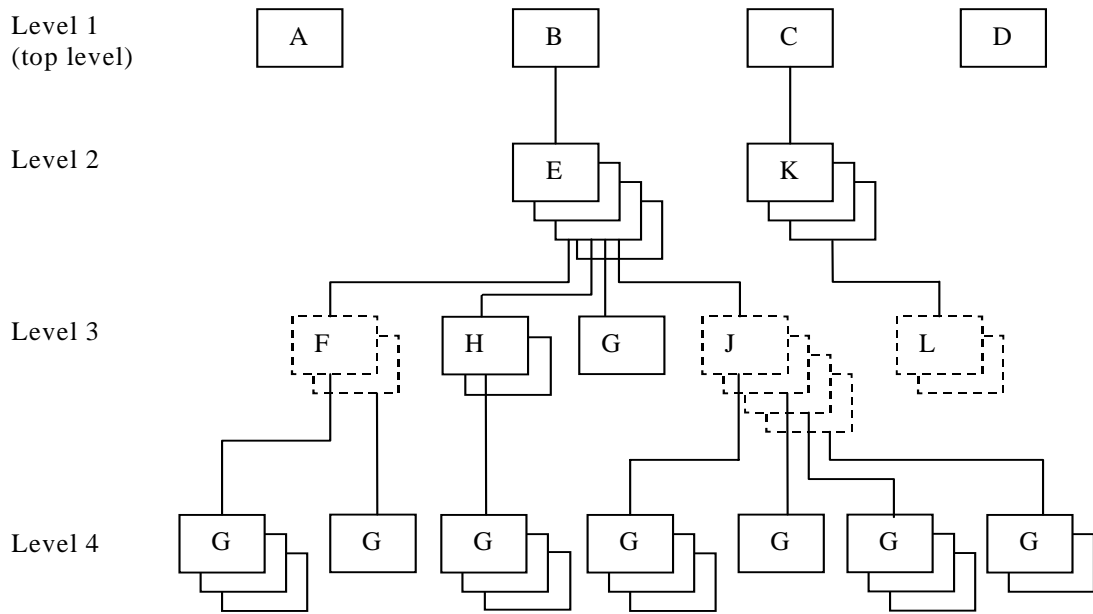


Figure A.1: Example of content of a received PCAP message based on the EXAMPLE MESSAGE

A.3 Content of Criticality Diagnostics

A.3.1 Example 1

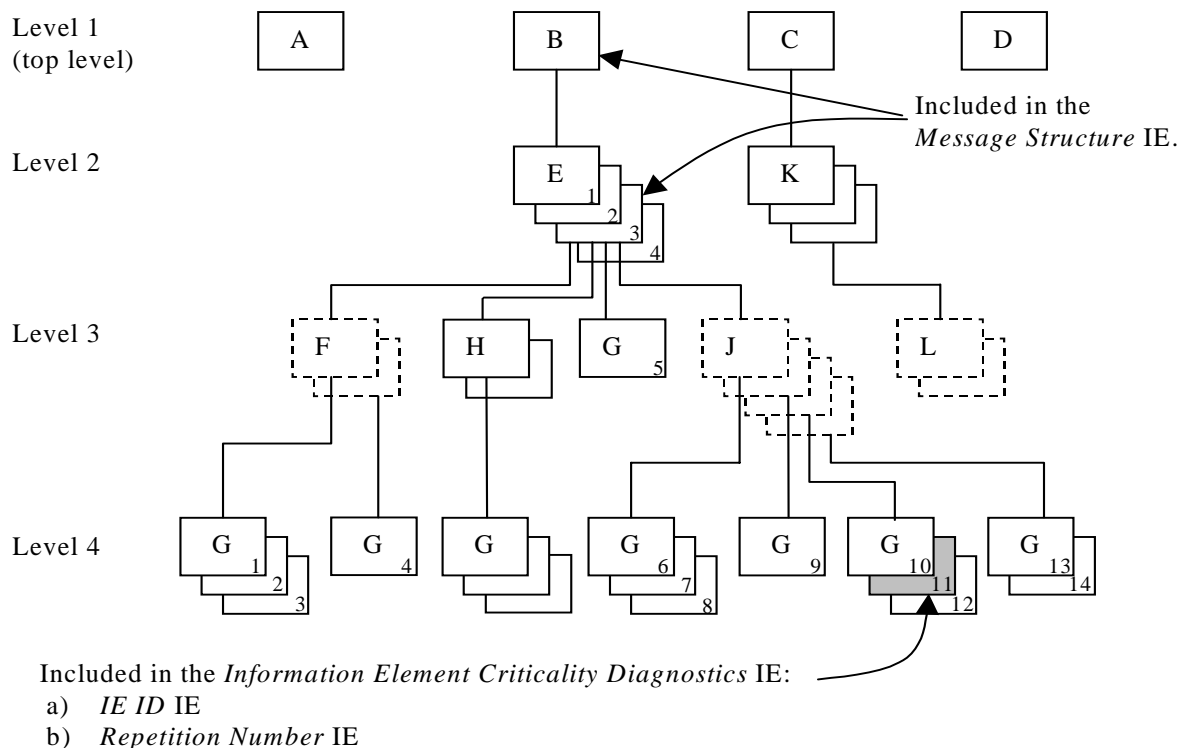


Figure A.2: Example of a received PCAP message containing a not comprehended IE

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* IEs as 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 <i>Message Structure</i> IE this is the eleventh occurrence of IE G within the IE E (level 2).
Type of Error	not understood	
<i>Message Structure, first repetition</i>		
>IE ID	id-B	IE ID from level 1.
<i>Message Structure, second repetition</i>		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE 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

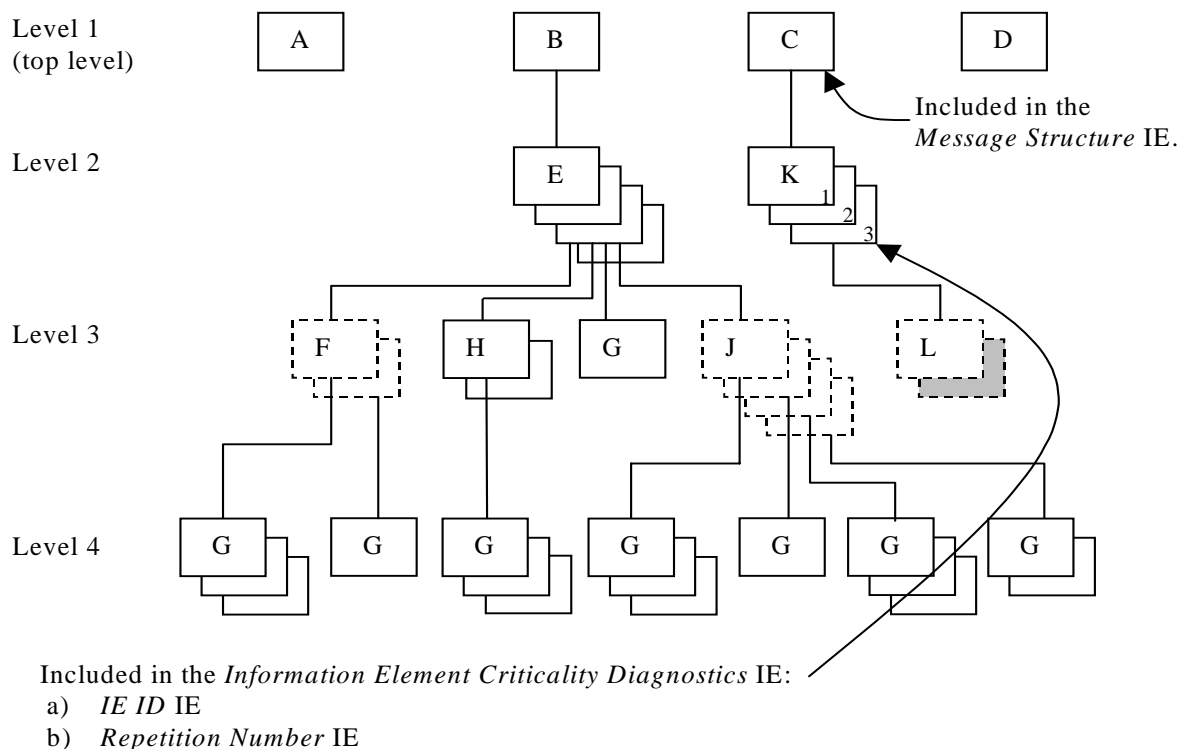


Figure A.3: Example of a received PCAP message containing a not comprehended IE

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 IE*s 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, <i>first repetition</i>		
>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

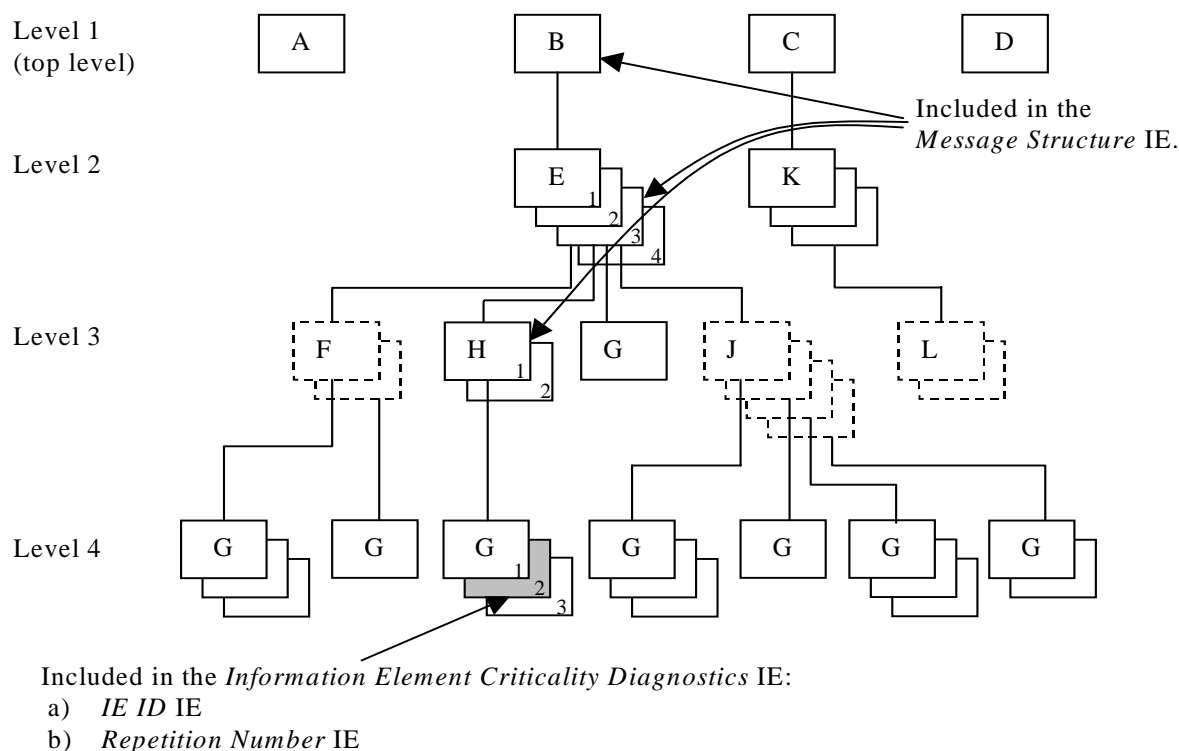


Figure A.4: Example of a received PCAP message containing a not comprehended IE

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

NOTE: 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

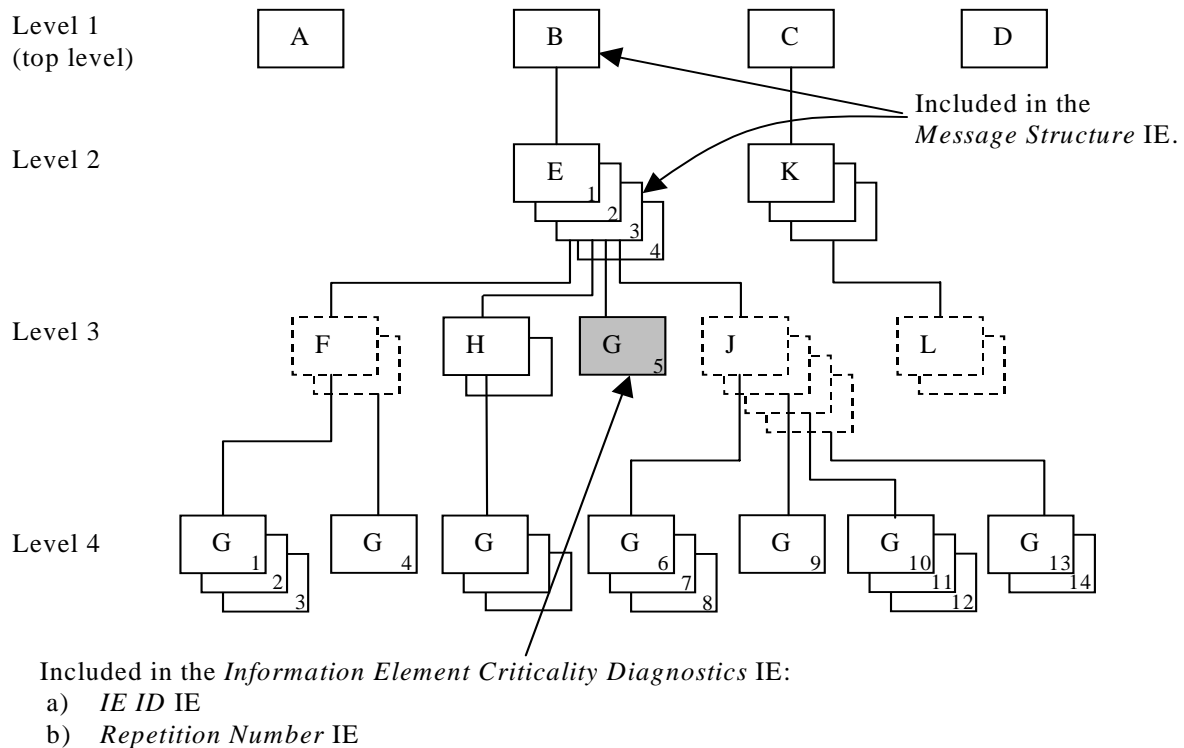


Figure A.5: Example of a received PCAP message containing a not comprehended IE

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 <i>Message Structure</i> IE this is the fifth occurrence of IE G within the IE E (level 2).
Type of Error	not understood	
Message Structure, <i>first repetition</i>		
>IE ID	id-B	IE ID from level 1.
Message Structure, <i>second repetition</i>		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE: 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

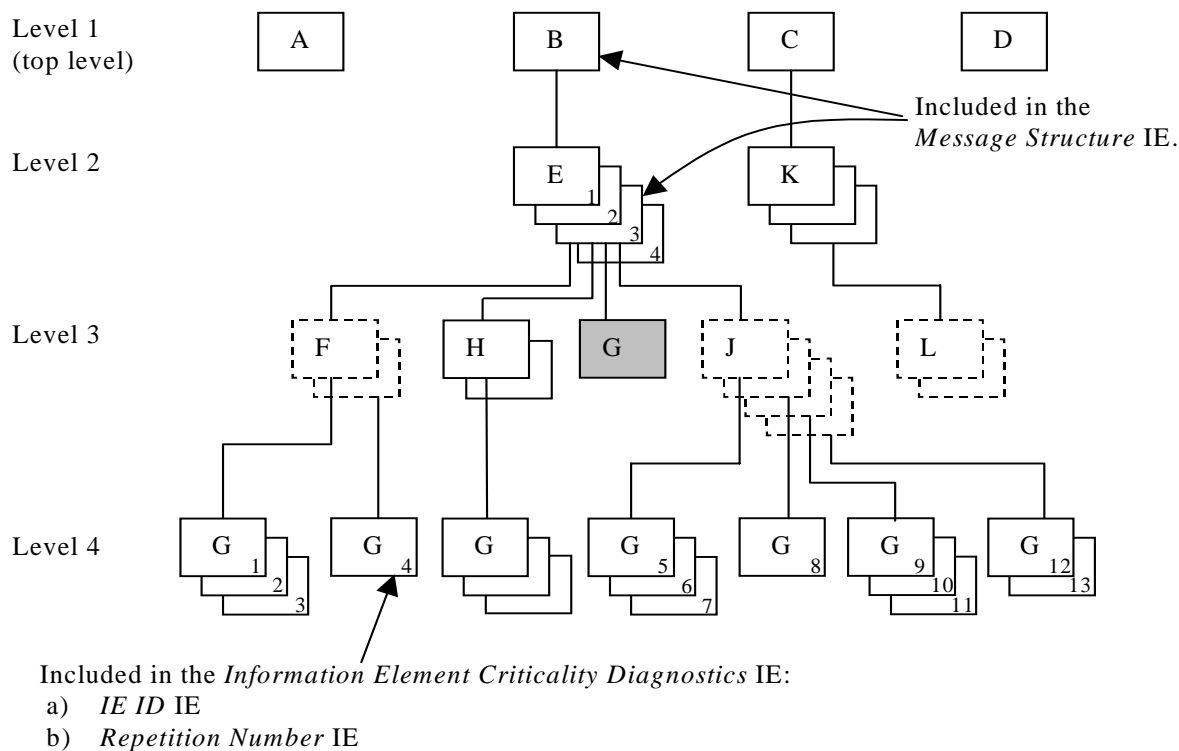


Figure A.6: Example of a received PCAP message with a missing IE

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 <i>Message Structure</i> IE there have been four occurrences of IE G within the IE E (level 2) up to the missing occurrence.
Type of Error	missing	
<i>Message Structure, first repetition</i>		
>IE ID	id-B	IE ID from level 1.
<i>Message Structure, second repetition</i>		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

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

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

E-IEs PCAP-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 PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

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

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

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

G2-IEs PCAP-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 PCAP-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 PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}
G-List3 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G3-IEs} }
G3-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY notify  TYPE G  PRESENCE mandatory }
}
G-List1 ::= ProtocolIE-Single-Container { {G1-IEs} }
G1-IEs PCAP-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 PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
G-List4 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G4-IEs} }
G4-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY reject  TYPE G  PRESENCE mandatory }
}
C ::= SEQUENCE {
  k          K-List,
  iE-Extensions ProtocolExtensionContainer { {C-ExtIEs} } OPTIONAL,
  ...
}
C-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
K-List ::= SEQUENCE (SIZE (1..maxK)) OF ProtocolIE-Single-Container { {K-IEs} }
K-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-K    CRITICALITY notify  TYPE K  PRESENCE mandatory }
}
K ::= SEQUENCE {
  l          L-List,
  iE-Extensions ProtocolExtensionContainer { {K-ExtIEs} } OPTIONAL,
  ...
}
K-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
L-List ::= SEQUENCE (SIZE (1..maxL)) OF L
L ::= SEQUENCE {
  m          M OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {L-ExtIEs} } OPTIONAL,
  ...
}
L-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
ExampleMessage-Extensions PCAP-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
06/2002	16	RP-020432	017	2	Criticality Information Decoding Failure Handling	5.3.0	5.4.0
06/2002	16	RP-020432	018	1	Clarification for the usage of the cause value	5.3.0	5.4.0
03/2003	19	RP-030065	023		CR on GPS Almanac and Satellite Health	5.4.0	5.5.0
03/2003	19	RP-030065	024		CR on GPS Measured Results	5.4.0	5.5.0
03/2003	19	RP-030067	026		Alignment of "Uncertainty Ellipse" with RRC	5.4.0	5.5.0
03/2003	19	RP-030070	027		Correction for the Information Exchange Initiation procedure	5.4.0	5.5.0
03/2003	19	RP-030084	022	2	CR on revising the position calculation function and definition of SAS to support all REL-4 UE positioning methods	5.5.0	6.0.0
06/2003	20	RP-030324	032	1	Alignment of the Requested Data Value Information IE description	6.0.0	6.1.0
06/2003	20	RP-030325	034		GPS trigger condition	6.0.0	6.1.0
06/2003	20	RP-030341	035		Position Calculation Extension for TDD	6.0.0	6.1.0
06/2003	20	RP-030322	037	1	"On Modification" and "Periodic" reporting alignment for Information Exchange procedures	6.0.0	6.1.0
06/2003	20	RP-030322	044		CR on Criticality Aspects	6.0.0	6.1.0
06/2003	20	RP-030322	045		CR on Information Exchange Initiation Request for GPS Navigation Model	6.0.0	6.1.0
06/2003	20	RP-030322	046		CR on DGPS Parameters	6.0.0	6.1.0
06/2003	20	RP-030322	047		CR on Removal of Information Exchange Object Type	6.0.0	6.1.0
06/2003	20	RP-030322	048		CR on Information Report of GPS Almanac and Satellite Health	6.0.0	6.1.0
06/2003	20	RP-030326	050		Correction of Failure message used for logical errors	6.0.0	6.1.0
09/2003	21	RP-030442	052		Correction to an incorrect implementation in the Requested Data Value Information IE	6.1.0	6.2.0
09/2003	21	RP-030445	054		Alignment of title and sub-clause text of chapter 10.3.4.2	6.1.0	6.2.0
09/2003	21	RP-030446	059		Removal of the note in chapter 10	6.1.0	6.2.0
09/2003	21	RP-030454	060		Improvement of position calculation with pathloss	6.1.0	6.2.0
12/2003	22	RP-030697	061		Improvement of position calculation through set enlargement	6.2.0	6.3.0
12/2003	22	RP-030683	064		Information Exchange Initiation behavior correction	6.2.0	6.3.0
03/2004	23	RP-040053	068		Alignment with 23.032 correction of Included Angle for Ellipsoid Arc	6.3.0	6.4.0
03/2004	23	RP-040075	069		Initial UE Position IE only mandatory necessary for GPS	6.3.0	6.4.0
03/2004	23	RP-040072	071		PCAP Review	6.3.0	6.4.0
06/2004	24	RP-040184	072	1	Correction to usage of INITIAL UE POSITION	6.4.0	6.5.0
09/2004	25	RP-040306	074	1	Introduction of the requested accuracy and an indication of achieved accuracy in Position Calculation procedure over Iupc interface	6.5.0	6.6.0
12/2004	26	RP-040441	076		outdated ITU-T reference	6.6.0	6.7.0
03/2005	27	RP-050055	078	1	Corrections to descriptions of GPS Almanac and Ephemeris fields	6.7.0	6.8.0
06/2005	28	RP-050217	082	2	Correction of deletion of Information Exchange Context	6.8.0	6.9.0
09/2005	29	RP-050441	083	1	Addition of the U-TDOA positioning method to the UTRAN	6.9.0	7.0.0
12/2005	30	RP-050705	086	2	Addition of TDD aspects of the U-TDOA positioning method	7.0.0	7.1.0
12/2005	30	RP-050701	087		PCAP Review	7.0.0	7.1.0
12/2005	30	RP-050706	088		Wording Alignment for Procedure Text	7.0.0	7.1.0
03/2006	31	RP-060072	084	10	Enabling the Providing of Velocity	7.1.0	7.2.0
03/2006	31	RP-060071	089	1	Completion of SAS-centric mode	7.1.0	7.2.0
03/2006	31	RP-060073	090	1	Introduction of 7.68Mcps TDD option	7.1.0	7.2.0
06/2006	32	RP-060290	093	2	Release 7 Timing Advance (3.84 Mcps and 7.68 Mcps TDD)	7.2.0	7.3.0
06/2006	32	RP-060386	094	1	Correction of positioning confidence reporting inconsistencies	7.2.0	7.3.0

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
09/2006	33	RP-060510	095	3	Addition of Periodic Location Procedures	7.3.0	7.4.0
09/2006	33	RP-060509	096	2	Extended WCDMA Cell Range	7.3.0	7.4.0
12/2006	34	RP-060705	097		Correction of Round Trip Time for Extended Cell Range	7.4.0	7.5.0
12/2006	34	RP-060837	098	1	Consistency of Specification Notations	7.4.0	7.5.0
03/2007	35	RP-070052	101	1	Presence inconsistency	7.5.0	7.6.0
03/2007	35	RP-070064	102	2	UE Rx-Tx Time Difference Type 1	7.5.0	7.6.0
06/2007	36	RP-070340	103	2	Support for additional measurements in Cell-ID positioning method and Information Exchange	7.6.0	7.7.0
06/2007	36	RP-070337	105	2	Introduction of GANSS (Galileo and Additional Navigation Systems) in PCAP	7.6.0	7.7.0
06/2007	36	RP-070474	106	2	Introduction of Extended RNC-ID	7.6.0	7.7.0

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