3GPP TS 25.453 V11.1.0 (2013-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
UTRAN Iupc interface Positioning Calculation Application Part (PCAP) signalling
(Release 11)

Keywords

UMTS, radio

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

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 TS 25.305 [6] and thus defines the Iupc interface and its associated signaling procedures.

2 References

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

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

[1] Void

[2] Void

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

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

[5] Void

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

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

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

[9] ITU-T Recommendation X.691 (2002-07): "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.

[23] IS-GPS-200, Revision D, Navstar GPS Space Segment/Navigation User Interfaces, March 7th, 2006.

[24] IS-GPS-705, Navstar GPS Space Segment/User Segment L5 Interfaces, September 22, 2005.

[25] IS-GPS-800, Navstar GPS Space Segment/User Segment L1C Interfaces, March 31, 2008.

[26] Specification for the Wide Area Augmentation System (WAAS), US Department of Transportation, Federal Aviation Administration, DTFA01-96-C-00025, 2001.

[27] IS-QZSS, Quasi Zenith Satellite System Navigation Service Interface Specifications for QZSS, Ver.1.0, June 17, 2008.

[28] Global Navigation Satellite System GLONASS Interface Control Document, Version 5, 2002.

[29] 3GPP TS 45.005: "Radio transmission and reception".

[30] 3GPP TS 45.008: "Radio subsystem link control".

[31] Void

[32] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

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-GANSS	Assisted GANSS
A-GPS	Assisted GPS
ASN.1	Abstract Syntax Notation One
CN	Core Network
CRNC	Controlling RNC
DGANSS	Differential GANSS
DGPS	Differential GPS
ECEF	Earth-Centered, Earth-Fixed
EGNOS	European Geostationary Navigation Overlay Service
EP	Elementary Procedure
FDD	Frequency Division Duplex
GAGAN	GPS Aided Geo Augmented Navigation
GANSS	Galileo and Additional Navigation Satellite Systems
GLONASS	GLObal'naya NAvigatsionnaya Sputnikovaya Sistema (Engl.: Global Navigation Satellite System)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICD	Interface Control Document
MSAS	Multi-functional Satellite Augmentation System
OTDOA	Observed Time Difference Of Arrival
PCAP	Positioning Calculation Application Part
PRC	Pseudorange Correction
QZSS	Quasi-Zenith Satellite System
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RRC	Radio Resource Control
SAS	Stand-Alone SMLC
SBAS	Satellite Based Augmentation System
SCCP	Signalling Connection Control Part
SIB	System Information Block
SMLC	Serving Mobile Location Center
SRNC	Serving RNC
SV	Space Vehicle
TDD	Time Division Duplex
TOD	Time of Day
TOW	Time of Week
UE	User Equipment
UTC	Universal Coordinated Time
U-TDOA	Uplink Time Difference Of Arrival
UTRAN	Universal Terrestrial Radio Access Network
WAAS	Wide Area Augmentation System

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.
[3.84Mcps TDD]	This tagging of a word indicates that the word preceding the tag "[3.84Mcps TDD]" applies only to 3.84Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[3.84Mcps TDD]" and the section following the heading applies only to 3.84Mcps TDD.
[1.28Mcps TDD]	This tagging of a word indicates that the word preceding the tag "[1.28Mcps TDD]" applies only to 1.28Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[1.28Mcps TDD]" and the section following the heading applies only to 1.28Mcps TDD.
[7.68Mcps TDD]	This tagging of a word indicates that the word preceding the tag "[7.68Mcps TDD]" applies only to 7.68Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[7.68Mcps TDD]" and the section following the heading applies only to 7.68Mcps TDD.

[FDD - …]	This tagging indicates that the enclosed text following the "[FDD - " applies only to FDD. Multiple sequential paragraphs applying only to FDD are enclosed separately to enable insertion of TDD specific (or common) paragraphs between the FDD specific paragraphs.
[TDD - …]	This tagging indicates that the enclosed text following the "[TDD - " applies only to TDD, including 7.68 Mcps TDD, 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD. Multiple sequential paragraphs applying only to TDD are enclosed separately to enable insertion of FDD specific (or common) paragraphs between the TDD specific paragraphs.
[3.84Mcps TDD - …]	This tagging indicates that the enclosed text following the "[3.84Mcps TDD - " applies only to 3.84Mcps TDD. Multiple sequential paragraphs applying only to 3.84Mcps TDD are enclosed separately to enable insertion of FDD and TDD specific (or common) paragraphs between the 3.84Mcps TDD specific paragraphs.
[1.28Mcps TDD - …]	This tagging indicates that the enclosed text following the "[1.28Mcps TDD - " applies only to 1.28Mcps TDD. Multiple sequential paragraphs applying only to 1.28Mcps TDD are enclosed separately to enable insertion of FDD and TDD specific (or common) paragraphs between the 1.28Mcps TDD specific paragraphs.
[7.68Mcps TDD - …]	This tagging indicates that the enclosed text following the "[7.68Mcps TDD - " applies only to 7.68Mcps TDD. Multiple sequential paragraphs applying only to 7.68Mcps TDD are enclosed separately to enable insertion of FDD and TDD specific (or common) paragraphs between the 7.68Mcps TDD specific paragraphs.
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 (TS 25.452 [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	IINFORMATION 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

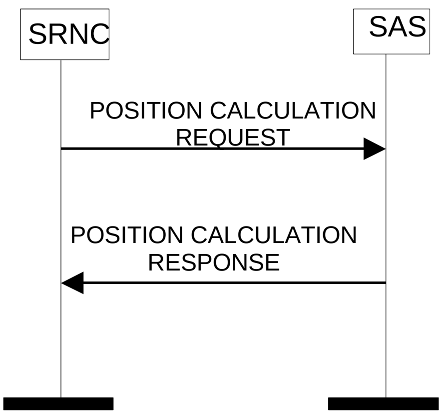

Figure 1: Position Calculation procedure, Successful Operation

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 or A-GANSS 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 a particular GANSS does not contain the *GANSS Signal ID* IE, the SAS shall assume the default value as defined in TS 25.331 [4].
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE and the *GANSS Code Phase Ambiguity Extension* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* IE and the *GANSS Integer Code Phase Extension* IE associated to a given satellite (identified by the *Sat ID* IE value) is not present within the *GANSS Measurement Parameters* IE, the SAS shall use the default "1" (ms) for the GANSS Code Phase Ambiguity value in order to compute the value of the Total Code Phase (as defined in TS 25.331 [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity* IE.

If an optional *Cell-ID IRAT Measured Results Sets* IE is included in the POSITION CALCULATION REQUEST message, the SAS shall, if supported, use this value for the calculation of the UE Position Estimate in case of RFPM positioning method is used. The SAS may use this value for the calculation of the UE Position when any other methods are used.

If the *IMSI* IE, or *IMEI* IE is included in the POSITION CALCULATION REQUEST message, the SAS may save these IEs for use in location session correlation.

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

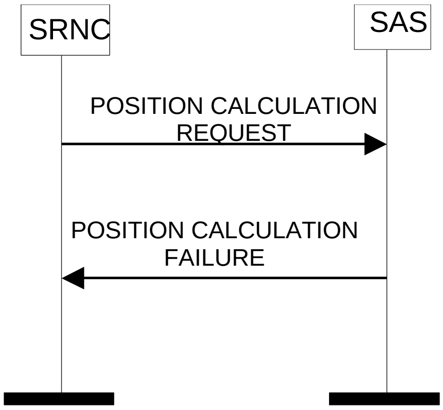

Figure 2: Position Calculation procedure, Unsuccessful Operation

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, Galileo, GLONASS or GANSS 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* included in the *UTDOA Group* IE 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 the *GANSS 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 ,the *OTDOA Measurement Group* IE nor the *GANSS Measured Results* 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

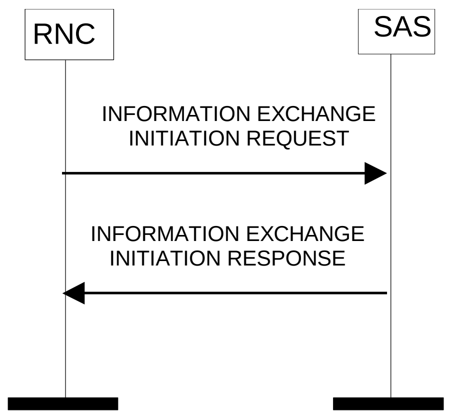

Figure 3: Information Exchange Initiation procedure, Successful Operation

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, GANSS Reference Location, GANSS Additional Ionospheric Model, or GANSS Earth Orientation Parameters 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*, *GANSS Data Bit Assistance*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model GNSS-GNSS*, *GANSS Navigation Model*, *GANSS Additional Navigation Models*, *GANSS Additional UTC Models*, or *GANSS Auxiliary Information* 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 is set to "GANSS Generic Data" and includes the *GANSS Almanac and Satellite Health* IE, the SAS shall initiate the Information Reporting

procedure for this specific Explicit Information Type when a change in the T_{oa} , IOD_a, or Week Number 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 is set to "GANSS Generic Data" and includes the *GANSS UTC Model* IE, 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 is set to "GANSS Generic Data" and includes the *GANSS Additional UTC Models* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{ot},WN_{ot}, WN_t, or N^A parameter has occurred in the GANSS Additional 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 is set to "GANSS Common Data" and includes the *GANSS Ionosphere Model* IE, 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 is set to "GANSS Common Data" and includes the *GANSS Additional Ionospheric Model* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the GANSS additional ionospheric model.
  - If the *Data ID* IE is set to value "11", then the SAS shall include the *GANSS Additional Ionospheric Model* IE for the area as defined in IS-QZSS [27]. If the *Data ID* IE is set to value "00", then the SAS shall include the *GANSS Additional Ionospheric Model* IE applicable worldwide as defined in IS-QZSS [27].
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Common Data" and includes the *GANSS Earth Orientation Parameters* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{EOP} parameter has occurred in the GANSS Earth Orientation Parameters.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Navigation Model* IE, 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 is set to "GANSS Generic Data" and includes the *GANSS Additional Navigation Models* IE, 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 is set to "GANSS Generic Data" and includes the *GANSS Time Model GNSS-GNSS* IE, 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 is set to "GANSS Generic Data" and includes the *DGANSS Corrections* IE, 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 is set to "GANSS Common Data" and includes the *GANSS Reference Time* IE, 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 is set to "GANSS Generic Data" and includes the *GANSS Reference Measurement Information* IE, 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 is set to "GANSS Generic Data" and includes the *GANSS Real Time Integrity* IE, 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 the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Auxiliary Information* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the *Signals Available* or *Channel Number* IEs has occurred in the GANSS Auxiliary 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 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.

If the *IMSI* IE, or *IMEI* IE is included in the INFORMATION EXCHANGE INITIATION REQUEST message, the SAS may save these IEs for use in location session correlation.

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 Ionospheric Model*, *GANSS Reference Location, GANSS Additional Ionospheric Model,* or *GANSS Earth Orientation Parameters* IEs shall be present.

- If the *GANSS Reference Time* 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, GANSS Data Bit Assistance*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model, GANSS Time Model, GANSS Navigation Model, GANSS Additional Time Models, GANSS Additional Navigation Models, GANSS Additional UTC Models,* or *GANSS Auxiliary Information* IEs.

- If the *GANSS Generic Assistance Data* 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 a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in TS 25.331 [4].

- 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 a particular GANSS that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see OS SIS ICD [22], IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], DTFA01-96-C-00025 [26], IS-QZSS [27], [28]).

- The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in TS 25.331 [4].

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Time Model GNSS-GNSS* IE with exactly one bit set to value "1" in the *GNSS-GNSS Time ext* IE, the SAS shall include the *GANSS Time Model* IE in the *Requested Data Value* IE with the requested time information.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Time Model GNSS-GNSS* IE with more than one bit set to value "1" in the *GNSS-GNSS Time ext* IE, the SAS shall include the *GANSS Additional Time Models* IE in *Requested Data Value* IE with the requested time information for each GANSS.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "DGPS Corrections", the SAS shall include the *DGPS Corrections* IE in *Requested Data Value* IE with the *DGNSS Validity Period* IE included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "DGANSS Corrections", the SAS shall include the *DGANSS Corrections* IE in *Requested Data Value* IE with the *DGNSS Validity Period* IE included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "Acquisition Assistance ", the SAS shall include the *GPS Acquisition Assistance* IE in *Requested Data Value* IE with the *Azimuth and Elevation* and *Azimuth and Elevation LSB* IEs included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "Almanac and Satellite Health", the SAS shall include the *GPS Almanac and Satellite Health* IE in *Requested Data Value* IE with the *Complete Almanac Provided* IE included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "Reference Time", the SAS shall include the *GPS Reference Time* IE in *Requested Data Value* IE with the *GPS Week Cycle Number* IE included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Almanac and Satellite Health", the SAS shall include the *GANSS Almanac and Satellite Health* IE in *Requested Data Value* IE with the *Complete Almanac Provided* IE included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Reference Measurement Information ", the SAS shall include the *GANSS Reference Measurement Information* IE in *Requested Data Value* IE with the *Azimuth and Elevation* and *Azimuth and Elevation LSB* IEs included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Reference Time", the SAS shall include the *GANSS Reference Time* IE in *Requested Data Value* IE with the *GANSS Day Cycle Number* IE included, if available.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Time Model GNSS-GNSS", the SAS shall include the *GANSS Time Model* IE in *Requested Data Value* IE with the *Delta_T* IE included, if available.

8.3.3 Unsuccessful Operation

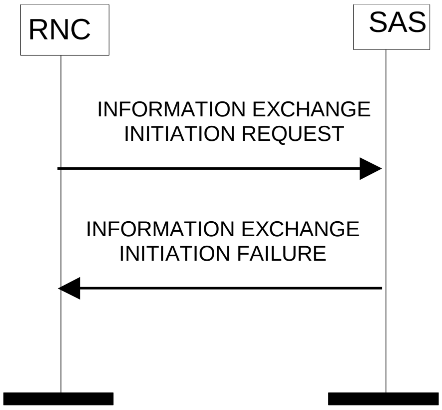

Figure 4: Information Exchange Initiation procedure, Unsuccessful Operation

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" or "GANSS 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 Ionosphere Model	X	X	X
GANSS Reference Location	X		
GANSS Additional Ionospheric Model	X	X	X
GANSS Earth Orientation Parameters	X	X	X
GANSS Real Time Integrity	X	X	X
GANSS Data Bit Assistance	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 GNSS-GNSS	X	X	X
GANSS Navigation Model	X	X	X
GANSS Additional Navigation Models	X	X	X
GANSS Additional UTC Models	X	X	X
GANSS Auxiliary Information	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

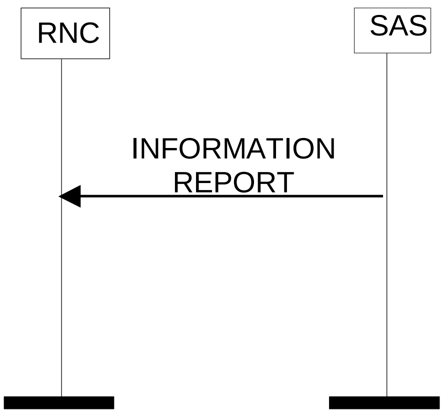

Figure 5: Information Reporting procedure, Successful Operation

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 Ionospheric Model, GANSS Reference Location*, *GANSS Additional Ionospheric Model*, or *GANSS Earth Orientation Parameters* 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*, *GANSS Data Bit Assistance*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model*, *GANSS Navigation Model, GANSS Additional Time Models, GANSS Additional Navigation Models, GANSS Additional UTC Models,* or *GANSS Auxiliary Information* IEs.

- If the *GANSS Generic Assistance Data* 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 a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in TS 25.331 [4].

- 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 a particular GANSS that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see OS SIS ICD [22], IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], DTFA01-96-C-00025 [26], IS-QZSS [27], [28]).

- The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in TS 25.331 [4].

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Time Model GNSS-GNSS* IE with exactly one bit set to value "1" in the *GNSS-GNSS Time ext* IE, the SAS shall include the *GANSS Time Model* IE in the *Requested Data Value* IE with the requested time information.

If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Time Model GNSS-GNSS* IE with more than one bit set to value "1" in the *GNSS-GNSS Time ext* IE, the SAS shall include the *GANSS Additional Time Models* IE in *Requested Data Value* IE with the requested time information for each GANSS.

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

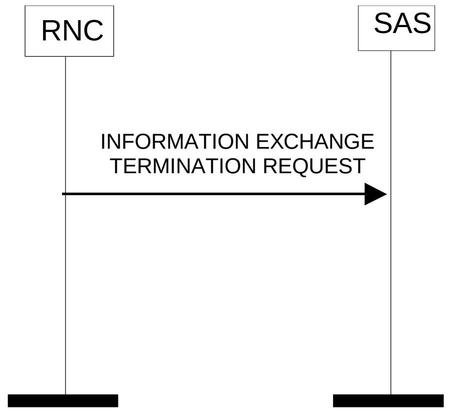

Figure 6: Information Exchange Termination procedure, Successful Operation

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

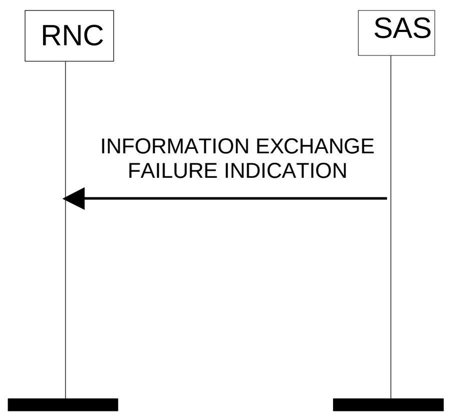

Figure 7: Information Exchange Failure procedure, Successful Operation

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

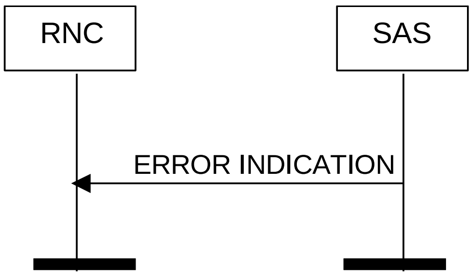

Figure 8: Error Indication procedure, SAS Originated, Successful Operation

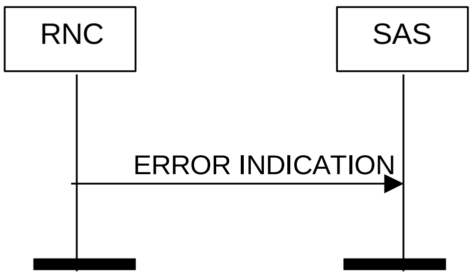

Figure 9: Error Indication procedure, RNC Originated, Successful Operation

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

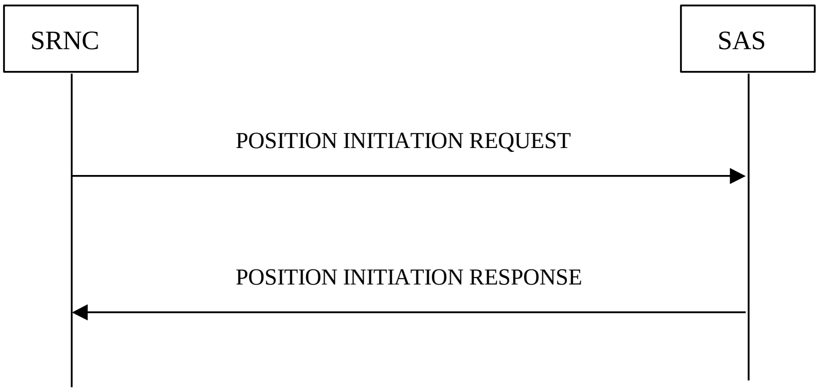

Figure 9a: Position Initiation procedure, Successful Operation

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 a particular GANSS does not contain the *GANSS Signal ID* IE and the *GANSS Signal IDs* IE, the SAS shall assume that the corresponding GANSS Signal is the default signal defined in TS 25.331 [4].

If the *IMSI* IE, or *IMEI* IE is included in the in POSITION INITIATION REQUEST message, the SAS may save these IEs for use in location session correlation.

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

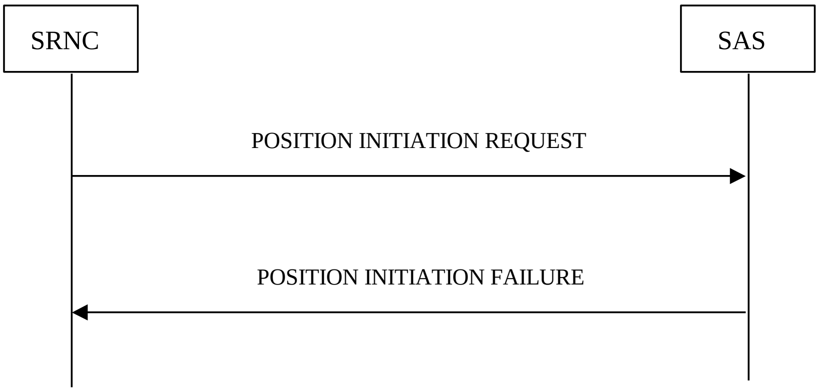

Figure 9b: Position Initiation procedure, Unsuccessful Operation

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

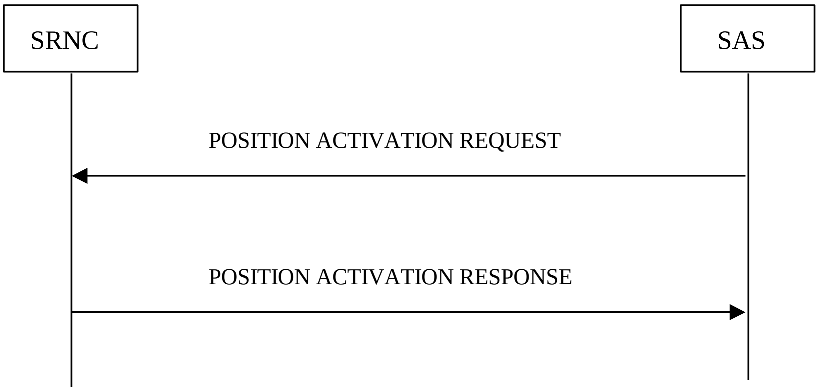

Figure 9c: Position Activation procedure, Successful Operation

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, *Cell-ID Measured Results Sets* IE, *OTDOA Measured Results Sets* IE, *UTDOA Group* IE, *GANSS Measurement Results* IE, *Required GPS Assistance Data* IE or *Required GANSS Assistance Data* IE.

If the *Positioning Method* IE in a POSITION ACTIVATION REQUEST message includes the *GNSS Positioning Method* IE indicating allowance of 'GPS' and any other GNSS ('Galileo', 'SBAS', 'Modernized GPS', 'QZSS', 'GLONASS'), the SRNC may include both, the *GPS Measurement Results* IE and the *GANSS Measurement Results* IE, or both, the *Required GPS Assistance Data* IE or *Required GANSS Assistance Data* IE in the POSITION ACTIVATION RESPONSE message.

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 *GERAN* IE is included in the *Requested Cell-ID Measurements* IE in the *Cell-ID Positioning* IE, the SRNC shall use it to determine the requested inter-RAT measurements.

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 Metho*d 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 the RNC includes the measurements in the *Requested Cell-ID Measurements* IE it shall, if supported, do so for all cells (i.e. those in the active, monitored and detected sets) for which measurements are available from the UE. 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 Data Value* IE, it shall contain a *GANSS Real Time Integrity*, *GANSS Data Bit Assistance*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model, GANSS Navigation Model, GANSS Additional Time Models, GANSS Additional Navigation Models, GANSS Additional UTC Models,* or *GANSS Auxiliary Information* IE.
  - If the *GANSS Generic Assistance Data* 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 a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in TS 25.331 [4].
  - 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 a particular GANSS that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see OS SIS ICD [22], IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], DTFA01-96-C-00025 [26], IS-QZSS [27], [28]).
  - The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in TS 25.331 [4].

If the RRC State included in the *UTDOA Group* IE 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 a particular GANSS does not contain the *GANSS Signal ID* IE, the SAS shall assume the default value as defined in TS 25.331 [4].
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE and the *GANSS Code Phase Ambiguity Extension* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* IE and the *GANSS Integer Code Phase Extension* IE associated to a given satellite (identified by the *Sat ID* IE value) is not present within the *GANSS Measurement Parameters* IE, the SAS shall use the default "1" (ms) for the GANSS Code Phase Ambiguity value in order to compute the value of the Total Code Phase (as defined in TS 25.331 [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity* IE.

If the *OTDOA Measured Results Sets* IE is included in the POSITION ACTIVATION RESPONSE message the SRNC should also include the *OTDOA Reference Cell Info*. The SAS shall use the cell identified in the *OTDOA Reference Cell Info* IE as reference cell for the measurements provided in the *OTDOA Measured Results Info List* IE.

If an optional *Cell-ID IRAT Measured Results Sets* IE is included in the POSITION ACTIVATION RESPONSE message, the SAS shall, if supported, use this value for the calculation of the UE Position Estimate in case of RFPM positioning method is used. The SAS may use this value for the calculation of the UE Position when any other methods are used.

8.9.3 Unsuccessful Operation

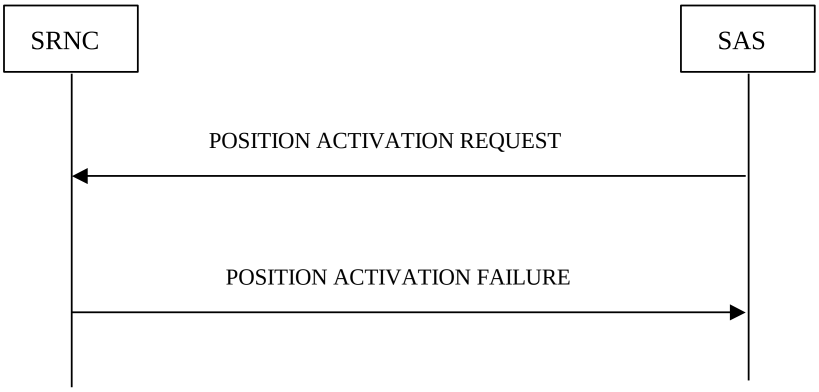

Figure 9d: Position Activation procedure, Unsuccessful Operation

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

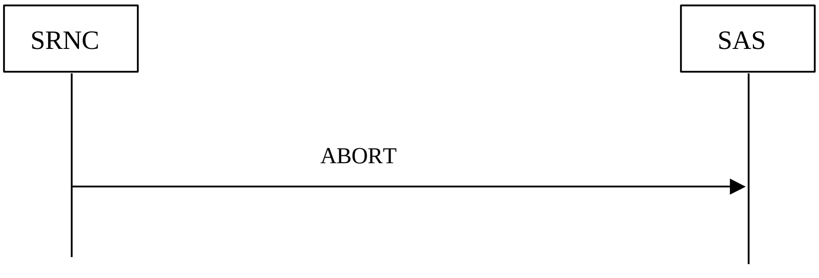

Figure 9f: Abort procedure, Successful Operation

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

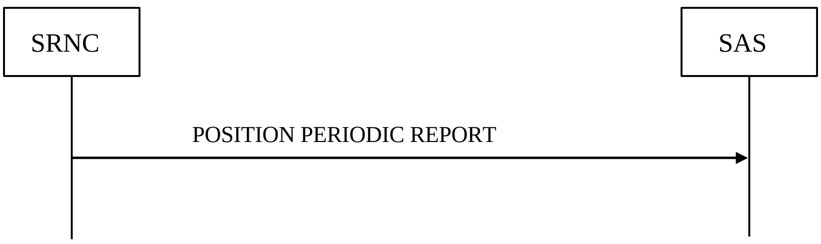

Figure 9g: Position Periodic Report procedure, Successful Operation

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 and only if the *Cause* IE indicates the error reason "UE Positioning Error: Assistance Data Missing" the SRNC may include the *Required GPS Assistance Data* IE and/or the *Required GANSS Assistance Data* IE in the POSITION PERIODIC REPORT message.

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 a particular GANSS does not contain the *GANSS Signal ID* IE, the SAS shall assume the default value as defined in TS 25.331 [4].
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE and the *GANSS Code Phase Ambiguity Extension* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* IE and the *GANSS Integer Code Phase Extension* IE associated to a given satellite (identified by the *Sat ID* IE value) is not present within the *GANSS Measurement Parameters* IE, the SAS shall use the default "1" (ms) for the GANSS Code Phase Ambiguity value in order to compute the value of the Total Code Phase (as defined in TS 25.331 [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity* IE.

If the *OTDOA Measured Results Sets* IE is included in the POSITION PERIODIC REPORT message the SRNC should also include the *OTDOA Reference Cell Info*. The SAS shall use the cell identified in the *OTDOA Reference Cell Info* IE as reference cell for the measurements provided in the *OTDOA Measured Results Info List* IE.

If an optional *Cell-ID IRAT Measured Results Sets* IE is included in the POSITION PERIODIC REPORT message, the SAS shall, if supported, use this value for the calculation of the UE Position Estimate in case of RFPM positioning method is used. The SAS may use this value for the calculation of the UE Position when any other methods are used.

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

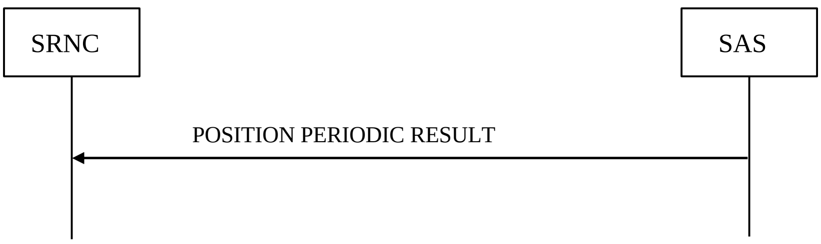

Figure 9h: Position Periodic Result procedure, Successful Operation

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

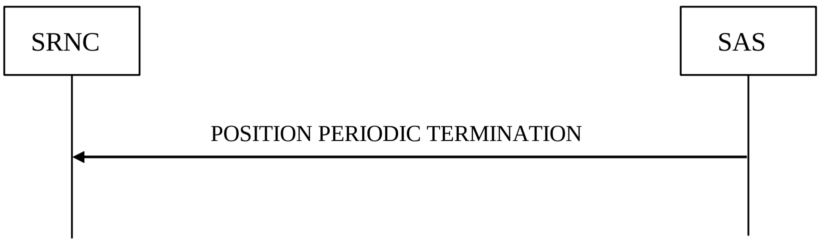

Figure 9i: Position Periodic Termination procedure, SAS Originated, Successful Operation

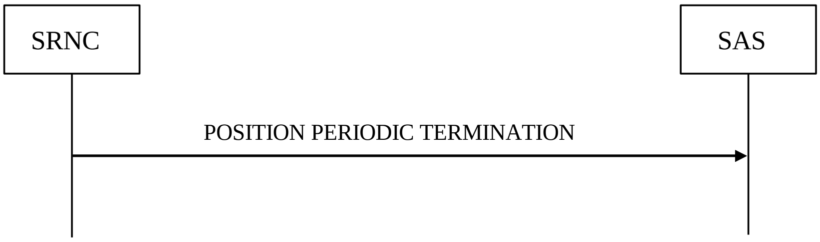

Figure 9k: Position Periodic Termination procedure, RNC Originated, Successful Operation

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 TS 25.921 [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		–	
Cell-ID IRAT Measured Results Sets		*0..<maxNoOfIRATMeasurements>*			GLOBAL	ignore
>IRAT Measured Results Info List	M		9.2.2.155		–	
IMSI	O		9.2.2.158		YES	ignore
IMEI	O		9.2.2.159		YES	ignore

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.
maxNoOfIRATMeasurements	Maximum number of IRATs for which Measurements of Cell-ID IRATMeasured Results Info List may be included in the Position Calculation Request message. The value for maxNoOfIRATMeasurements 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 *Information Exchange Object Type*	M				YES	reject
>Reference Position					–	
>>Reference Position Estimate/UE Initial Position	M		Geographical Area 9.2.2.6	For RNC-centric mode.	–	
>Additional Information Exchange Object Types						
>>Reference Position UC-ID						
>>>UTRAN Cell Identifier/UE Initial Position	M		UTRAN Cell Identifier 9.2.2.37	For SAS-centric mode.	YES	reject
>>Cell-ID Measured Results Sets						
>>>Cell-ID Measured Results Sets	M		9.2.2.152		YES	ignore
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
IMSI	O		9.2.2.158		YES	ignore
IMEI	O		9.2.2.159		YES	ignore

Table 11

Condition	Explanation
GPS	The IE shall be present if the information requested in the *Information Type* IE contains GPS-related data
GANSS	The IE shall be present if the information requested in the *Information Type* 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 *Information Exchange Object Type*	O				YES	ignore
>Reference Position					–	
>>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 *Information Exchange Object Type*	M				YES	ignore
>Reference Position					–	
>>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
IMSI	O		9.2.2.158		YES	ignore
IMEI	O		9.2.2.159		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 *Amount of Reporting* 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		–	

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		–	
Required GPS Assistance Data	O		Additional GPS Assistance Data Required 9.2.2.128		YES	ignore
Required GANSS Assistance Data	O		Additional GANSS Assistance Data Required 9.2.2.129		YES	ignore
OTDOA Reference Cell Info	O		OTDOA Reference Cell Info SAS-centric mode 9.2.2.153		YES	reject
Cell-ID IRAT Measured Results Sets		*0..<maxNoOfIRATMeasurements>*			GLOBAL	ignore
>IRAT Measured Results Info List	M		9.2.2.155		–	

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.
maxNoOfIRATMeasurements	Maximum number of IRATs for which Measurements of Cell-ID IRATMeasured Results Info List may be included in the Position Activation Response message. The value for maxNoOfIRATMeasurements 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		*0..<maxNoOfSets>*			GLOBAL	ignore
>GPS Measured Results	M		9.2.2.12		–	
Cell-ID Measured Results Sets		*0..<maxNoOfMeasurements>*			GLOBAL	ignore
>Cell-ID Measured Results Info List	M		9.2.2.31		–	
OTDOA Measured Results Sets		*0..<maxNoOfMeasurements>*			GLOBAL	ignore
>OTDOA Measured Results Info List	M		9.2.2.32		–	
Cause	O		9.2.2.3		YES	ignore
GANSS Measured Results		*0..<maxNoOfSets>*			GLOBAL	ignore
>GANSS Measured Results	M		9.2.2.117		–	
Required GPS Assistance Data	O		Additional GPS Assistance Data Required 9.2.2.128		YES	ignore
Required GANSS Assistance Data	O		Additional GANSS Assistance Data Required 9.2.2.129		YES	ignore
OTDOA Reference Cell Info	O		OTDOA Reference Cell Info SAS-centric mode 9.2.2.153		YES	reject
Cell-ID IRAT Measured Results Sets		*0..<maxNoOfIRATMeasurements>*			GLOBAL	ignore
>IRAT Measured Results Info List	M		9.2.2.155		–	

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.
maxNoOfIRATMeasurements	Maximum number of IRATs for which Measurements of Cell-ID IRATMeasured Results Info List may be included in the Position Periodic Report message. The value for maxNoOfIRATMeasurements 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		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, UE Positioning Error: Assistance Data Missing position calculation error: invalid GLONASS measured results, position calculation error: invalid GANSS measured results, position calculation error: A-GANSS positioning method not supported, UE Positioning Error: Not enough GANSS Satellites, UE Positioning Error: Not Accomplished GANSS Timing of Cell Frames)	
>Transport Layer				
>>Transport Layer Cause	M		ENUMERATED (Transport Resource Unavailable, Unspecified, ...)	
>Protocol				

>>Protocol Cause	M		ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State, Semantic Error, Unspecified, Abstract Syntax Error (Falsely Constructed Message), ...)	
>Misc				
>>Misc Cause	M		ENUMERATED (Processing Overload, Hardware Failure, O&M Intervention, Unspecified, ...)	

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

Table 21

Radio Network Layer cause	Meaning
Invalid reference information	The reference information (GPS-UTRAN Time Relationship Uncertainty and/or Initial UE Position Estimate) provided by the RNC are invalid
Information temporarily not available	The information requested by RNC is temporarily not available
Information Provision not supported for the object	The SAS does not support provision of the requested information for the concerned object types
Position calculation error: invalid GPS measured results	The SAS cannot calculate position due to invalid GPS measured results
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"
UE Positioning Error: Assistance Data Missing	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Assistance Data Missing"
Position calculation error: invalid GLONASS measured results	The SAS cannot calculate position due to invalid GLONASS measured results
Position calculation error: invalid GANSS measured results	The SAS cannot calculate position due to invalid GANSS measured results

Position calculation error: A-GANSS positioning method not supported	The SAS cannot calculate position because it does not support any A-GANSS positioning method
UE Positioning Error: Not enough GANSS Satellites	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason “Not Enough GANSS Satellites”.
UE Positioning Error: Not Accomplished GANSS 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 GANSS 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		*0..<maxnoof errors>*		
>IE Criticality	M		ENUMERATED (reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value 'Ignore" shall never be used.
>IE Id	M		INTEGER (0..65535)	The IE Id of the not understood or missing IE as defined in the ASN.1 part of the specification.
>Repetition Number	O		INTEGER (0..255)	The *Repetition Number* IE gives - in case of a not understood IE: The number of occurrences of the reported IE up to and including the not understood occurrence - in case of a missing IE: The number of occurrences up to but not including the missing occurrence. Note: All the counted occurrences of the reported IE must have the same top-down hierarchical message structure of IEs with assigned criticality above them.
>Message Structure	O		9.2.2.23	The *Message Structure* IE describes the structure where the not understood or missing IE was detected. This IE is included if the not understood IE is not the top level of the message.
>Type of Error	M		ENUMERATED(not understood, missing, ...)	

Table 26

Range bound	Explanation
maxnooferrors	Maximum number of IE errors allowed to be reported with a single message. 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	Criticality	Assigned Criticality
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 ICD-GPS-200 [10].	–	
>IODE	M		INTEGER (0..255)		–	
>UDRE	M		ENUMERATED (UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE)	The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite.	–	
>PRC	M		INTEGER (-2047..2047.)	Scaling factor 0.32 Meters	–	
>Range Rate Correction	M		INTEGER (-127..127)	Scaling factor 0.032 meters/sec	–	
>DGNSS Validity Period	O		9.2.2.154		YES	ignore

Table 28

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

Table 29

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

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 TS 23.032 [11].

Table 30

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE *Geographical Area*				
>Point				Ellipsoid point
>>Geographical Coordinates	M		9.2.2.7	
>Point With Uncertainty				Ellipsoid point with uncertainty circle
>>Geographical Coordinates	M		9.2.2.7	
>>Uncertainty Code	M		INTEGER (0..127)	The uncertainty "r" expressed in meters is derived from the "Uncertainty Code" k by r = 10x(1.1^{k}-1)
>Polygon				List of Ellipsoid points
>>Polygon		*1..<maxnoofPoints>*		
>>>Geographical Coordinates	M		9.2.2.7	
>Ellipsoid point with uncertainty Ellipse				
>>Geographical Coordinates	M		9.2.2.7	
>>Uncertainty Ellipse	M		9.2.2.30	
>>Confidence	M		INTEGER (0..100)	In percentage
>Ellipsoid point with altitude				
>>Geographical Coordinates	M		9.2.2.7	
>>Altitude and direction	M		9.2.2.2	
>Ellipsoid point with altitude and uncertainty Ellipsoid				
>>Geographical Coordinates	M		9.2.2.7	
>>Altitude and direction	M		9.2.2.2	
>>Uncertainty Ellipse	M		9.2.2.30	
>>Uncertainty Altitude	M		INTEGER (0..127)	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
>Ellipsoid Arc				
>>Geographical Coordinates	M		9.2.2.7	
>>Inner radius	M		INTEGER (0..2^{16}-1)	The relation between the value (N) and the radius (r) in meters it describes is 5N≤ r <5(N+1), except for N=2^{16}-1 for which the range is extended to include all grater values of (r).
>>Uncertainty radius	M		INTEGER (0..127)	The uncertainty "r" is derived from the "Uncertainty 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 ICD-GPS-200 [10].	–	
>Doppler (0th order term)	M		INTEGER (-2048..2047)	Scaling factor 2.5Hz	–	
>Extra Doppler		*0..1*			–	
>>Doppler (1st order term)	M		INTEGER (-42..21)	Scaling factor 1/42	–	
>>Doppler Uncertainty	M		ENUMERATED (12.5,25,50, 100,200,…)	In Hz	–	
>Code Phase	M		INTEGER (0..1022)	In Chips, specifies the centre of the search window	–	
>Integer Code Phase	M		INTEGER (0..19)	Number of 1023 chip segments	–	
>GPS Bit number	M		INTEGER (0..3)	Specifies GPS bit number (20 1023 chip segments)	–	
>Code Phase Search Window	M		ENUMRATED (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	–	
>>Azimuth and Elevation LSB		*0..1*			YES	ignore
>>>Azimuth LSB	M		INTEGER (0..15)	Scale factor 0.703125. The full satellite azimuth is constructed as “Azimuth” × 11.25 + “Azimuth LSB” × 0.703125 degrees.	–	
>>>Elevation LSB	M		INTEGER (0..15)	Scale factor 0.703125.	–	

				The full satellite elevation is constructed as "Elevation" × 11.25 + "Elevation LSB" × 0.703125 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
GPS Reference Time Uncertainty	O		9.2.2.132	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	Criticality	Assigned Criticality
WN_a	M		BIT STRING (8)		–	
Satellite information		*1..<maxSatAlmanac>*			–	
>DataID	M		BIT STRING (2)	See ICD-GPS-200 [10]	–	
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in ICD-GPS-200 [10].	–	
>e	M		BIT STRING (16)	Eccentricity (ICD-GPS-200 [10])	–	
>t_{oa}	M		BIT STRING (8)	Reference Time of Almanac (ICD-GPS-200 [10])	–	
>δi	M		BIT STRING (16)	Correction to Inclination (semi-circles) (ICD-GPS-200 [10])	–	
>OMEGADOT	M		BIT STRING (16)	Rate of Right Ascension (semi-circles/sec) (ICD-GPS-200 [10])	–	
>SV Health	M		BIT STRING (8)	ICD-GPS-200 [10]	–	
>$A^{1/2}$	M		BIT STRING (24)	Semi-Major Axis (meters)$^{1/2}$ (ICD-GPS-200 [10])	–	
>$OMEGA_0$	M		BIT STRING (24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) (ICD-GPS-200 [10])	–	
>M_0	M		BIT STRING (24)	Mean Anomaly at Reference Time (semi-circles) (ICD-GPS-200 [10])	–	
>ω	M		BIT STRING (24)	Argument of Perigee (semi-circles) (ICD-GPS-200 [10])	–	
>af_0	M		BIT STRING (11)	apparent clock correction (ICD-GPS-200 [10])	–	
>af_1	M		BIT STRING (11)	apparent clock correction (ICD-GPS-200 [10])	–	
SV Global Health	O		BIT STRING (364)	This enables GPS time recovery and possibly extended GPS correlation intervals	–	
Complete Almanac Provided	O		BOOLEAN	This field indicates whether the SAS provided almanac for the full GPS constellation or not. TRUE means complete GPS almanac is provided.	YES	ignore

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 (ICD-GPS-200 [10])
URA Index	M		BIT STRING (4)	User Range Accuracy (ICD-GPS-200 [10])
SV Health	M		BIT STRING (6)	ICD-GPS-200 [10]
IODC	M		BIT STRING (10)	Issue of Data, Clock (ICD-GPS-200 [10])
L2 P Data Flag	M		BIT STRING (1)	ICD-GPS-200 [10]
SF 1 Reserved	M		BIT STRING (87)	ICD-GPS-200 [10]
T_{GD}	M		BIT STRING (8)	Estimated group delay differential (ICD-GPS-200 [10])
t_{oc}	M		BIT STRING (16)	apparent clock correction (ICD-GPS-200 [10])
af_2	M		BIT STRING (8)	apparent clock correction (ICD-GPS-200 [10])
af_1	M		BIT STRING (16)	apparent clock correction (ICD-GPS-200 [10])
af_0	M		BIT STRING (22)	apparent clock correction (ICD-GPS-200 [10])
C_{rs}	M		BIT STRING (16)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) (ICD-GPS-200 [10])
Δn	M		BIT STRING (16)	Mean Motion Difference From Computed Value (semi-circles/sec) (ICD-GPS-200 [10])
M_0	M		BIT STRING (32)	Mean Anomaly at Reference Time (semi-circles) (ICD-GPS-200 [10])
C_{uc}	M		BIT STRING (16)	Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) (ICD-GPS-200 [10])
e	M		BIT STRING (32)	Eccentricity (ICD-GPS-200 [10])
C_{us}	M		BIT STRING (16)	Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) (ICD-GPS-200 [10])
$(A)^{1/2}$	M		BIT STRING (32)	Semi-Major Axis (meters)$^{1/2}$ (ICD-GPS-200 [10])
t_{oe}	M		BIT STRING (16)	Reference Time Ephemeris (ICD-GPS-200 [10])
Fit Interval Flag	M		BIT STRING (1)	ICD-GPS-200 [10]
AODO	M		BIT STRING (5)	Age Of Data Offset (ICD-GPS-200 [10])
C_{ic}	M		BIT STRING (16)	Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) (ICD-GPS-200 [10])
$OMEGA_0$	M		BIT STRING (32)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) (ICD-GPS-200 [10])
C_{is}	M		BIT STRING (16)	Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) (ICD-GPS-200 [10])
i_0	M		BIT STRING	Inclination Angle at Reference

			(32)	Time (semi-circles) (ICD-GPS-200 [10])
C_{rc}	M		BIT STRING (16)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) (ICD-GPS-200 [10])
ω	M		BIT STRING (32)	Argument of Perigee (semi-circles) (ICD-GPS-200 [10])
OMEGAdot	M		BIT STRING (24)	Rate of Right Ascension (semi-circles/sec) (ICD-GPS-200 [10])
Idot	M		BIT STRING (14)	Rate of Inclination Angle (semi-circles/sec) (ICD-GPS-200 [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 (ICD-GPS-200 [10]). NOTE 2: The parameters β_n are the coefficients of a cubic equation representing the period of the ionospheric model (ICD-GPS-200 [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 *UTRAN GPS reference time Result* 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 ICD-GPS-200 [10].	–	
>C/N$_o$	M		INTEGER (0..63)	The estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (Typical levels will be in the range of 20 – 50 dB-Hz).	–	
>Doppler	M		INTEGER (-32768..-32768)	Hz, scale factor 0.2.	–	
>Whole GPS Chips	M		INTEGER (0..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
GPS Reference Time Uncertainty	O		9.2.2.132		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 <= P < 0.5625
i	X	Y	0.5 * (1 + x/8) * 2y	xi-1 <= P < xi
62	110	111	112	104 <= P < 112
63	111	111	--	112 <= P

9.2.2.13 GPS Navigation Model

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

Table 43

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Satellite information		*1..<maxSat>*		
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in ICD-GPS-200 [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
Satellite status	The IE shall be present if the *Satellite Status* IE is not set to ES_SN

Table 46

Range bound	Explanation
maxSat	Maximum number of satellites for which data is included in this IE. 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 *Bad Satellites Presence*				
>Bad Satellites				
>>Satellite information		*1..<maxSat>*		
>>>BadSatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in ICD-GPS-200 [10].
>No Bad Satellites			NULL	

Table 48

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

9.2.2.15 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 ICD-GPS-200 [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
GPS Reference Time Uncertainty	O		9.2.2.132	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GPS Week Cycle Number	O		INTEGER (0..7)	Number of 1024 GPS week cycles occurred since the GPS zero time-point (midnight of the night of January 5, 1980/morning of January 6, 1980). The first 1024 GPS weeks since the zero time-point is GPS Week Cycle Number 0.	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 (ICD-GPS-200 [10])
A_0	M		BIT STRING (32)	seconds (ICD-GPS-200 [10])
t_{ot}	M		BIT STRING (8)	seconds (ICD-GPS-200 [10])
Δt_{LS}	M		BIT STRING (8)	seconds (ICD-GPS-200 [10])
WN_t	M		BIT STRING (8)	weeks (ICD-GPS-200 [10])
WN_{LSF}	M		BIT STRING (8)	weeks (ICD-GPS-200 [10])
DN	M		BIT STRING (8)	days (ICD-GPS-200 [10])
Δt_{LSF}	M		BIT STRING (8)	seconds (ICD-GPS-200 [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 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 *Information Report Periodicity*	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 *Information Report Characteristics Type* IE indicates 'periodic'

9.2.2.22 Information Type

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

Table 58

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE *Information Type*					–	
>Implicit					–	
>>Method Type	M		9.2.2.25		–	
>Explicit					–	
>>Explicit Information		*1..<max noofExpInfo>*			–	
>>>CHOICE Explicit Information Item	M				–	
>>>>Almanac and Satellite Health			NULL		–	
>>>>UTC Model					–	
>>>>>Transmission TOW Indicator	M		9.2.2.29		–	
>>>>Ionospheric Model					–	
>>>>>Transmission TOW Indicator	M		9.2.2.29		–	
>>>>Navigation Model					–	
>>>>>Transmission TOW Indicator	M		9.2.2.29		–	
>>>>>Nav. Model Additional Data		*0..1*			–	
>>>>>>GPS Week	M		INTEGER (0..1023)		–	
>>>>>>GPS_Toe	M		INTEGER (0..167)	GPS time of ephemeris in hours of the latest ephemeris set	–	
>>>>>>T-Toe limit	M		Integer (0..10)	ephemeris age tolerance in hours	–	
>>>>>>Satellite related data		*0..<maxSat>*			–	
>>>>>>>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in ICD-GPS-200 [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 Reference Location	O		ENUMERATED(Requested, Not-Requested)	This IE may only be present if SAS operates in SAS-centric mode.	–	
>>>>>GANSS Additional Ionospheric Model	O		GANSS Additional Ionospheric Model Request 9.2.2.137	Presence means requested.	YES	ignore
>>>>>GANSS Earth Orientation Parameters	O		GANSS Earth Orientation Parameters Request 9.2.2.138		YES	ignore
>>>>GANSS Generic Data					–	
>>>>>**GANSS Generic Data Item**		*1..<maxGANSS>*			–	
>>>>>>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>>>>>>GANSS Real Time Integrity		*0..1*			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>GANSS Data Bits		*0..1*			–	
>>>>>>>GANSS TOD	M		INTEGER (0..86399)	The GANSS TOD for which the data bits are requested.	–	
>>>>>>>Data Bit Assistance		*1*			–	
>>>>>>>>GANSS Signal ID	M		BIT STRING(8)	Coded as defined in TS 25.331 [4]	–	
>>>>>>>>GANSS Data Bit Interval	M		INTEGER(0..15)	This field represents the time length for which the Data Bit Assistance is requested. The Data Bit Assistance shall be relative to the time interval (GANSS TOD, GANSS TOD	–	

				+ Data Bit Interval). The Data Bit Interval *r*, expressed in seconds, is mapped to a binary number K with the following formula: $r = 0.1 * 2^{K}$ Value K=15 means that the time interval is not specified.		
>>>>>>>>Satellite Information		*0..<maxGANSSSat>*			–	
>>>>>>>>>Sat ID	M		INTEGER (0..63)	Defined in TS 25.331 [4].	–	
>>>>>>DGANSS Corrections		*0..1*			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>>DGANSS Signal	M		BIT STRING(8)	Coded as defined in TS 25.331 [4]	–	
>>>>>>GANSS Almanac and Satellite Health		*0..1*			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>GANSS Reference Measurement Information		*0..1*			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>GANSS UTC Model		*0..1*			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>GANSS Time Model GNSS-GNSS		*0..1*			–	
>>>>>>>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 clause 9.2.1). Bit 1 stands for GPS, Bit 2 stands for Galileo, Bit 3 stands for QZSS Bit 4 stands for GLONASS. Other bits are reserved.	–	

>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>GANSS Navigation Model		*0..1*			–	
>>>>>>>GANSS Week	M		INTEGER(0..4095)	Defined in TS 25.331 [4].	–	
>>>>>>>GANSS Toe	M		INTEGER(0..167)	Defined in TS 25.331 [4].	–	
>>>>>>>GANSS T-Toe Limit	M		INTEGER(0..10)	Defined in TS 25.331 [4].	–	
>>>>>>>Satellite Related Data		*0..<max GANSS Sat>*			–	
>>>>>>>>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].	–	
>>>>>>>>IOD	M		BIT STRING(10)	Defined in TS 25.331 [4].	–	
>>>>>>GANSS Additional Navigation Models		*0..1*			–	
>>>>>>>GANSS Week	M		INTEGER(0..4095)	Defined in TS 25.331 [4].	–	
>>>>>>>GANSS Toe	M		INTEGER(0..167)	Defined in TS 25.331 [4].	–	
>>>>>>>GANSS T-Toe Limit	M		INTEGER(0..10)	Defined in TS 25.331 [4].	–	
>>>>>>>Satellite Related Data		*0..<max GANSS Sat>*			–	
>>>>>>>>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].	–	
>>>>>>>>IOD	M		BIT STRING(10)	Defined in TS 25.331 [4].	–	
>>>>>>GANSS Additional UTC Models		*0..1*			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>GANSS Auxiliary Information		*0..1*			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>SBAS ID	C-GANSS-ID		9.2.2.134		–	

Table 59

Range Bound	Explanation
maxnoofExpInfo	Maximum number of Explicit Information supported in one Information Exchange. The value of maxnoofExpInfo 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 64

Table 59A

Condition	Explanation
GANSS-ID	This IE shall be present if the *GANSS ID* IE indicates 'SBAS'.

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		*1..<maxnooflevels>*		The first repetition of the *Message Structure* IE corresponds to the top level of the message. The last repetition of the *Message Structure* IE corresponds to the level above the reported level for the 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 *Repetition Number* IE gives, if applicable, the number of occurrences of this level's reported IE up to and including the occurrence containing the not understood or missing IE. Note: All the counted occurrences of the reported IE must have the same 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 “7” = Private Message “8” = Position Parameter Modification “9” = Position Initiation “10” = Position Activation “11” = Abort “12” = Position Periodic Report “13” = Position Periodic Result “14” = Position Periodic Termination
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		*0..1*			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	This IE may only be present if SAS operates in SAS-centric mode.	–	
>GANSS Additional Ionospheric Model	O		9.2.2.116A		YES	ignore
>GANSS Earth Orientation Parameters	O		9.2.2.133		YES	ignore
GANSS Generic Assistance Data		*0..<maxGANSS>*			GLOBAL	ignore
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>GANSS Real Time Integrity	O		9.2.2.122		–	
>GANSS Data Bit Assistance	O		9.2.2.127A		–	
>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		–	
>GANSS Additional Time Models	O		9.2.2.125A		YES	ignore
>GANSS Additional	O		9.2.2.118A		YES	ignore

Navigation Models						
>GANSS Additional UTC Models	O		9.2.2.126A		YES	ignore
>GANSS Auxiliary Information	O		9.2.2.135		YES	ignore
>SBAS ID	C-GANSS-ID		9.2.2.134		YES	ignore

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.

Table 64B

Condition	Explanation
GANSS-ID	This IE shall be present if the *GANSS ID* IE indicates 'SBAS'.

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 *Information Availability Indicator*	M				–	
>Information Available					–	
>>Requested Data Value	M		9.2.2.26		–	
>*Information not Available*			NULL		–	

9.2.2.28 Transaction ID

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

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

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

Table 66

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE *Transaction ID Length*				The Transaction ID shall be interpreted for its integer value, not for the type of encoding ("short" or "long").
>*Short*				
>>Transaction ID Value	M		INTEGER (0..127)	
>*Long*				
>>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			ENUMERATED (requested, not requested)	

9.2.2.30 Uncertainty Ellipse

This IE contains the uncertainty ellipse of a geographical area.

Table 68

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Uncertainty semi-major	M		INTEGER (0..127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k}-1)$
Uncertainty semi-minor	M		INTEGER (0..127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k}-1)$
Orientation of major axis	M		INTEGER (0..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		*1..<maxNoOfMeasNCell>*			–	
>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**		*0..1*		FDD only	–	
>>UE Rx-Tx Time Difference Type 2	M		INTEGER (0..8191)	According to mapping in TS 25.133 [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 TS 25.133 [13].	–	
>>Extended Round Trip Time	O		INTEGER (32767..103041)	Continuation of intervals as mapped in TS 25.133 [13]. Included only if the *Round Trip Time* IE above is included with its maximum value and if the actual value is outside the possible range for the *Round Trip Time* IE	YES	ignore
>Rx Timing Deviation Info		*0..1*		3.84Mcps TDD only	–	
>>Rx Timing Deviation	M		INTEGER (0..8191)	According to mapping in TS 25.123 [14].	–	
>>Timing Advance	M		INTEGER (0..63)	According to TS 25.331 [4].	–	
>Rx Timing Deviation LCR Info		*0..1*		1.28Mcps TDD only	–	

>>Rx Timing Deviation LCR	M		INTEGER (0..511)	According to mapping in TS 25.123 [14].	–	
>>Timing Advance LCR	M		INTEGER (0..2047)	According to TS 25.331 [4]. The content of this IE shall be ignored if the *Extended Timing Advance LCR* IE is present	–	
>>Extended Timing Advance LCR	O		INTEGER (2048..8191)	According to TS 25.331 [4].	YES	ignore
>Pathloss	O		INTEGER (46..158)	Unit: dB downlink pathloss as defined in the *Cell measured results* IE in TS 25.331 [4].	–	
>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 TS 25.123 [14].	–	
>>Timing Advance 7.68Mcps	M		INTEGER (0.. 511)	According to TS 25.331 [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 TS 25.123 [14].	–	
>>Timing Advance	M		INTEGER (0.. 255)	According to TS 25.331 [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 TS 25.133 [13].	–	
>>Round Trip Time	M		INTEGER (0..32766)	According to mapping in TS 25.133 [13].	–	
>>Extended Round Trip Time	O		INTEGER (32767..103041)	Continuation of intervals as mapped in TS 25.133 [13]. Included only if the *Round Trip Time* IE above is included with its maximum value and if the actual value is outside the possible range for the *Round Trip Time* IE	–	
>Additional UE Measurement Info		*0..1*		FDD only	YES	ignore
>>CPICH RSCP	O		INTEGER (-5..91)	According to CPICH_RSCP in TS 25.133 [13].	–	

>>CPICH Ec/N0	O		INTEGER (0..49)	According to CPICH_Ec/No in TS 25.133 [13].	–	
>Angle Of Arrival LCR		*0..1*		1.28Mcps TDD only	YES	ignore
>>AOA LCR	M		INTEGER (0..719)	According to mapping in TS 25.123 [14]	–	
>>AOA LCR Accuracy Class	M		ENUMERATED (A, B, C, D, E, F, G, H,...)	According to mapping in TS 25.123 [14]	–	

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		*1..<MaxnoofMeasNCell>*			–	
>UC-ID	M		9.2.2.37	The identifier of the neighbour cell.	–	
>UE SFN-SFN Observed Time Difference Type 2 Info		*1*			–	
>>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)	The interval of time, in units of 10ms frames, spanning the following two events: 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. 2) The point in time when this corresponding SFN-SFN observed time difference measurement was captured by the UE. If the SAS operates in SAS-centric mode, 1) above shall be set to zero. I.e., in SAS-centric mode this IE	–	

				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 *Relative Timing Difference Info*	M			
>*SFN-SFN Measurement Value Information*				
>>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 μ = 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 μ = E[x] is the expectation value of x.
>*$T_{UTRAN-GPS}$ Measurement Value Information*				
>>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 μ = 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 μ = E[x] is the expectation value of x.
>$T_{UTRAN-GANSS}$ Measurement Value Information				
>>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.
>>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 μ = 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 μ = 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 μ = 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 μ = E[x] is the expectation value of x.	–	

$T_{UTRAN-GANSS}$ Measurement Value Information		*0..1*			GLOBAL	ignore
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>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..4294967 295)	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.	–	
Additional Measurement Information LCR		*0..1*		1.28Mcps TDD only	YES	ignore
>Timing Advance LCR R7	M		INTEGER (0..8191)	According to TS 25.331 [4].	–	
>Rx Timing Deviation LCR	M		INTEGER (0..511)	According to mapping in TS 25.123 [14].	–	

>Angle Of Arrival LCR		*0..1*		1.28Mcps TDD only	–	
>>AOA LCR	M		INTEGER (0..719)	According to mapping in TS 25.123 [14]	–	
>>AOA LCR Accuracy Class	M		ENUMERATED (A, B, C, D, E, F, G, H,...)	According to mapping in TS 25.123 [14]	–	

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 μ = 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.

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 *Extended RNC-ID* IE is included in the *UC-ID* IE, the *RNC-ID* 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 *Extended RNC-ID* 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 *Extended RNC-ID* 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 $r = 10x(1.1^{k}-1)$

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 $v = 45x(1.025^{k}-1)$.

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 *mode*	M			
>FDD				
>>Scrambling code type	M		ENUMERATED (short, long)	
>>Scrambling code number	M		INTEGER(0..16777215)	
>>TFCI existence	M		BOOLEAN	TRUE means existence.
>>Number of FBI bits	M		INTEGER(0..2)	In bits.
>TDD				
>>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 *mode*	M			
>FDD				
>>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 (TS 25.101 [20])
>>UARFCN downlink (Nd)	M		INTEGER (0 .. 16383)	TS 25.101 [20]
>TDD				
>>UARFCN	M		INTEGER (0 .. 16383)	TS 25.102 [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 .. *<maxPRACH>*		
>PRACH information	M		9.2.2.47	
>TFS	M		9.2.2.48	
>**TFCS**		*1..<maxTFC>*		
>>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
Downlink information		1		
>Primary Scrambling Code	M		9.2.2.46	
>Chip Offset	M		9.2.2.63	
>Frame Offset	M		9.2.2.64	
Uplink information		1		
>Transmisson 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 TS 25.213 [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..<*maxTF*>		
>RLC Size	M		INTEGER (129..5055)	Unit is bits
>Number of TBs and TTI List		1..<*maxTF*>		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**
CHOICE *CTFC Size*				
>2 bit CTFC				
>>CTFC information-2		*1..<max TFC>*		
>>>ctfc2Bit	M		INTEGER (0..3)	
>4 bit CTFC				
>>CTFC information-4		*1..<max TFC>*		
>>>ctfc4Bit	M		INTEGER (0..15)	
>6 bit CTFC				
>>CTFC information-6		*1..<max TFC>*		
>>>ctfc6Bit	M		INTEGER (0..63)	
>8 bit CTFC				
>>CTFC information-8		*1..<max TFC>*		
>>>ctfc8Bit	M		INTEGER (0..255)	
>12 bit CTFC				
>>CTFC information-12		*1..<max TFC>*		
>>>ctfc12Bit	M		INTEGER (0..4095)	
>16 bit CTFC				
>>CTFC information-16		*1..<max TFC>*		
>>>ctfc16Bit	M		INTEGER (0..65535)	
>24 bit CTFC				
>>CTFC information-24		*1..<max TFC>*		
>>>ctfc22Bit	M		INTEGER (0.. 16777215)	

Table 92A

Range bound	**Explanation**
maxTFC	Maximum number of TFC. Value is 1024.

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(Stop 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(Service Area, Geographical Area, ...)	
Horizontal Accuracy Code	O		INTEGER(0..127)	The requested accuracy "r" is derived from the "accuracy code" k by $r = 10x(1.1^{k}-1)$.

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 (TS 25.331 [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		*0..<maxGANSS>*			GLOBAL	ignore
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>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		9.2.2.131	Absence of this field means the default value for the GANSS	–	

				identified by “GANSS ID” (TS 25.331 [4]).		
>Support for GANSS timing of cell frames measurement	M		BOOLEAN	Defines if a UE has the capability to perform the UE GANSS timing of cell frames measurement (TS 25.331 [4]). TRUE means capable	–	
>Support for GANSS Carrier-Phase Measurement	M		BOOLEAN	Defines if a UE has the capability to perform the UE GANSS Carrier-Phase Measurement. TRUE means capable	–	
>SBAS IDs	C-GANSS-ID		9.2.2.150		YES	ignore
>GANSS Signal IDs	O		9.2.2.131a		YES	ignore
>Support for non-native assistance choices	O		Support for Non-Native Assistance Choices Indication 9.2.2.139		YES	ignore

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.

Table 94B

Condition	Explanation
GANSS-ID	This IE shall be present if the *GANSS ID* IE indicates 'SBAS'.

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 TS 22.071 [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 TS 22.071 [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 clause 9.2.1). bit 1: GPS bit 2: Galileo bit 3: SBAS(WAAS, EGNOS, MSAS, GAGAN) bit 4: Modernized GPS (L1C, L2C, L5) bit 5: QZSS bit 6: GLONASS bits 7-9: 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 *Selected Position Method* 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 *UE positioning OTDOA neighbour cell info.*	–	
>CHOICE mode					–	
>>Fdd					–	
>>>Primary CPICH Information	M		Primary scrambling code 9.2.2.46		–	
>>Tdd					–	
>>>Cell Parameter ID	M		9.2.2.81		–	
>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 TS 25.133 [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 TS 25.133 [13]. Included only if the *Round Trip Time* IE above is included with its maximum value and if the actual value is outside the possible range for the *Round Trip Time* IE.	YES	ignore
>Timing Advance LCR R7	O		INTEGER (0..8191)	1.28Mcps TDD only. According to TS 25.331 [4].	–	
>Rx Timing Deviation LCR	O		INTEGER (0..511)	1.28Mcps TDD only . According to mapping in TS 25.123 [14].	–	
>Angle Of Arrival LCR		*0..1*		1.28Mcps TDD only	–	
>>AOA LCR	M		INTEGER (0..719)	According to mapping in TS 25.123 [14]	–	
>>AOA LCR Accuracy Class	M		ENUMERATED (A, B, C, D, E, F, G, H,...)	According to mapping in TS 25.123 [14]	–	

UE Positioning OTDOA Neighbour Cell List	O				–	
>UE positioing OTDOA Neighbour cell info		1..<maxCellMeas>			–	
>>CHOICE mode					–	
>>>*FDD*					–	
>>>>Primary CPICH Information	M		Primary scrambling code 9.2.2.46		–	
>>>*TDD*					–	
>>>>Cell Parameter ID	M		9.2.2.81		–	
>>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 difference	M		9.2.2.73		–	
>>SFN Offset Validity	O		ENUMERATED (false)	Absence of this element means SFN offset is valid. False means SFN offset is not valid.	–	
>>SFN-SFN Drift	O		ENUMERATED (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		ENUMERATED (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 *Round Trip Time* IE above is included with its maximum value and if the actual value is outside the possible range for the *Round Trip Time* 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	C-*Coding*		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” or “Turbo”.

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	M				–	
>Positioning Data Discriminator	M		BIT STRING (4)	The positioning data discriminator defines the type of data provided for each positioning method: 0000 indicates the presence of the *Positioning Data Set* IE (that reports the usage of each non-GANSS method that was successfully used to obtain the location estimate) and optional presence of the *GANSS Positioning Data Set* IE 0001 indicates the presence of the GANSS Positioning Data Set IE (that reports the usage of each GANSS method that was successfully used to obtain the location estimate) and the absence of the *Positioning Data Set* IE 1 octet of data is provided for each positioning method included. All other values are reserved.	–	
>Positioning Data Set	C-ifDiscriminator=0				–	

>>Positioning Method and Usage		*1..<maxSet>*	OCTET STRING (1)	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 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.	–	
>GANSS Positioning Data Set			0..1		YES	ignore

>>GANSS Positioning Method and Usage		*1..<maxGANSSSet>*	OCTET STRING (1)	Coding of Method (Bits 8-7) : 00 : UE-Based 01 : UE-Assisted 10 : Conventional 11 : Reserved Coding of GANSS ID (Bits 6-4) : 000 : Galileo 001 : SBAS 010 : Modernized GPS 011 : QZSS 100 : GLONASS other values reserved Coding of usage (bits 3-1): 011 Attempted successfully: results used to generate location 100 Attempted successfully: case where UE supports multiple mobile based positioning methods and the actual method or methods used by the UE cannot be determined.	–	

Table 112

Condition	Explanation
ifDiscriminator=0	This IE is present if the *Positioning Data Discriminator* 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 9.

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..144, …)	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		*0..<maxTGPS>*		
>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 TS 23.032 [11].

Table 120

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE *Geographical Area*				
>Point				Ellipsoid point
>>Geographical Coordinates	M		9.2.2.7	
>Ellipsoid point with altitude				
>>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
CHOICE mode				
>FDD				
>>IP Spacing	M		ENUMERATED(5,7,10,15,20,30,40,50,…)	See TS 25.331 [4]
>>IP Length	M		ENUMERATED(5,10,…)	See TS 25.331 [4]
>>IP Offset	M		INTEGER(0..9)	See TS 25.331 [4]
>>Seed	M		INTEGER(0..63)	See TS 25.331 [4]
>TDD				
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 Difference

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 *RRC State*	M			
>CELL_DCH				
>>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..<maxTFC>*		
>>>>CTFC	M		9.2.2.49	
>>>**TrCH Information List**		*1..<maxTrCH>*		
>>>>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	
>CELL_FACH				
>>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 TS 25.212 [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		*0..<maxnoofRefETFCIs>*		
>Reference E-TFCI	M		INTEGER (0..127)	
>Reference E-TFCI Power Offset	M		9.2.2.78	

Table 129

Range Bound	Explanation
maxnoofRefETFCIs	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. TS 25.213 [17].

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. TS 25.213 [17].

9.2.2.81 Cell Parameter ID

The Cell Parameter ID identifies unambiguously the Code Groups, Scrambling Codes, Midambles and Toffset (see ref. TS 25.223 [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. TS 25.331 [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. TS 25.331 [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 Offet for each DPCH in this CCTrCH shall calculated by TDD DPCH Offset *mod* Repetition period, see ref. TS 25.331 [4].

Table 137

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

Table 138A

Range Bound	Explanation
maxnoofULts	Maximum number of allocated time slots for an UL DPCH. The value of *maxnoofULts* is 15.

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 *Burst Type*				
>Type1				
>>Midamble Configuration Burst Type 1 And 3	M		INTEGER (4, 8, 16)	As defined in TS 25.221 [19].
>>CHOICE *Midamble Allocation Mode*	M			
>>>Default Midamble			NULL	
>>>Common Midamble			NULL	
>>>UE Specific Midamble				
>>Midamble Shift Long	M		INTEGER (0..15)	
>Type2				
>>Midamble Configuration Burst Type 2	M		INTEGER (3,6)	As defined in TS 25.221 [19].
>>CHOICE *Midamble Allocation Mode*	M			
>>>Default Midamble			NULL	
>>>Common Midamble			NULL	
>>>UE Specific Midamble				
>>Midamble Shift Short	M		INTEGER (0..5)	
>Type3				UL only
>>Midamble Configuration Burst Type 1 And 3	M		INTEGER (4, 8, 16)	As defined in TS 25.221 [19].
>>CHOICE *Midamble Allocation Mode*	M			
>>>Default Midamble			NULL	
>>>UE Specific Midamble				
>>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 TS 25.221 [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..<maxnoofDPCHs>*		
>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..<maxTFC>*		
>CTFC	M		9.2.2.49	
TrCH Information List		*1..<maxTrCH>*		
>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 TS 23.032 [11].

Table 152

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice *Velocity Estimate*				
>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 ≤ h < N + 0.5 (N=0) N – 0.5 ≤ h < N + 0.5 (0<N<2^{11}-1) N – 0.5 ≤ 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 ≤ v< N + 0.5 (N = 0) N – 0.5 ≤ v< N + 0.5 (0 < N < 2^8-1) N – 0.5 ≤ 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	Criticality	Assigned Criticality
CHOICE *Reference Time*	M				–	
>UTRAN GPS reference time Result			9.2.2.104		–	
>GPS reference time only					–	
>>GPS TOW msec	M		INTEGER (0..6.048*10^{8}-1, …)	GPS Time of Week in milliseconds.	–	
>Cell timing					–	
>>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.	–	
>UTRAN GANSS reference time result					–	
>>UTRAN-GANSS Reference Time Result	M		9.2.2.136		YES	ignore
>GANSS reference time only					–	
>>GANSS reference time only	M				YES	ignore
>>>GANSS TOD msec	M		INTEGER(0..3599999)	GANSS Time of Day in milliseconds.	–	
>>>GANSS time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.	–	
UE Position Estimate	M		Geographical Area 9.2.2.6		–	
GPS Reference Time Uncertainty	O		9.2.2.132		YES	ignore
Position Data	O		Position Data UE-Based 9.2.2.140		YES	ignore

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 1/16th UMTS chips according to TS 25.133 [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 $T_{UTRAN-GPS}$ Drift Rate

Table 159

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
$T_{UTRAN-GPS}$ 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	Criticality	Assigned Criticality
Choice *mode*	M					
>FDD					-	
>>Round Trip Time Info	M		BOOLEAN	If set to TRUE, the RNC is requested to include the *Round Trip Time Info* IE in the Cell-ID Measured Results Info List.	-	
>>Pathloss	M		BOOLEAN	If set to TRUE, the RNC is requested to include the *Pathloss* 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 *Round Trip Time Info With Type 1* IE in the Cell-ID Measured Results Info List.	-	
>>CPICH RSCP	M		BOOLEAN	If set to TRUE, the RNC is requested to include the *CPICH RSCP* 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 *CPICH Ec/N0* IE in the Cell-ID Measured Results Info List.	-	
>TDD						
>>Rx Timing Deviation Info	M		BOOLEAN	If set to TRUE, the RNC is requested to include the *Rx Timing Deviation Info* IE in the Cell-ID Measured Results Info List.	-	
>>Pathloss	M		BOOLEAN	If set to TRUE, the RNC is requested to include the *Pathloss* 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 *Rx Timing Deviation LCR Info* 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 *Rx Timing Deviation 768Info* 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 *Rx Timing Deviation 384ext Info* IE in the Cell-ID Measured Results Info List.	-	
>>Angle Of Arrival LCR	M		BOOLEAN	If set to TRUE, the RNC is requested to include the *Angle Of Arrival LCR* IE in the Cell-ID Measured Results Info List.	-	
>>Timing Advance LCR	M		BOOLEAN	If set to TRUE, the RNC is requested to include the *Timing Advance LCR* IE (or the *Extended Timing Advance LCR* IE) in the Cell-ID Measured Results Info List.	-	
GERAN	O				YES	reject
>GSM RSSI	M		BOOLEAN	If set to TRUE, the RNC is requested to include the GSM RSSI measurement as part of the IRAT Measured Result 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	Criticality	Assigned Criticality
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..<maxSgnType>*			–	
>GANSS Signal ID	O		9.2.2.131	Absence of this field means the default value for the GANSS identified by "GANSS ID" (TS 25.331 [4]).	–	
>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..<maxGANSSSat>*			–	
>>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].	–	
>>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	–	
>>DGNSS Validity Period	O		9.2.2.154		YES	ignore

Table 167A

Range bound	Explanation
maxSgnType	Maximum number of signals for which data is included in this IE. The value of maxSgnType is 8
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 64

Table 167B

Condition	Explanation
Status/Health	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	Criticality	Assigned Criticality
Week Number	M		INTEGER(0..255)	Almanac reference week , number of weeks since the beginning of GANSS specific system time (mod 256)	–	
CHOICE *Almanac Model*	M				–	
>Keplerian Parameters				Model 1	–	
>>T_{oa}	M		INTEGER(0..255)	Scaling factor 2^{12} s Reference time of almanac within week in GANSS TOD time base	–	
>>IOD_a	M		INTEGER(0..3)	Issue-Of –Data, common to all satellites	–	
>>**Satellite Information KP**		*1..<maxGANSSSatAlmanac>*		Almanacs are in the order of the SV IDs, the smallest ID first.	–	
>>>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].	–	
>>>e	M		BIT STRING(11)	Eccentricity, dimensionless (OS SIS ICD [22])	–	
>>>δi	M		BIT STRING(11)	semi-circles (OS SIS ICD [22])	–	
>>>OMEGADOT	M		BIT STRING(11)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) (OS SIS ICD [22])	–	
>>>SV Health KP	M		BIT STRING(4)	dimensionless	–	
>>>delta $A^{1/2}$	M		BIT STRING(17)	Semi-Major Axis delta $(meters)^{1/2}$ (OS SIS ICD [22])	–	
>>>$OMEGA_0$	M		BIT STRING(16)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) (OS SIS ICD [22])	–	
>>>M_0	M		BIT STRING(16)	Mean Anomaly at Reference Time (semi-circles) (OS SIS ICD [22])	–	
>>>ω	M		BIT STRING(16)	Argument of Perigee (semi-circles) (OS SIS ICD [22])	–	
>>>af_0	M		BIT STRING(14)	Seconds (OS SIS ICD [22])	–	
>>>af_1	M		BIT STRING(11)	sec/sec (OS SIS ICD [22])	–	
>NAV Keplerian Parameters				Model 2		
>>Keplerian NAV Almanac	M				YES	ignore
>>>T_{oa}	M		INTEGER(0..255)	Scaling factor 2^{12} s Reference time of almanac within week in GANSS TOD time base	–	
>>>**Satellite information NAV-KP**		*1..<maxG*			–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
		ANSSS atAlmanac>				
>>>>Sat ID	M		INTEGER (0..63)	Defined in TS 25.331 [4].	–	
>>>>e	M		BIT STRING(16)	Eccentricity, dimensionless (IS-QZSS [27])	–	
>>>>δi	M		BIT STRING (16)	Correction to inclination, semi-circles (IS-QZSS [27])	–	
>>>>OMEGADOT	M		BIT STRING (16)	Rate of right ascension, semi-circles/sec (IS-QZSS [27])	–	
>>>>SV Health	M		BIT STRING (8)	Satellite health (IS-QZSS [27])	–	
>>>>$A^{1/2}$	M		BIT STRING (24)	Square root of the semi-major axis, meters$^{1/2}$ (IS-QZSS [27])	–	
>>>>$OMEGA_0$	M		BIT STRING (24)	Longitude of ascending node of orbit plane at weekly epoch, semi-circles (IS-QZSS [27])	–	
>>>>ω	M		BIT STRING (24)	Argument of perigee semi-circles (IS-QZSS [27])	–	
>>>>M_0	M		BIT STRING (24)	Mean anomaly at reference time semi-circles (IS-QZSS [27])	–	
>>>>af_0	M		BIT STRING (11)	Apparent satellite clock correction seconds (IS-QZSS [27])	–	
>>>>af_1	M		BIT STRING (11)	Apparent satellite clock correction sec/sec (IS-QZSS [27])	–	
>Reduced Keplerian Parameters				Model 3		
>>Keplerian Reduced Almanac	M				YES	ignore
>>>T_{oa}	M		INTEGER(0..255)	Scaling factor 2^{12} s Reference time of almanac within week in GANSS TOD time base	–	
>>>**Satellite information RED-KP**		*1..<maxGANSSSatAlmanac>*			–	
>>>>Sat ID	M		INTEGER (0..63)	Defined in TS 25.331 [4].	–	
>>>>δ_A	M		BIT STRING(8)	meters (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>Ω_0	M		BIT STRING (7)	semi-circles (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>Φ_0	M		BIT STRING (7)	semi-circles (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>L1 Health	M		BIT STRING	dimensionless (IS-GPS-	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
			(1)	200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])		
>>>>L2 Health	M		BIT STRING (1)	dimensionless (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>L5 Health	M		BIT STRING (1)	dimensionless (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>Midi Keplerian Parameters				Model 4		
>>Keplerian Midi Almanac	M				YES	ignore
>>>T_{oa}	M		INTEGER(0..255)	Scaling factor 2^{12} s Reference time of almanac within week in GANSS TOD time base	–	
>>>**Satellite information MIDI-KP**		*1..<maxGANSSSatAlmanac>*			–	
>>>>Sat ID	M		INTEGER (0..63)	Defined in TS 25.331 [4].	–	
>>>>e	M		BIT STRING(11)	dimensionless (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>δ_i	M		BIT STRING (11)	semi-circles (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>Ω_dot	M		BIT STRING (11)	semi-circles/sec (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>sqrtA	M		BIT STRING (17)	meters$^{1/2}$ (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>Ω_0	M		BIT STRING (16)	semi-circles (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>ω	M		BIT STRING (16)	semi-circles (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>M_0	M		BIT STRING (16)	semi-circles (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>a_{f0}	M		BIT STRING (11)	seconds (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>a_{f1}	M		BIT STRING (10)	sec/sec (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>L1 Health	M		BIT STRING (1)	Dimensionless (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>>>>L2 Health	M		BIT STRING (1)	dimensionless (IS-GPS-200 [23], IS-GPS-705	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
				[24], IS-GPS-800 [25], IS-QZSS [27])		
>>>>L5 Health	M		BIT STRING (1)	dimensionless (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])	–	
>GLONASS Keplerian Parameters				Model 5		
>>Keplerian GLONASS	M				YES	ignore
>>>Satellite information GLO-KP		*1..<maxGANSSSatAlmanac>*			–	
>>>>N^A	M		BIT STRING(11)	days [28]	–	
>>>>n^A	M		BIT STRING (5)	dimensionless [28]	–	
>>>>H_n^A	M		BIT STRING (5)	dimensionless [28]	–	
>>>>λ_n^A	M		BIT STRING (21)	semi-circles [28]	–	
>>>>$t_{\lambda n}^A$	M		BIT STRING (21)	seconds [28]	–	
>>>>Δi_n^A	M		BIT STRING (18)	semi-circles [28]	–	
>>>>ΔT_n^A	M		BIT STRING (22)	sec/orbit period [28]	–	
>>>>$\Delta T\_DOT_n^A$	M		BIT STRING (7)	sec/orbit period^2 [28]	–	
>>>>ε_n^A	M		BIT STRING (15)	dimensionless [28]	–	
>>>>ω_n^A	M		BIT STRING (16)	semi-circles [28]	–	
>>>>τ_n^A	M		BIT STRING (10)	seconds [28]	–	
>>>>C_n^A	M		BIT STRING (1)	dimensionless [28]	–	
>>>>M_n^A	O		BIT STRING (2)	dimensionless [28]	–	
>SBAS ECEF Parameters				Model 6		
>>ECEF SBAS Almanac	M				YES	ignore
>>>**Satellite information SBAS-ECEF**		*1..<maxGANSSSatAlmanac>*			–	
>>>>Data ID	M		BIT STRING(2)	Dimensionless (DTFA01-96-C-00025 [26])	–	
>>>>SV ID	M		INTEGER (0..63)	Defined in TS 25.331 [4].	–	
>>>>Health	M		BIT STRING (8)	Dimensionless (DTFA01-96-C-00025 [26])	–	
>>>>X_G	M		BIT STRING (15)	meters (DTFA01-96-C-00025 [26])	–	
>>>>Y_G	M		BIT STRING (15)	meters (DTFA01-96-C-00025 [26])	–	
>>>>Z_G	M		BIT STRING (9)	meters (DTFA01-96-C-00025 [26])	–	
>>>>X_G Rate-of-Change	M		BIT STRING (3)	meters/sec (DTFA01-96-C-00025 [26])	–	
>>>>Y_G Rate-of-Change	M		BIT STRING (3)	meters/sec (DTFA01-96-C-00025 [26])	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
>>>>Z_G Rate-of-Change	M		BIT STRING (4)	meters/sec (DTFA01-96-C-00025 [26])	–	
>>>>t_0	M		BIT STRING (11)	seconds (DTFA01-96-C-00025 [26])	–	
Complete Almanac Provided	O		BOOLEAN	This field indicates whether the SAS provided almanac for the full GANSS constellation or not. TRUE means complete GANSS almanac is provided.	YES	ignore

Table 168A

Range bound	Explanation
maxGANSSSatAlmanac	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 36

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
Satellite Clock Model		*1..<maxGANSSClockMod>*		Model-1. There may be more than one clock model included if defined in SIS ICD (e.g. two for Galileo)
>t_{oc}	M		BIT STRING(14)	defined in OS SIS ICD [22]
>a_{i2}	M		BIT STRING(12)	defined in OS SIS ICD [22]
>a_{i1}	M		BIT STRING(18)	defined in OS SIS ICD [22]
>a_{i0}	M		BIT STRING(28)	defined in OS SIS ICD [22]
>T_{GD}	O		BIT STRING(10)	defined in OS SIS ICD [22]
>Model ID	O		INTEGER(0..3)	Coded as defined in Table 169B.

Table 169A

Range bound	Explanation
maxGANSSClockMod	Maximum number of satellite clock models for which data is included in this IE. The value of maxGANSSClockMod is 4

Table 169B

GANSS Id	Model ID Value	Explanation
Galileo	0	I/NAV
	1	F/NAV
	2	Reserved
	3	Reserved

9.2.2.115A GANSS Additional Clock Models

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

Table 169C

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

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE *Additional Clock Models*				
>NAV-Clock Model				Model-2
>>t_{oc}	M		BIT STRING(16)	Time of clock (seconds) (IS-QZSS [27])
>>af_2	M		BIT STRING (8)	Clock correction polynomial coefficient (sec/sec^2) (IS-QZSS [27])
>>af_1	M		BIT STRING (16)	Clock correction polynomial coefficient (sec/sec) (IS-QZSS [27])
>>af_0	M		BIT STRING (22)	Clock correction polynomial coefficient (seconds) (IS-QZSS [27])
>>T_{GD}	M		BIT STRING (8)	Group delay (seconds) (IS-QZSS [27])
>CNAV/CNAV-2 Clock Model				Model-3
>>t_{oc}	M		BIT STRING (11)	Clock data reference time of week (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>t_{op}	M		BIT STRING (11)	Clock data predict time of week (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>URA_{oc} Index	M		BIT STRING (5)	SV clock accuracy index (dimensionless) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>URA_{oc1} Index	M		BIT STRING (3)	SV clock accuracy change index (dimensionless) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>URA_{oc2} Index	M		BIT STRING (3)	SV clock accuracy change rate index (dimensionless) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>a_{f2-n}	M		BIT STRING (10)	SV clock drift rate correction coefficient (sec/sec^2) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>a_{f1-n}	M		BIT STRING (20)	SV clock drift correction coefficient (sec/sec) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>a_{f0-n}	M		BIT STRING (26)	SV clock bias correction coefficient (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>T_{GD}	M		BIT STRING (13)	Group delay correction (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>ISC_{L1CP}	O		BIT STRING (13)	Inter signal group delay correction (seconds) (IS-GPS-800 [25], IS-QZSS [27])
>>ISC_{L1CD}	O		BIT STRING (13)	Inter signal group delay correction

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
				(seconds) (IS-GPS-800 [25], IS-QZSS [27])
>>$ISC_{L1C/A}$	O		BIT STRING (13)	Inter signal group delay correction (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-QZSS [27])
>>ISC_{L2C}	O		BIT STRING (13)	Inter signal group delay correction (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-QZSS [27])
>>ISC_{L5I5}	O		BIT STRING (13)	Inter signal group delay correction (seconds) (IS-GPS-705 [24], IS-QZSS [27])
>>ISC_{L5Q5}	O		BIT STRING (13)	Inter signal group delay correction (seconds) (IS-GPS-705 [24], IS-QZSS [27])
>GLONASS Satellite Clock Model				Model-4
>$\tau_n(t_b)$	M		BIT STRING (22)	Satellite clock offset (seconds) [28]
>$\gamma_n(t_b)$	M		BIT STRING (11)	Relative frequency offset from nominal value (dimensionless) [28]
>$\Delta\tau_n$	O		BIT STRING (5)	Time difference between transmission in G2 and G1 (seconds) [28]
>SBAS Satellite Clock Model				Model-5
>t_0	M		BIT STRING (13)	(seconds) (DTFA01-96-C-00025 [26])
>a_{Gfo}	M		BIT STRING (12)	(seconds) (DTFA01-96-C-00025 [26])
>a_{Gf1}	M		BIT STRING (8)	(sec/sec) (DTFA01-96-C-00025 [26])

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

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
a_{i0}	M		BIT STRING(12)	This parameter is used as defined in OS SIS ICD [22]
a_{i1}	M		BIT STRING(12)	This parameter is used as defined in OS SIS ICD [22]
a_{i2}	M		BIT STRING(12)	This parameter is used as defined in OS SIS ICD [22]
GANSS Ionosphere Regional Storm Flags		*0..1*		
>Storm Flag 1	M		BOOLEAN	This parameter is used as defined in OS SIS ICD [22]
>Storm Flag 2	M		BOOLEAN	This parameter is used as defined in OS SIS ICD [22]
>Storm Flag 3	M		BOOLEAN	This parameter is used as defined in OS SIS ICD [22]
>Storm Flag 4	M		BOOLEAN	This parameter is used as defined in OS SIS ICD [22]
>Storm Flag 5	M		BOOLEAN	This parameter is used as defined in OS SIS ICD [22]

9.2.2.116A GANSS Additional Ionospheric Model

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

Table 170A

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Data ID	M		BIT STRING(2)	Coded as defined in TS 25.331 [4]
α_0	M		BIT STRING (8)	seconds (IS-QZSS [27])
α_1	M		BIT STRING (8)	sec/semi-circle (IS-QZSS [27])
α_2	M		BIT STRING (8)	sec/(semi-circle)^2 (IS-QZSS [27])
α_3	M		BIT STRING (8)	sec/(semi-circle)^3 (IS-QZSS [27])
β_0	M		BIT STRING (8)	seconds (IS-QZSS [27])
β_1	M		BIT STRING (8)	sec/semi-circle (IS-QZSS [27])
β_2	M		BIT STRING (8)	sec/(semi-circle)^2 (IS-QZSS [27])
β_3	M		BIT STRING (8)	sec/(semi-circle)^3 (IS-QZSS [27])

9.2.2.117 GANSS Measured Results

Table 171

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
CHOICE *Reference Time*	M				–	
>UTRAN Reference Time				This choice may only be present if SAS operates in SAS-centric mode.	–	
>>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		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANS Time ID.	–	
>>GANSS TOD Uncertainty	O		INTEGER(0..127)	Provides the accuracy of the relation between GANSS TOD and UTRAN time. Its coding is defined in TS 25.331 [4].	–	
>>UC-ID	M		UTRAN Cell Identifier 9.2.2.37	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.	–	
>GANSS Reference Time Only					–	
>>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		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.	–	
>>GANSS TOD Uncertainty	O		INTEGER(0..127)	Provides the accuracy of the GANSS TOD. Its coding is defined in TS 25.331 [4].	–	
GANSS Generic Measurement Information		*1..<maxGANSS>*			–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>**GANSS Signal Measurement Information**	M	*1..<maxSgnType>*			–	
>>GANSS Signal ID	O		9.2.2.131	Absence of this field means the default value for the GANSS identified by "GANSS ID" TS 25.331 [4].	–	
>>GANSS Code Phase Ambiguity	O		INTEGER(0..31)	In milliseconds. Defined in TS 25.331 [4].	–	
>>GANSS Code Phase Ambiguity Extension	O		9.2.2.141		YES	ignore
>>**GANSS Measurement Parameters**	M	*1.. <maxGANSSSat>*			–	
>>>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].	–	
>>>C/N_o	M		INTEGER(0..63)	the estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (typical levels will be in the range of 20 – 50 dB-Hz).	–	
>>>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 TS 25.331 [4].	–	
>>>GANSS Code Phase	M		INTEGER(0..2^{21}-1)	Defined in TS 25.331 [4].	–	
>>>GANSS Integer Code Phase	O		INTEGER(0..63)	Defined in TS 25.331 [4].	–	
>>>GANSS Integer Code Phase Extension	O		9.2.2.142		YES	ignore
>>>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	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
				particular satellite signal.		

Table 171A

Range bound	Explanation
maxGANSS	Maximum number of GANSS. The value of maxGANSS is 8.
maxSgnType	Maximum number of signals for which data is included in this IE. The value of maxSgnType is 8.
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 64

9.2.2.118 GANSS Navigation Model

This IE contains 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
Satellite Information		*1..<maxGANSSSat>*		
>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4]
>SV Health	M		BIT STRING(5)	Coded as defined in TS 25.331 [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 64

NOTE 1: The Non-Broadcast Indication allows to inform that the navigation model is not 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.

9.2.2.118A GANSS Additional Navigation Models

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

Table 172B

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

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
				derived from satellite broadcast. See NOTE 1 in 9.2.2.118.
Satellite Information		*1..<maxGANSSSat>*		
>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].
>SV Health	M		BIT STRING(6)	Coded as defined in TS 25.331 [4].
>IOD	M		BIT STRING(11)	Coded as defined in TS 25.331 [4].
>GANSS Additional Clock Models	M		GANSS addtional clock models 9.2.2.115A	
>GANSS Additional Orbit Models	M		GANSS additional orbit models 9.2.2.119A	

Table 172C

Range bound	Explanation
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 64

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
CHOICE *Orbit Model*	M			
>*Keplerian Parameters*				Model-1
>>t_{oe}	M		BIT STRING(14)	Time-of-Ephemeris in seconds, scale factor 60 (OS SIS ICD [22])
>>ω	M		BIT STRING(32)	Argument of Perigee (semi-circles) (OS SIS ICD [22])
>>Δn	M		BIT STRING(16)	Mean Motion Difference From Computed Value (semi-circles/sec) (OS SIS ICD [22])
>>M_0	M		BIT STRING(32)	Mean Anomaly at Reference Time (semi-circles) (OS SIS ICD [22])
>>OMEGAdot	M		BIT STRING(24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) (OS SIS ICD [22])
>>e	M		BIT STRING(32)	Eccentricity, scale factor 2^{-33} (OS SIS ICD [22])
>>Idot	M		BIT STRING(14)	Rate of Inclination Angle (semi-circles/sec) (OS SIS ICD [22])
>>sqrtA	M		BIT STRING(32)	Semi-Major Axis in $(meters)^{1/2}$, scale factor 2^{-19} (OS SIS ICD [22])
>>i_0	M		BIT STRING(32)	Inclination Angle at Reference Time (semi-circles) (OS SIS ICD [22])

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>>$OMEGA_0$	M		BIT STRING(32)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) (OS SIS ICD [22])
>>C_{rs}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) (OS SIS ICD [22])
>>C_{is}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) (OS SIS ICD [22])
>>C_{us}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) (OS SIS ICD [22])
>>C_{rc}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) (OS SIS ICD [22])
>>C_{ic}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) (OS SIS ICD [22])
>>C_{uc}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) (OS SIS ICD [22])

9.2.2.119A GANSS Additional Orbit Models

This IE contains information for GANSS orbit model parameters.

Table 173A

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE *Additional Orbit Models*				
>*NAV-Keplerian Parameters*				Model-2
>>URA Index	M		BIT STRING(4)	SV accuracy (dimensionless) (IS-QZSS [27])
>>Fit Interval Flag	M		BIT STRING (1)	Fit interval indication (dimensionless) (IS-QZSS [27])
>>t_{oe}	M		BIT STRING(16)	Time of ephemeris (seconds) (IS-QZSS [27])
>>ω	M		BIT STRING (32)	Argument of perigee (semi-circles) (IS-QZSS [27])
>>Δn	M		BIT STRING (16)	Mean motion difference from computed value (semi-circles/sec) (IS-QZSS [27])
>>M_0	M		BIT STRING (32)	Mean anomaly at reference time (semi-circles) (IS-QZSS [27])
>>OMEGAdot	M		BIT STRING (24)	Rate of right ascension (semi-circles/sec) (IS-QZSS [27])
>>e	M		BIT STRING (32)	Eccentricity (dimensionless) (IS-QZSS [27])

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>>Idot	M		BIT STRING (14)	Rate of inclination angle (semi-circles/sec) (IS-QZSS [27])
>>sqrtA	M		BIT STRING (32)	Square root of semi-major axis (meters$^{1/2}$) (IS-QZSS [27])
>>i_0	M		BIT STRING (32)	Inclination angle at reference time (semi-circles) (IS-QZSS [27])
>>$OMEGA_0$	M		BIT STRING (32)	Longitude of ascending node of orbit plane at weekly epoch (semi-circles) (IS-QZSS [27])
>>C_{rs}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the orbit radius (meters) (IS-QZSS [27])
>>C_{is}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the angle of inclination (radians) (IS-QZSS [27])
>>C_{us}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the argument of latitude (radians) (IS-QZSS [27])
>>C_{rc}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the orbit radius (meters) (IS-QZSS [27])
>>C_{ic}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the angle of inclination (radians) (IS-QZSS [27])
>>C_{uc}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the argument of latitude (radians) (IS-QZSS [27])

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>CNAV/CNAV-2 Keplerian Parameters				Model-3
>>t_{op}	M		BIT STRING (11)	Data predict time of week (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>URA_{oe} Index	M		BIT STRING (5)	SV accuracy (dimensionless) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>ΔA	M		BIT STRING (26)	Semi-major axis difference at reference time (meters) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>A_dot	M		BIT STRING (25)	Chane rate in semi-major axis (meters/sec) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>Δn_0	M		BIT STRING (17)	Mean motion difference from computed value at reference time (semi-circles/sec) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>Δn_0_dot	M		BIT STRING (23)	Rate of mean motion difference from computed value (semi-circles/sec^2) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>M_{0-n}	M		Bit String(33)	Mean anomaly at reference time (semi-circles) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>e_n	M		BIT STRING (33)	Eccentricity (dimensionless) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>ω_n	M		Bit String(33)	Argument of perigee (semi-circles) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>Ω_{0-n}	M		BIT STRING (33)	Reference right ascension angle (semi-circles) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>$\Delta\Omega$_dot	M		BIT STRING (17)	Rate of right ascension difference (semi-circles/sec) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>i_{0-n}	M		BIT STRING (33)	Inclination angle at reference time (semi-circles) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>I_{0-n}_dot	M		BIT STRING (15)	Rate of inclination angle (semi-circles/sec) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>>C_{is-n}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the angle of inclination (radians) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>C_{ic-n}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the angle of inclination (radians) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>C_{rs-n}	M		BIT STRING (24)	Amplitude of sine harmonic correction term to the orbit radius (meters) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>C_{rc-n}	M		BIT STRING (24)	Amplitude of cosine harmonic correction term to the orbit radius (meters) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>C_{us-n}	M		BIT STRING (21)	Amplitude of sine harmonic correction term to the argument of latitude (radians) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>>C_{uc-n}	M		BIT STRING (21)	Amplitude of cosine harmonic correction term to the argument of latitude (radians) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>GLONASS Earth-Centered, Earth-fixed Parameters				Model-4
>>E_n	M		BIT STRING (5)	Age of data (days) [28]
>>P1	M		BIT STRING (2)	Time interval between two adjacent values of t_b (minutes) [28]
>>P2	M		BIT STRING (1)	Change of t_b flag (dimensionless) [28]
>>M	O		BIT STRING (2)	Type of satellite (dimensionless) [28]
>> $x_n(t_b)$	M		BIT STRING (27)	x-coordinate of satellite at time t_b (kilometers) [28]
>> $\dot{x}_n(t_b)$	M		BIT STRING (24)	x-coordinate of satellite velocity at time t_b (kilometers/sec) [28]
>> $\ddot{x}_n(t_b)$	M		BIT STRING (5)	x-coordinate of satellite acceleration at time t_b (kilometers/sec^2) [28]
>> $y_n(t_b)$	M		BIT STRING (27)	y-coordinate of satellite at time t_b (kilometers) [28]
>> $\dot{y}_n(t_b)$	M		BIT STRING (24)	y-coordinate of satellite velocity at time t_b (kilometers/sec) [28]
>> $\ddot{y}_n(t_b)$	M		BIT STRING (5)	y-coordinate of satellite acceleration at time t_b (kilometers/sec^2) [28]

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>> $z_n(t_b)$	M		BIT STRING (27)	z-coordinate of satellite at time t_b (kilometers) [28]
>> $\dot{z}_n(t_b)$	M		BIT STRING (24)	z-coordinate of satellite velocity at time t_b (kilometers/sec) [28]
>> $\ddot{z}_n(t_b)$	M		BIT STRING (5)	z-coordinate of satellite acceleration at time t_b (kilometers/sec^2) [28]
>SBAS Earth-Centered, Earth-fixed Parameters				Model-5
>>t_0	C-*ClockModel*		BIT STRING (13)	Time of applicability (seconds) (DTFA01-96-C-00025 [26])
>>Accuracy	M		BIT STRING (4)	(dimensionless) (DTFA01-96-C-00025 [26])
>>X_G	M		BIT STRING (30)	(meters) (DTFA01-96-C-00025 [26])
>>Y_G	M		BIT STRING (30)	(meters) (DTFA01-96-C-00025 [26])
>>Z_G	M		BIT STRING (25)	(meters) (DTFA01-96-C-00025 [26])
>>X_G Rate-of-Change	M		BIT STRING (17)	(meters/sec) (DTFA01-96-C-00025 [26])
>>Y_G Rate-of-Change	M		BIT STRING (17)	(meters/sec) (DTFA01-96-C-00025 [26])
>>Z_G Rate-of-Change	M		BIT STRING (18)	(meters/sec) (DTFA01-96-C-00025 [26])
>>X_G Acceleration	M		BIT STRING (10)	(meters/sec^2) (DTFA01-96-C-00025 [26])
>>Y_G Acceleration	M		BIT STRING (10)	meters/sec^2) (DTFA01-96-C-00025 [26])
>>Z_G Acceleration	M		BIT STRING (10)	meters/sec^2) (DTFA01-96-C-00025 [26])

Table 173B

Condition	Explanation
ClockModel	This IE shall be present if "SBAS Satellite Clock Model" (Model-5) in IE *GANSS Additional Clock Models* is not included in *GANSS Additional Navigation Models* IE.

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	Criticality	Assigned Criticality
Horizontal Accuracy Code	O		9.2.2.38		–	
Vertical Accuracy Code	O		9.2.2.39		–	
GANSS Timing of Cell Wanted	M		BIT STRING(8)	For each bit, if set to '1', indicates that for respective GANSS the GANSS Timing of Cell is wanted. Bit 1 is the MSB and bit 8 is the LSB (see clause 9.2.1). bit 1: Galileo bit 2: Modernized GPS bit 3: QZSS bit 4: GLONASS bits 5-8: reserved for future GANSS.	–	
Additional Assistance Data Request	M		BIT STRING(8)	For each bit, if set to '1', indicates that the UE is requested to send an additional assistance data request for the respective GANSS. Bit 1 is the MSB and bit 8 is the LSB (see clause 9.2.1). bit 1: Galileo bit 2: SBAS bit 3: Modernized GPS bit 4: QZSS bit 5: GLONASS bits 6-8: reserved for future GANSS.	–	
Measurement Validity	O		ENUMERATED (CELL_DCH, all states except CELL_DCH, all states, …)		–	
GANSS Carrier-Phase Measurement Requested	O		9.2.2.143		YES	ignore
GANSS Multi-frequency Measurement Requested	O		9.2.2.144		YES	ignore

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		9.2.2.130	Absence of this IE means Galileo.

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..<maxGANSSSat>*		
>Bad GANSS Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].
>Bad GANSS Signal ID	O		BIT STRING(8)	Coded as defined in TS 25.331 [4].

Table 176A

Range bound	Explanation
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 64

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	Criticality	Assigned Criticality
GANSS Signal ID	O		9.2.2.131	Absence of this field means the default value for the GANSS identified by "GANSS ID" TS 25.331 [4].	–	
Satellite Information		*1..<maxGANSSSat>*			–	
>Sat ID	M		INTEGER (0..63)	Defined in TS 25.331 [4].	–	
>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 *nominal* wavelength of the assisted signal.	–	
>Extra Doppler		*0..1*			–	
>>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} *Nominal* 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 TS 25.331 [4].	–	
>Azimuth and Elevation		*0..1*			–	
>>Azimuth	M		INTEGER(0..31)	Scaling factor 11.25 Degrees.	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
>>Elevation	M		INTEGER(0..7)	Scaling factor 11.25 Degrees.	–	
>>Azimuth and Elevation LSB		*0..1*			YES	ignore
>>>Azimuth LSB	M		INTEGER(0..15)	The full satellite azimuth is constructed as "Azimuth" × 11.25 + "Azimuth LSB" × 0.703125 degrees. An angle of x degrees means the satellite azimuth a is in the range x ≤ a < x+0.703125 degrees.	–	
>>>Elevation LSB	M		INTEGER(0..15)	The full satellite elevation is constructed as "Elevation" × 11.25 + "Elevation LSB" × 0.703125 degrees. An angle of y degrees means the satellite elevation e is in the range y ≤ e < y+0.703125 degrees.	–	

Table 177A

Range bound	Explanation
maxGANSSSat	Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 64

9.2.2.124 GANSS Reference Time

Table 178

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
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)	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 TS 25.331 [4]. This IE may only be present if SAS operates in SAS-centric mode.	–	
GANSS Time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.	–	
UTRAN GANSS Reference Time		*0..1*		This IE may only be present if SAS operates in SAS-centric mode.	–	
>UTRAN GANSS Timing of Cell Frames	M		INTEGER(0.. 999999750 by step of 250)	UTRAN GANSS timing of cell frames in steps of 250 ns. Indicates sub-second part of *GANSS TOD IE.* See TS 25.331 [4].	–	
>UC-ID	O		UTRAN Cell Identifier 9.2.2.37	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.	–	
$T_{UTRAN\text{-}GANSS}$ 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.	–	
GANSS Day Cycle Number	O		INTEGER (0..7)	Number of 8192 day cycles occurred since the GANSS zero time-point defined in TS 25.331 [4]. The first 8192 GANSS days since the zero time-point is GANSS Day Cycle Number 0.	YES	ignore

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	Criticality	Assigned Criticality
GANSS Time Model Reference Time	M		INTEGER (0..37799)	GANSS reference time (modulo 1 week) in seconds. Scale Factor 2^4	–	
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_TO_ID	M		ENUMERATED(GPS,…, Galileo, QZSS, GLONASS)		–	
Week Number	O		INTEGER (0..8191)	Reference week of GANSS Time Model	–	
Delta_T	O		INTEGER (-128..127)	This field specifies the integer seconds of the GNSS-GNSS Time Offset. Scale factor 1 second.	YES	ignore

9.2.2.125A GANSS Additional Time Models

The *GANSS Additional Time Models* IE contains a set of parameters needed to relate GANSS time to selected time references.

Table 179A

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
GNSS-GNSS Time Model		*1..<maxGANSS-1>*		
>GANSS Time Model			9.2.2.125	

Table 179B

Range Bound	Explanation
maxGANSS-1	Maximum number of GANSS systems for which data is included in this IE. The value of maxGANSS-1 is 7.

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

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
A_1	M		BIT STRING(24)	sec/sec (OS SIS ICD [22])
A_0	M		BIT STRING(32)	seconds (OS SIS ICD [22])
t_{ot}	M		BIT STRING(8)	seconds (OS SIS ICD [22])
WN_t	M		BIT STRING(8)	weeks (OS SIS ICD [22])
Δt_{LS}	M		BIT STRING(8)	seconds (OS SIS ICD [22])
WN_{LSF}	M		BIT STRING(8)	weeks (OS SIS ICD [22])
DN	M		BIT STRING(8)	days (OS SIS ICD [22])
Δt_{LSF}	M		BIT STRING(8)	seconds (OS SIS ICD [22])

9.2.2.126A GANSS Additional UTC Models

The *GANSS Additional UTC Models* IE contains several sets of parameters needed to relate GANSS time to Universal Time Coordinate (UTC), as defined in [23,24,25,26,27,28].

Table 180A

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

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE *Additional UTC Models*				
>*Model Set 1*				
>A_{0-n}	M		BIT STRING(16)	Bias coefficient of GNSS time scale relative to UTC time scale (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>A_{1-n}	M		BIT STRING (13)	Drift coefficient of GNSS time scale relative to UTC time scale (sec/sec) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>A_{2-n}	M		BIT STRING (7)	Drift rate correction coefficient of GNSS time scale relative to UTC time scale (sec/sec^2) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>Δt_{LS}	M		BIT STRING (8)	Current or past leap second count (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>t_{ot}	M		BIT STRING (16)	Time data reference time of week (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>WN_{ot}	M		BIT STRING (13)	Time data reference week number (weeks) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>WN_{LSF}	M		BIT STRING (8)	Leap second reference week number (weeks) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>DN	M		BIT STRING (4)	Leap second reference day number (days) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>Δt_{LSF}	M		BIT STRING (8)	Current or future leap second count (seconds) (IS-GPS-200 [23], IS-GPS-705 [24], IS-GPS-800 [25], IS-QZSS [27])
>*Model Set 2*				
>N^A	M		BIT STRING (11)	Callendar day number within four-year period beginning since the leap year (days) [28]
>τ_c	M		BIT STRING (32)	GLONASS time scale correction to UTC(SU) (seconds) [28]
>Delta UT1	O			
>>B1	M		BIT STRING (11)	Coefficient to determine ΔUT1 (seconds) [28]
>>B2	M		BIT STRING (10)	Coefficient to determine ΔUT1 (seconds/msd) [28]
>KP	O		BIT STRING (2)	Notification of expected leap second correction

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
				(dimensionless) [28]
>Model Set 3				
>A_{1WNT}	M		BIT STRING (24)	sec/sec (DTFA01-96-C-00025 [26], Message Type 12)
>A_{0WNT}	M		BIT STRING (32)	seconds (DTFA01-96-C-00025 [26], Message Type 12)
>t_{ot}	M		BIT STRING (8)	seconds (DTFA01-96-C-00025 [26], Message Type 12)
>WN_t	M		BIT STRING (8)	weeks (DTFA01-96-C-00025 [26], Message Type 12)
>Δt_{LS}	M		BIT STRING (8)	seconds (DTFA01-96-C-00025 [26], Message Type 12)
>WN_{LSF}	M		BIT STRING (8)	weeks (DTFA01-96-C-00025 [26], Message Type 12)
>DN	M		BIT STRING (8)	days (DTFA01-96-C-00025 [26], Message Type 12)
>Δt_{LSF}	M		BIT STRING (8)	seconds (DTFA01-96-C-00025 [26], Message Type 12)
>UTC Standard ID	M		BIT STRING (3)	dimensionless Coded as defined in TS 25.331 [4].

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)	

9.2.2.127A GANSS Data Bit Assistance

Table 181A

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS TOD	M		INTEGER(0..59,…)	Reference time (modulo 1 minute) of the first bit of the data in *Data Bits* IE, in seconds.
Data Bit Assistance List		*1..<maxGANSSSat>*		
>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].
>Data Bit Assistance Sgn List		*1..<maxSgnType>*		
>>GANSS Signal ID	M		9.2.2.131	
>>Data Bits	M		BIT STRING(1..1024)	Raw data bits as transmitted from a specific satellite at the time indicated by GANSS_TOD. See TS 25.331 [4].

Table 181B

Range bound	Explanation
maxSgnType	Maximum number of signals for which data is included in this IE. The value of maxSgnType is 8
maxGANSSSat	Maximum number of GANSS satellites for which data is included in the IE. The value of maxGANSSSat is 64.

9.2.2.128 Additional GPS Assistance Data Required

This IE lists the GPS assistance data types required by the UE.

Table 182

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Almanac	M		BOOLEAN	TRUE means requested
UTC Model	M		BOOLEAN	TRUE means requested
Ionospheric Model	M		BOOLEAN	TRUE means requested
Navigation Model	M		BOOLEAN	TRUE means requested
DGPS Corrections	M		BOOLEAN	TRUE means requested
Reference Location	M		BOOLEAN	TRUE means requested
Reference Time	M		BOOLEAN	TRUE means requested
Acquisition Assistance	M		BOOLEAN	TRUE means requested
Real-Time Integrity	M		BOOLEAN	TRUE means requested
Nav. Model Additional Data		*0..1*		
>GPS Week	M		INTEGER (0..1023)	GPS week number
>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
>Satellites 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 ICD-GPS-200 [10].
>>IODE	M		INTEGER (0..255)	Issue of Data Ephemeris for SatID

Table 183

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

9.2.2.129 Additional GANSS Assistance Data Required

This IE lists the GANSS assistance data types required by the UE.

Table 184

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GANSS Reference Time	M		BOOLEAN	TRUE means requested	–	
GANSS Reference Location	M		BOOLEAN	TRUE means requested	–	
GANSS Ionospheric model	M		BOOLEAN	TRUE means requested	–	
GANSS Additional Ionospheric Model	O		GANSS Additional Ionospheric Model Required 9.2.2.145	Presence means required.	YES	ignore
GANSS Earth Orientation Parameters	O		GANSS Earth Orientation Parameters Required 9.2.2.146		YES	ignore
GANSS Requested Generic Assistance Data		*1..<maxGANSS>*			–	
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo	–	
>GANSS Real-Time Integrity	O		BOOLEAN	TRUE means requested	–	
>GANSS Differential Corrections		*0..1*			–	
>>DGANSS Signal	M		BIT STRING (8)	Coded as defined in TS 25.331 [4].	–	
>GANSS Almanac	O		BOOLEAN	TRUE means requested	–	
>GANSS Navigation Model	O		BOOLEAN	TRUE means requested	–	
>GANSS Time Model GNSS-GNSS	O		BIT STRING (9)	Defines the time model. Bit 1 is the MSB and bit 9 is the LSB (see clause 9.2.1). Bit 1 is set for GPS, Bit 2 is set for Galileo. Bit 3 is set for QZSS Bit 4 is set for GLONASS Other bits are reserved.	–	
>GANSS Reference Measurement Information	O		BOOLEAN	TRUE means requested	–	
>GANSS Data Bits		*0..1*			–	
>>GANSS TOD	M		INTEGER (0..86399)	The GANSS TOD for which the data bits are requested.	–	

>>Data Bit Assistance		*1*			–	
>>>GANSS Signal ID	M		BIT STRING(8)	Coded as defined in TS 25.331 [4].	–	
>>>GANSS Data Bit Interval	M		INTEGER(0..15)	This field represents the time length for which the Data Bit Assistance is requested. The Data Bit Assistance shall be relative to the time interval (GANSS TOD, GANSS TOD + Data Bit Interval). The Data Bit Interval *r*, expressed in seconds, is mapped to a binary number K with the following formula: $r = 0.1 * 2^{K}$ Value K=15 means that the time interval is not specified.	–	
>>>Satellite Information		*0..<maxGANSSSat>*			–	
>>>>Satellite ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].	–	
>GANSS UTC model	O		BOOLEAN	TRUE means requested	–	
>GANSS Navigation Model Additional data		*0..1*			–	
>>GANSS Week/Day	M		INTEGER (0..4095)	Defined in TS 25.331 [4].	–	
>>GANSS_Toe	M		INTEGER (0..167)	Defined in TS 25.331 [4].	–	
>>T-Toe limit	M		INTEGER (0..10)	Defined in TS 25.331 [4].	–	
>>Satellites list related data	M	*0.. <maxGANSSSat>*			–	
>>>Sat ID	M		INTEGER (0..63)	Defined in TS 25.331 [4].	–	
>>>IOD	M		BIT STRING (10)	Defined in TS 25.331 [4].	–	
>GANSS Additional Navigation Models	O		GANSS Additional Navigation Models Required 9.2.2.147		YES	ignore
>GANSS Additional UTC Models	O		GANSS Additional UTC Models Required		YES	ignore

			9.2.2.148			
>GANSS Auxiliary Information	O		GANSS Auxiliary Information Required 9.2.2.149		YES	ignore
>SBAS ID	O		9.2.2.134		YES	ignore
>GANSS Additional Assistance Data Choices	O		9.2.2.151		YES	ignore

Table 185

Range Bound	Explanation
maxGANSS	Maximum number of GANSS for which data is included in this IE. The value of maxGANSS is 8.
maxGANSSSat	Maximum number of GANSS satellites for which data is included in this IE. The value of maxGANSSSat is 64.

9.2.2.130 GANSS ID

This IE defines a particular GANSS.

Table 186

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS ID	M		INTEGER(0..7)	Defines the GANSS and is coded as defined in the *UE positioning GANSS additional assistance data request* IE in TS 25.331 [4].

9.2.2.131 GANSS Signal ID

This IE defines a specific signal within a particular GANSS.

Table 187

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Signal ID	M		INTEGER (0..3,…,4..7)	Defines the GANSS signal and is coded as defined in TS 25.331 [4].

9.2.2.131a GANSS Signal IDs

This IE defines multiple signals within a particular GANSS.

Table 187A

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Signal IDs	M		BIT STRING(8)	Each bit represents one signal as defined in TS 25.331 [4].

9.2.2.132 GPS Reference Time Uncertainty

Table 188

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS Reference Time Uncertainty	M		Integer (0..127)	This element provides the accuracy of the provided GPS time, or alternatively the accuracy of the provided relation between GPS and UTRAN time. If "GPS TOW" is the provided GPS time, or alternatively the GPS time corresponding to the UTRAN time provided, then the true GPS time lies in the interval ["GPS TOW" - "GPS Reference Time Uncertainty", "GPS TOW" + "GPS Reference Time Uncertainty"]. The uncertainty r, expressed in microseconds, is mapped to a number K with the following formula: r = C*(((1+x)K)-1) with C = 0.0022 and x = 0.18. To encode any higher value of the uncertainty than that corresponding to K=127 in the formula above, or to indicate an undefined value of the "GPS TOW", the same value, K=127, shall be used.

9.2.2.133 GANSS Earth Orientation Parameters

Table 189

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
t_{EOP}	M		BIT STRING(16)	EOP data reference time (seconds) (IS-GPS-200 [23])
PM_X	M		BIT STRING (21)	X-axis polar motion value at reference time (arc-seconds) (IS-GPS-200 [23])
PM_X_dot	M		BIT STRING (15)	X-axis polar motion drift at reference time (arc-seconds/day) (IS-GPS-200 [23])
PM_Y	M		BIT STRING (21)	Y-axis polar motion value at reference time (arc-seconds) (IS-GPS-200 [23])
PM_Y_dot	M		BIT STRING (15)	Y-axis polar motion drift at reference time (arc-seconds/day) (IS-GPS-200 [23])
ΔUT1	M		BIT STRING (31)	UT1-UTC difference at reference time (seconds) (IS-GPS-200 [23])
ΔUT1_dot	M		BIT STRING (19)	Rate of UT1-UTC difference at reference time (seconds/day) (IS-GPS-200 [23])

9.2.2.134 SBAS ID

This IE defines a specific SBAS.

Table 190

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SBAS ID	M		ENUMERATED(WAAS, EGNOS, MSAS, GAGAN, …)	

9.2.2.135 GANSS Auxiliary Information

Table 191

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE *GANSS-ID*				
>GANSS-ID-1				This choice may only be present if GANSS ID indicated "Modernized GPS"
>>**Aux Info List**		*1 .. <maxGANSSSat>*		
>>>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].
>>>Signals Available	M		BIT STRING(8)	Coded as defined in TS 25.331 [4].
>GANSS-ID-3				This choice may be present if GANSS ID indicated "GLONASS"
>>**Aux Info List**		*1 .. <maxGANSSSat>*		
>>>Sat ID	M		INTEGER(0..63)	Defined in TS 25.331 [4].
>>>Signals Available	M		BIT STRING(8)	Coded as defined in TS 25.331 [4].
>>>Channel Number	M		INTEGER (-7..13)	This field indicates the GLONASS carrier frequency number of the satellite identified by *Sat ID*, as defined in [28].

Table 192

Range Bound	Explanation
maxGANSSSat	Maximum number of GANSS satellites for which data is included in this IE. The value of maxGANSSSat is 64.

9.2.2.136 UTRAN-GANSS Reference Time Result

Table 193

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE GANSS timing of cell frames	M		INTEGER(0..345599999999,…)	GANSS Time of Day in steps of 250 ns TS 25.331 [4].
GANSS time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.
GANSS TOD Uncertainty	O		INTEGER(0..127)	Coded as defined in TS 25.331 [4].
UC-ID	M		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GANSS TOD-SFN relationship.
SFN	M		INTEGER (0..4095)	This IE indicates the SFN at which the UE timing of cell frame is captured.

9.2.2.137 GANSS Additional Ionospheric Model Request

Table 194

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Data ID	M		BIT STRING(2)	Data ID for GANSS Additional Ionospheric Model as defined in TS 25.331 [4].

9.2.2.138 GANSS Earth Orientation Parameters Request

Table 195

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Earth Orientation Parameters Request	M		ENUMERATED(Requested, Not-Requested)	

9.2.2.139 Support for Non-Native Assistance Choices Indication

Table 196

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Support for Non-Native Assistance Choices Indication	M		BOOLEAN	TRUE means supported.

9.2.2.140 Position Data UE-Based

Table 197

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Position Data UE-Based	M		Bit String(16)	For each bit, if set to '1' indicates that respective GNSS or position system was used by the UE for position calculation. Coded as defined in TS 25.331 [4].

9.2.2.141 GANSS Code Phase Ambiguity Extension

Table 198

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Code Phase Ambiguity Extension	M		INTEGER(32..127)	In milliseconds. Defined in TS 25.331 [4].

9.2.2.142 GANSS Integer Code Phase Extension

Table 199

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Integer Code Phase Extension	M		INTEGER(64..127)	In milliseconds. Defined in TS 25.331 [4].

9.2.2.143 GANSS Carrier-Phase Measurement Requested

Table 200

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Carrier-Phase Measurement Requested	M		BIT STRING(8)	For each bit, if set to '1', indicates that the UE is requested to report carrier phase measurements for the respective GANSS. Bit 1 is the MSB and bit 8 is the LSB (see clause 9.2.1). bit 1: Galileo bit 2: SBAS bit 3: Modernized GPS bit 4: QZSS bit 5: GLONASS bits 6-8: reserved for future GANSS.

9.2.2.144 GANSS Multi-frequency Measurement Requested

Table 201

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Multi-frequency Measurement Requested	M		BIT STRING(8)	For each bit, if set to '1', indicates that the UE is requested to report measurements for multiple GANSS signals for the respective GANSS. Bit 1 is the MSB and bit 8 is the LSB (see clause 9.2.1). bit 1: Galileo bit 2: SBAS bit 3: Modernized GPS bit 4: QZSS bit 5: GLONASS bits 6-8: reserved for future GANSS.

9.2.2.145 GANSS Additional Ionospheric Model Required

Table 202

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Data ID	M		BIT STRING(2)	Data ID for GANSS Additional Ionospheric Model as defined in the *UE positioning GANSS additional assistance data request* IE of TS 25.331 [4].

9.2.2.146 GANSS Earth Orientation Parameters Required

Table 203

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Earth Orientation Parameters Required	M		BOOLEAN	TRUE means required.

9.2.2.147 GANSS Additional Navigation Models Required

Table 204

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Additional Navigation Models Required	M		BOOLEAN	TRUE means required.

9.2.2.148 GANSS Additional UTC Models Required

Table 205

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Additional UTC Models Required	M		BOOLEAN	TRUE means required.

9.2.2.149 GANSS Auxiliary Information Required

Table 206

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Auxiliary Information Required	M		BOOLEAN	TRUE means required.

9.2.2.150 SBAS IDs

This IE defines multiple SBASs.

Table 207

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SBAS IDs	M		BIT STRING(8)	Each bit represents one SBAS as defined in TS 25.331 [4], subclause 10.3.3.45.

9.2.2.151 GANSS Additional Assistance Data Choices

Table 208

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Additional Assistance Data Choices		*1*		
>Orbit Model ID	O		INTEGER(0..7)	Coded as defined in the *UE positioning GANSS additional assistance data request* IE of TS 25.331 [4].
>Clock Model ID	O		INTEGER(0..7)	Coded as defined in the *UE positioning GANSS additional assistance data request* IE of TS 25.331 [4].
>UTC Model ID	O		INTEGER(0..7)	Coded as defined in the *UE positioning GANSS additional assistance data request* IE of TS 25.331 [4].
>Almanac Model ID	O		INTEGER(0..7)	Coded as defined in the *UE positioning GANSS additional assistance data request* IE of TS 25.331 [4].

9.2.2.152 Cell-ID Measured Results Sets

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

Table 209

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Cell-ID Measured Results Sets		*1..<maxNoOfMeasurements>*		
>Cell-ID Measured Results Info List	M		9.2.2.31	For SAS-centric mode.

Table 209A

Range Bound	Explanation
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.

9.2.2.153 OTDOA Reference Cell Info SAS-centric mode

Table 210

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UC-ID	M		9.2.2.37	The identifier of the reference cell for the SFN-SFN Observed Time Difference Type 2 measurements.

9.2.2.154 DGNSS Validity Period

This IE defines the validity period of the GNSS differential corrections provided in *DGPS corrections* and *DGANSS corrections* IEs

Table 211

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UDRE Growth Rate	M		Enumerated(UDRE growth 1.5, UDRE growth 2, UDRE growth 4, UDRE growth 6, UDRE growth 8, UDRE growth 10, UDRE growth 12, UDRE growth 16)	This field provides an estimate of the growth rate of uncertainty (1-σ) in the corrections. The UDRE at time value specified in the *Time of Validity for UDRE Growth Rate* field is the value of this field times the value of UDRE provided in *DGPS Corrections* or *DGANSS corrections* IE (TS 25.331 [4]).
Time of Validity for UDRE Growth Rate	M		Enumerated(val20sec, val40sec, val80sec, val160sec, val320sec, val640sec, val1280sec, val2560sec)	This field specifies the time when the *UDRE Growth Rate* field applies (TS 25.331 [4]).

9.2.2.155 IRAT Measured Results Info List

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

Table 212

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Cell-ID IRAT Measured Results Info				
>**GERAN Measured Results Info**	O			
>>**GERAN Measured Results**	M	*1 to <maxReportedGERANCells>*		
>>GERAN Cell Global Identity	O		9.2.2.156	
>>>GERAN PCI		*1*		
>>>>bsic	M		9.2.2.157	
>>>>arfcn	M		INTEGER (0..1023)	TS 45.005 [29]
>>>GSM RSSI	M		INTEGER (0..63)	RXLEV is mapped to a value between 0 and 63, TS 45.008 [30].

Table 212A

Range bound	Explanation
maxReportedGERANCells	Maximum number of GERAN neighbour cells. The value of maxReportedGERANCells is 6.

9.2.2.156 GERAN Cell Global Identity

Table 213

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PLMN Identity	M		OCTET STRING (SIZE (3))	- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n -The PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC).
LAC	M		INTEGER(0..65535)	Location Area Code
CI	M		INTEGER(0..65535)	Cell Identifiier

9.2.2.157 GSM BSIC

Table 214

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Network Colour Code (NCC)	M		BIT STRING (3)	The first/leftmost bit of the bit string contains the most significant bit of the NCC.
Base Station Colour Code (BCC)	M		BIT STRING (3)	The first/leftmost bit of the bit string contains the most significant bit of the BCC.

9.2.2.158 IMSI

This information element identifies the International Mobile Subscriber Identity of the target UE (see TS 25.413 [32]).

Table 215

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
IMSI	M		OCTET STRING (SIZE (3..8))	- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bit 4 to 1 of octet n encoding digit 2n-1 - bit 8 to 5 of octet n encoding digit 2n -Number of decimal digits shall be from 6 to 15 starting with the digits from the PLMN identity. When the IMSI is made of an odd number of digits, the filler digit shall be added at the end to make an even number of digits of length 2N. The filler digit shall then be consequently encoded as bit 8 to 5 of octet N.

9.2.2.159 IMEI

This information element identifies the International Mobile Station Equipment Identity of the target UE (see TS 25.413 [32])

Table 216

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
IMEI	M		OCTET STRING (SIZE (8))	- hexadecimal digits 0 to F, two hexadecimal digits per octet, - each hexadecimal digit encoded 0000 to 1111, - 1111 used as filler for bits 8 to 5 of last octet - bit 4 to 1 of octet n encoding digit 2n-1 - bit 8 to 5 of octet n encoding digit 2n Number of hexadecimal digits shall be 15.

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

9.3.0 General

PCAP ASN.1 definition conforms with ITU-T Rec. X.680 [7], ITU-T Rec. X.681 [8], and ITU-T Rec. X.691 [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,
	AdditionalGPSAssistDataRequired,
	AdditionalGanssAssistDataRequired,
	OTDOA-ReferenceCellInfoSAS-centric,
	CellId-IRATMeasuredResultsSets,
	IMSI,
	IMEI

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,
	id-AdditionalGPSAssistDataRequired,
	id-AdditionalGanssAssistDataRequired,
	id-OTDOA-ReferenceCellInfo,
	id-CellId-IRATMeasuredResultsSets,
```

```
			id-IMSI,
	id-IMEI


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 } |
	{ ID id-CellId-IRATMeasuredResultsSets	CRITICALITY ignore	EXTENSION CellId-IRATMeasuredResultsSets PRESENCE optional } |
	{ ID id-IMSI							CRITICALITY ignore	EXTENSION IMSI									PRESENCE optional } |
	{ ID id-IMEI							CRITICALITY ignore	EXTENSION IMEI									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
    { ID id-IMSI                            CRITICALITY ignore  EXTENSION IMSI
        PRESENCE optional } |
    { ID id-IMEI                            CRITICALITY ignore  EXTENSION IMEI
        PRESENCE optional },
    ...
}

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 mandatory }
}

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 }|
    { ID id-IMSI                        CRITICALITY ignore  EXTENSION IMSI                      PRESENCE optional }|
    { ID id-IMEI                        CRITICALITY ignore  EXTENSION IMEI                      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 } |
	{ ID id-AdditionalGPSAssistDataRequired		CRITICALITY ignore	EXTENSION AdditionalGPSAssistDataRequired		PRESENCE optional } |
	{ ID id-AdditionalGanssAssistDataRequired	CRITICALITY ignore	EXTENSION AdditionalGanssAssistDataRequired		PRESENCE optional } |
	{ ID id-OTDOA-ReferenceCellInfo			CRITICALITY reject	EXTENSION OTDOA-ReferenceCellInfoSAS-centric	PRESENCE optional } |
	{ ID id-CellId-IRATMeasuredResultsSets		CRITICALITY ignore	EXTENSION CellId-IRATMeasuredResultsSets		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 } |
    { ID id-AdditionalGPSAssistDataRequired        CRITICALITY ignore  EXTENSION AdditionalGPSAssistDataRequired             PRESENCE optional } |
    { ID id-AdditionalGanssAssistDataRequired      CRITICALITY ignore  EXTENSION AdditionalGanssAssistDataRequired           PRESENCE optional } |
    { ID id-OTDOA-ReferenceCellInfo                CRITICALITY reject  EXTENSION OTDOA-ReferenceCellInfoSAS-centric    PRESENCE optional } |
    { ID id-CellId-IRATMeasuredResultsSets         CRITICALITY ignore  EXTENSION CellId-IRATMeasuredResultsSets              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,
	maxGANSSSatAlmanac,
	maxGANSSClockMod,
	maxGANSS-1,
	maxNrOfIRATMeasurements,
	maxReportedGERANCells,


	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-NetworkAssistedGANSSSuport,
```

```
            id-TUTRANGANSSMeasurementValueInfo,
    id-angleOfArrivalLCR,
    id-extendedTimingAdvanceLCR,
    id-additionalMeasurementInforLCR,
    id-timingAdvanceLCR-R7,
    id-rxTimingDeviationLCR,
    id-GPSReferenceTimeUncertainty,
    id-GANSS-AddIonoModelReq,
    id-GANSS-EarthOrientParaReq,
    id-GANSS-Additional-Ionospheric-Model,
    id-GANSS-Earth-Orientation-Parameters,
    id-GANSS-Additional-Time-Models,
    id-GANSS-Additional-Navigation-Models,
    id-GANSS-Additional-UTC-Models,
    id-GANSS-Auxiliary-Information,
    id-GANSS-SBAS-ID,
    id-GANSS-SBAS-IDs,
    id-GANSS-Signal-IDs,
    id-GANSS-alm-keplerianNAVAlmanac,
    id-GANSS-alm-keplerianReducedAlmanac,
    id-GANSS-alm-keplerianMidiAlmanac,
    id-GANSS-alm-keplerianGLONASS,
    id-GANSS-alm-ecefSBASAlmanac,
    id-UTRAN-GANSSReferenceTimeResult,
    id-GANSS-Reference-Time-Only,
    id-GANSS-AddADchoices,
    id-supportGANSSNonNativeADchoices,
    id-PositionDataUEbased,
    id-ganssCodePhaseAmbiguityExt,
    id-ganssIntegerCodePhaseExt,
    id-GANSScarrierPhaseRequested,
    id-GANSSMultiFreqMeasRequested,
    id-ganssReq-AddIonosphericModel,
    id-ganssReq-EarthOrientPara,
    id-ganssAddNavigationModel-req,
    id-ganssAddUTCModel-req,
    id-ganssAuxInfo-req,
    id-GANSS-AlmanacModelChoice,
    id-DGNSS-ValidityPeriod,
    id-AzimuthAndElevationLSB,
    id-completeAlmanacProvided,
    id-GPS-Week-Cycle,
    id-GANSS-Day-Cycle,
    id-ganss-Delta-T,
    id-requestedCellIDGERANMeasurements


FROM PCAP-Constants

    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
```

```
			TransactionID,
	TriggeringMessage

FROM PCAP-CommonDataTypes

	ProtocolExtensionContainer{},
	ProtocolIE-Single-Container{},
	PCAP-PROTOCOL-EXTENSION,
	PCAP-PROTOCOL-IES

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,
	ue-positioning-error-Assistance-Data-missing,
	position-calculation-error-invalid-GLONASS-measured-results,
	position-calculation-error-invalid-GANSS-measured-results,
```

```
            position-calculation-error-AGANSS-positioning-method-not-      supported,
    ue-positioning-error-Not-enough-GANSS-Satellites,
    ue-positioning-error-Not-Accomplished-GANSS-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 }|
	{ ID id-angleOfArrivalLCR			CRITICALITY ignore	EXTENSION AngleOfArrivalLCR					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,
	 -- The content of this IE shall be ignored if the id-extendedTimingAdvanceLCR IE is present.
	iE-Extensions						ProtocolExtensionContainer { { RxTimingDeviationLCRInfo-ExtIEs } }			OPTIONAL,
	...
}

RxTimingDeviationLCRInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
{ ID id-extendedTimingAdvanceLCR	CRITICALITY ignore	EXTENSION ExtendedTimingAdvanceLCR					PRESENCE optional }, -- 1.28Mcps TDD only
	...
}

ExtendedTimingAdvanceLCR ::=			INTEGER (2048..8191)

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 ::= {
	...
}

AngleOfArrivalLCR ::=				SEQUENCE {
	aOA-LCR							AOA-LCR,
	aOA-LCR-Accuracy-Class			AOA-LCR-Accuracy-Class,
	iE-Extensions					ProtocolExtensionContainer { { AngleOfArrivalLCR-ExtIEs } }			OPTIONAL,
	...
}

AngleOfArrivalLCR-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 the Cell measured results IE of TS 25.331 [4]

CPICH-EcNo ::=                          INTEGER (0..49)
-- According to CPICH_Ec/No in TS 25.133 [13]

CPICH-RSCP ::=                          INTEGER (-5..91)
-- According to CPICH_RSCP in TS 25.133 [13]

AOA-LCR ::=                             INTEGER (0..719)-- According to mapping in TS 25.123 [14]

AOA-LCR-Accuracy-Class ::=              ENUMERATED {
                                            a,b,c,d,e,f,g,h, ...}

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

CellId-IRATMeasuredResultsSets ::=      SEQUENCE (SIZE (1..maxNrOfIRATMeasurements)) OF
    CellId-IRATMeasuredResultsInfoList

CellId-IRATMeasuredResultsInfoList ::=  SEQUENCE {
    gERAN-MeasuredResultsInfoList       GERAN-MeasuredResultsInfoList
    OPTIONAL,
    iE-Extenstions                      ProtocolExtensionContainer { { CellId-IRATMeasuredResultsInfoListExtIEs }}      OPTIONAL,
    ...
}

CellId-IRATMeasuredResultsInfoListExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GERAN-MeasuredResultsInfoList ::=       SEQUENCE (SIZE (1..maxReportedGERANCells)) OF
    GERAN-MeasuredResultsInfo

GERAN-MeasuredResultsInfo ::=           SEQUENCE {
    gERANCellID                         GERANCellGlobalID                                                               OPTIONAL,
    gERANPhysicalCellID                 GERANPhysicalCellID,
    gSM-RSSI                            GSM-RSSI,
    iE-Extenstions                      ProtocolExtensionContainer { { GERAN-MeasuredResultsInfo-ExtIEs }} OPTIONAL,
    ...
}

GERAN-MeasuredResultsInfo-ExtIEs        PCAP-PROTOCOL-EXTENSION ::= {
    ...
```

```
	}

GERANCellGlobalID ::=				SEQUENCE {
	plmn-Identity					PLMN-Identity,		--As defined in TS 23.003
	locationAreaCode				BIT STRING (SIZE (16)),
	cellIdentity					BIT STRING (SIZE (16)),
	iE-Extenstions					ProtocolExtensionContainer { { GERANCellGlobalID-ExtIEs }}				OPTIONAL,
	...
}

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

PLMN-Identity ::=					OCTET STRING (SIZE (3))


GSM-RSSI ::=						INTEGER (0..63)

GERANPhysicalCellID ::=				SEQUENCE {
	bsic							GSM-BSIC,
	arfcn							GSM-BCCH-ARFCN
}

GSM-BSIC ::=						SEQUENCE {
	networkColourCode				BIT STRING (SIZE (3)),
	baseStationColourCode			BIT STRING (SIZE (3))
}

GSM-BCCH-ARFCN ::=					INTEGER (0..1023)

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

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

CellIDPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	{ ID id-requestedCellIDGERANMeasurements	CRITICALITY reject	EXTENSION RequestedCellIDGERANMeasurements	PRESENCE optional },
	...
}

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,
			angleOfArrivalLCRWanted			BOOLEAN,
			timingAdvanceLCRWanted			BOOLEAN,
			iE-Extensions					ProtocolExtensionContainer	{ { RequestedCellIDMeasurementsTDD-ExtIEs } } OPTIONAL,
			...
			},
	...
}

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

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

RequestedCellIDGERANMeasurements ::= SEQUENCE {
	rSSIMeasurementsWanted	BOOLEAN,
	iE-Extensions			ProtocolExtensionContainer { { RequestedCellIDGERANMeasurements-ExtIEs} }	OPTIONAL,
	...
}

RequestedCellIDGERANMeasurements-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 ::= {
    {ID id-DGNSS-ValidityPeriod CRITICALITY ignore  EXTENSION   DGNSS-ValidityPeriod    PRESENCE  optional},
    ...
}

DGNSS-ValidityPeriod ::=            SEQUENCE {
    udreGrowthRate                      UDREGrowthRate,
    udreValidityTime                    UDREValidityTime,
    iE-Extensions                       ProtocolExtensionContainer { { DGNSS-ValidityPeriod-ExtIEs } }          OPTIONAL,
    ...
}

DGNSS-ValidityPeriod-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

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

UDREGrowthRate ::=					ENUMERATED {
								growth-1-point-5,
								growth-2,
								growth-4,
								growth-6,
								growth-8,
								growth-10,
								growth-12,
								growth-16	}

UDREValidityTime	::=				ENUMERATED {
									val-20sec,
									val-40sec,
									val-80sec,
									val-160sec,
									val-320sec,
									val-640sec,
									val-1280sec,
									val-2560sec }

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

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

-- **************************************************************
--
-- IMEI, IMSI
--
-- **************************************************************

-- IMEI

IMEI ::=	OCTET STRING (SIZE (3..8))

-- IMSI

IMSI ::=	OCTET STRING (SIZE (8))


-- **************************************************************
--
-- 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 ::= {
    {ID id-GPSReferenceTimeUncertainty  CRITICALITY ignore  EXTENSION GPSReferenceTimeUncertainty        PRESENCE optional}|
    {ID id-PositionDataUEbased          CRITICALITY ignore  EXTENSION PositionDataUEbased                PRESENCE optional},
    ...
}

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

Extension-ReferenceTimeChoice ::= ProtocolIE-Single-Container {{ Extension-ReferenceTimeChoice-IE }}

Extension-ReferenceTimeChoice-IE PCAP-PROTOCOL-IES ::= {
    { ID id-UTRAN-GANSSReferenceTimeResult          CRITICALITY     ignore      TYPE    UTRAN-GANSSReferenceTimeResult          PRESENCE
    mandatory}|
    { ID id-GANSS-Reference-Time-Only               CRITICALITY     ignore      TYPE    GANSS-Reference-Time-Only                           PRESENCE
    mandatory}
```

```
        }


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

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

GANSS-Reference-Time-Only ::= SEQUENCE {
    ganssTODmsec    INTEGER (0..3599999),
    ganssTimeID     GANSSID                                                   OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { { GANSS-Reference-Time-Only-ExtIEs } } OPTIONAL,
    ...
}

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

PositionDataUEbased ::= SEQUENCE {
    positionData    BIT STRING (SIZE(16)),
    iE-Extensions   ProtocolExtensionContainer { { PositionDataUEbased-ExtIEs } }   OPTIONAL,
    ...
}

PositionDataUEbased-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-1msec                       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} |
    {ID id-GPSReferenceTimeUncertainty  CRITICALITY ignore  EXTENSION   GPSReferenceTimeUncertainty     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 ::= {
    {ID id-AzimuthAndElevationLSB       CRITICALITY ignore  EXTENSION   AzimuthAndElevationLSB  PRESENCE optional},
    ...
}

AzimuthAndElevationLSB ::=          SEQUENCE {
    azimuthLSB                          INTEGER (0..15),
    elevationLSB                        INTEGER (0..15),
    iE-Extensions                       ProtocolExtensionContainer { { AzimuthAndElevationLSB-ExtIEs } } OPTIONAL,
    ...
}

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

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

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

AuxInfoGANSS-ID1 ::= SEQUENCE (SIZE(1.. maxGANSSSat)) OF AuxInfoGANSS-ID1-element

AuxInfoGANSS-ID1-element ::= SEQUENCE {
    svID                INTEGER(0..63),
    signalsAvailable    BIT STRING (SIZE(8)),
    ie-Extensions       ProtocolExtensionContainer { { AuxInfoGANSS-ID1-element-ExtIEs } }  OPTIONAL,
    ...
}

AuxInfoGANSS-ID1-element-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

AuxInfoGANSS-ID3 ::= SEQUENCE (SIZE(1.. maxGANSSSat)) OF AuxInfoGANSS-ID3-element

AuxInfoGANSS-ID3-element  ::= SEQUENCE {
    svID                INTEGER(0..63),
    signalsAvailable    BIT STRING (SIZE(8)),
    channelNumber       INTEGER (-7..13),
    ie-Extensions       ProtocolExtensionContainer { { AuxInfoGANSS-ID3-element-ExtIEs } }  OPTIONAL,
    ...
}

AuxInfoGANSS-ID3-element-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

CNAVclockModel ::= SEQUENCE {
    cnavToc             BIT STRING (SIZE (11)),
    cnavTop             BIT STRING (SIZE (11)),
    cnavURA0            BIT STRING (SIZE (5)),
    cnavURA1            BIT STRING (SIZE (3)),
    cnavURA2            BIT STRING (SIZE (3)),
    cnavAf2             BIT STRING (SIZE (10)),
    cnavAf1             BIT STRING (SIZE (20)),
    cnavAf0             BIT STRING (SIZE (26)),
    cnavTgd             BIT STRING (SIZE (13)),
    cnavISCl1cp         BIT STRING (SIZE (13))                                      OPTIONAL,
    cnavISCl1cd         BIT STRING (SIZE (13))                                      OPTIONAL,
    cnavISCl1ca         BIT STRING (SIZE (13))                                      OPTIONAL,
    cnavISCl2c          BIT STRING (SIZE (13))                                      OPTIONAL,
    cnavISCl5i5         BIT STRING (SIZE (13))                                      OPTIONAL,
    cnavISCl5q5         BIT STRING (SIZE (13))                                      OPTIONAL,
    ie-Extensions       ProtocolExtensionContainer { { CNAVclockModel-ExtIEs } }    OPTIONAL,
    ...
}
```

```
        CNAVclockModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DeltaUT1 ::= SEQUENCE {
    b1                  BIT STRING (SIZE(11)),
    b2                  BIT STRING (SIZE(10)),
    ie-Extensions       ProtocolExtensionContainer { { DeltaUT1-ExtIEs } }  OPTIONAL,
    ...
}

DeltaUT1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

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                      GANSS-SignalID                                                          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


DGANSS-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 { { DGANSS-SignalInformationItem-ExtIEs } }     OPTIONAL,
```

```
		...
}

DGANSS-SignalInformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	{ID id-DGNSS-ValidityPeriod		CRITICALITY ignore	EXTENSION DGNSS-ValidityPeriod		PRESENCE optional},
	...
}

GANSS-AddClockModels ::= CHOICE {
	navClockModel				NAVclockModel,
	cnavClockModel				CNAVclockModel,
	glonassClockModel			GLONASSclockModel,
	sbasClockModel				SBASclockModel,
	...
	}

GANSS-AddOrbitModels ::= CHOICE {
	navKeplerianSet				NavModel-NAVKeplerianSet,
	cnavKeplerianSet			NavModel-CNAVKeplerianSet,
	glonassECEF					NavModel-GLONASSecef,
	sbasECEF					NavModel-SBASecef,
	...
	}

GANSS-Additional-Ionospheric-Model ::= SEQUENCE {
	dataID							BIT STRING (SIZE(2)),
	alpha-beta-parameters			GPS-Ionospheric-Model,
	ie-Extensions					ProtocolExtensionContainer { { GANSS-Additional-Ionospheric-Model-ExtIEs } }	OPTIONAL,
	...
}

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

GANSS-Additional-Navigation-Models ::= SEQUENCE {
	non-broadcastIndication		ENUMERATED { true }									OPTIONAL,
	ganssSatInfoNavList			Ganss-Sat-Info-AddNavList,
	ie-Extensions				ProtocolExtensionContainer { { GANSS-Additional-Navigation-Models-ExtIEs } } OPTIONAL,
	...
}

GANSS-Additional-Navigation-Models-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}
```

```
        GANSS-Additional-Time-Models ::= SEQUENCE (SIZE (1..maxGANSS-      1)) OF GANSS-Time-Model

GANSS-Additional-UTC-Models ::= CHOICE {
    utcModel1           UTCmodelSet1,
    utcModel2           UTCmodelSet2,
    utcModel3           UTCmodelSet3,
    ...
}

GANSS-ALM-ECEFsbasAlmanacSet ::= SEQUENCE {
    sat-info-SBASecefList       GANSS-SAT-Info-Almanac-SBASecefList,
    ie-Extensions               ProtocolExtensionContainer { { GANSS-ALM-ECEFsbasAlmanacSet-ExtIEs } }                  OPTIONAL,
    ...
}

GANSS-ALM-ECEFsbasAlmanacSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


GANSS-ALM-GlonassAlmanacSet ::= SEQUENCE {
    sat-info-GLOkpList          GANSS-SAT-Info-Almanac-GLOkpList,
    ie-Extensions               ProtocolExtensionContainer { { GANSS-ALM-GlonassAlmanacSet-ExtIEs } }                   OPTIONAL,
    ...
}

GANSS-ALM-GlonassAlmanacSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


GANSS-ALM-MidiAlmanacSet ::= SEQUENCE {
    t-oa                        INTEGER (0..255),
    sat-info-MIDIkpList         GANSS-SAT-Info-Almanac-MIDIkpList,
    ie-Extensions               ProtocolExtensionContainer { { GANSS-ALM-MidiAlmanacSet-ExtIEs } }                      OPTIONAL,
    ...
}

GANSS-ALM-MidiAlmanacSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-ALM-NAVKeplerianSet ::= SEQUENCE {
    t-oa                        INTEGER (0..255),
    sat-info-NAVkpList          GANSS-SAT-Info-Almanac-NAVkpList,
    ie-Extensions               ProtocolExtensionContainer { { GANSS-ALM-NAVKeplerianSet-ExtIEs } }                     OPTIONAL,
```

```
		...
}

GANSS-ALM-NAVKeplerianSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}


GANSS-ALM-ReducedKeplerianSet ::= SEQUENCE {
	t-oa						INTEGER (0..255),
	sat-info-REDkpList			GANSS-SAT-Info-Almanac-REDkpList,
	ie-Extensions				ProtocolExtensionContainer { { GANSS-ALM-ReducedKeplerianSet-ExtIEs } }					OPTIONAL,
	...
}

GANSS-ALM-ReducedKeplerianSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

GANSS-AlmanacAndSatelliteHealth ::= SEQUENCE {
	weekNumber				INTEGER(0..255),
	gANSS-AlmanacModel		GANSS-AlmanacModel,
	ie-Extensions			ProtocolExtensionContainer { { GANSS-AlmanacAndSatelliteHealth-ExtIEs } }					OPTIONAL,
	...
}

GANSS-AlmanacAndSatelliteHealth-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	{ID id-completeAlmanacProvided		CRITICALITY ignore	EXTENSION	CompleteAlmanacProvided PRESENCE optional},
	...
}

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

Extension-GANSS-AlmanacModel ::= ProtocolIE-Single-Container {{ Extension-GANSS-AlmanacModel-IE }}


Extension-GANSS-AlmanacModel-IE PCAP-PROTOCOL-IES ::= {
	{ ID id-GANSS-alm-keplerianNAVAlmanac			CRITICALITY	ignore		TYPE	GANSS-ALM-NAVKeplerianSet						PRESENCE 
	mandatory}|
	{ ID id-GANSS-alm-keplerianReducedAlmanac		CRITICALITY	ignore		TYPE	GANSS-ALM-ReducedKeplerianSet			PRESENCE 
	mandatory}|
	{ ID id-GANSS-alm-keplerianMidiAlmanac			CRITICALITY	ignore		TYPE	GANSS-ALM-MidiAlmanacSet						PRESENCE 
	mandatory}|
```

```
			{ ID id-GANSS-alm-keplerianGLONASS			CRITICALITY		ignore		TYPE	GANSS-ALM-GlonassAlmanacSet				PRESENCE		mand
	{ ID id-GANSS-alm-ecefSBASAlmanac			CRITICALITY		ignore		TYPE	GANSS-ALM-ECEFsbasAlmanacSet			PRESENCE
	mandatory}
}



GANSS-Auxiliary-Information ::= CHOICE {
	ganssID1	AuxInfoGANSS-ID1,	-- This choice may only be present if GANSS ID indicates Modernized GPS
	ganssID3	AuxInfoGANSS-ID3,	-- This choice may only be present if GANSS ID indicates GLONASS
	...
}

GANSS-AzimuthAndElevation ::= SEQUENCE {
	azimuth						INTEGER(0..31),
	-- applicable range of elevation is 0..7. Values 8-75 shall not be used.
	elevation					INTEGER(0..75),
	ie-Extensions				ProtocolExtensionContainer { { GANSS-AzimuthAndElevation-ExtIEs } }				OPTIONAL,
	...
}

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

GANSS-Clock-Model ::= SEQUENCE (SIZE (1..maxGANSSClockMod)) 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 ::= {
	{ ID id-GANSS-Additional-Ionospheric-Model		CRITICALITY ignore	EXTENSION GANSS-Additional-Ionospheric-Model		PRESENCE optional }|
	{ ID id-GANSS-Earth-Orientation-Parameters		CRITICALITY ignore	EXTENSION GANSS-Earth-Orientation-Parameters		PRESENCE optional },
	...
}


GANSS-Data-Bit-Assistance ::= SEQUENCE {
	ganssTod							INTEGER (0..59,...),
	dataBitAssistancelist				GANSS-DataBitAssistanceList,
	ie-Extensions						ProtocolExtensionContainer { { GANSS-Data-Bit-Assistance-ExtIEs } }		OPTIONAL,
```

```
		...
}

GANSS-Data-Bit-Assistance-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

GANSS-DataBitAssistanceList ::= SEQUENCE (SIZE (1..maxGANSSSat)) OF GANSS-DataBitAssistanceItem

GANSS-DataBitAssistanceItem ::= SEQUENCE {
	satId						INTEGER(0..63),
	dataBitAssistanceSgnList		GANSS-DataBitAssistanceSgnList,
	ie-Extensions				ProtocolExtensionContainer { { GANSS-DataBitAssistanceItem-ExtIEs } }		OPTIONAL,
	...
}

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

GANSS-DataBitAssistanceSgnList ::= SEQUENCE (SIZE (1..maxSgnType)) OF GANSS-DataBitAssistanceSgnItem


GANSS-DataBitAssistanceSgnItem ::= SEQUENCE {
	ganss-SignalId			GANSS-SignalID,
	ganssDataBits			BIT STRING (SIZE (1..1024)),
	ie-Extensions			ProtocolExtensionContainer { { GANSS-DataBitAssistanceSgnItem-ExtIEs } }		OPTIONAL,
	...
}

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

GANSS-Earth-Orientation-Parameters ::= SEQUENCE {
	teop				BIT STRING (SIZE (16)),
	pmX				BIT STRING (SIZE (21)),
	pmXdot			BIT STRING (SIZE (15)),
	pmY				BIT STRING (SIZE (21)),
	pmYdot			BIT STRING (SIZE (15)),
	deltaUT1			BIT STRING (SIZE (31)),
	deltaUT1dot		BIT STRING (SIZE (19)),
	ie-Extensions		ProtocolExtensionContainer { { GANSS-Earth-Orientation-Parameters-ExtIEs } }		OPTIONAL,
	...
}

GANSS-Earth-Orientation-Parameters-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                         GANSSID                                                         OPTIONAL,
    ganss-Real-Time-Integrity       GANSS-Real-Time-Integrity                                       OPTIONAL,
    ganss-DataBitAssistance         GANSS-Data-Bit-Assistance                                       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 ::= {
    { ID id-GANSS-Additional-Time-Models          CRITICALITY ignore  EXTENSION GANSS-Additional-Time-Models              PRESENCE optional }|
    { ID id-GANSS-Additional-Navigation-Models    CRITICALITY ignore  EXTENSION GANSS-Additional-Navigation-Models    PRESENCE optional }|
    { ID id-GANSS-Additional-UTC-Models           CRITICALITY ignore  EXTENSION GANSS-Additional-UTC-Models                      PRESENCE
optional }|
    { ID id-GANSS-Auxiliary-Information           CRITICALITY ignore  EXTENSION GANSS-Auxiliary-Information                      PRESENCE
optional }|
    -- the following IE shall be present if 'GANSSID' in 'GANSSGenericAssistanceData' is '0' (SBAS)
    { ID id-GANSS-SBAS-ID                         CRITICALITY ignore  EXTENSION GANSS-SBAS-ID                         PRESENCE optional },
    ...
}

GANSS-GenericMeasurementInfo ::= SEQUENCE(SIZE(1..maxGANSS)) OF SEQUENCE {
    ganssId                     GANSSID                                                                 OPTIONAL,
    ganssMeasurementSignalList  GANSSMeasurementSignalList,
    ie-Extensions               ProtocolExtensionContainer { { GANSS-GenericMeasurementInfo-ExtIEs } }   OPTIONAL,
    ...
}

GANSS-GenericMeasurementInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
```

```
		...
}

GANSSID ::= SEQUENCE {
	ganss-ID			INTEGER(0..7),
	ie-Extensions		ProtocolExtensionContainer { { GANSSID-ExtIEs } } OPTIONAL,
	...
}

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

GANSSMeasurementSignalList ::= SEQUENCE (SIZE (1..maxSgnType)) OF SEQUENCE {
	ganssSignalId					GANSS-SignalID					OPTIONAL,
	ganssCodePhaseAmbiguity			INTEGER (0..31)					OPTIONAL,
	ganssMeasurementParameters		GANSS-MeasurementParameters,
	ie-Extensions					ProtocolExtensionContainer { { GANSSMeasurementSignalList-ExtIEs } }	OPTIONAL,
	...

}

GANSSMeasurementSignalList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	{ID id-ganssCodePhaseAmbiguityExt	CRITICALITY ignore	EXTENSION	GanssCodePhaseAmbiguityExt PRESENCE		optional},
	...
}

GanssCodePhaseAmbiguityExt ::= SEQUENCE {
	ganssCodePhaseAmbiguity-ext		INTEGER (32..127),
	ie-Extensions					ProtocolExtensionContainer { { GanssCodePhaseAmbiguityExt-ExtIEs } }			OPTIONAL,
	...
}

GanssCodePhaseAmbiguityExt-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-nav								BIT STRING (SIZE (14)),
	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-nav							BIT STRING (SIZE (32)),
	idot-nav							BIT STRING (SIZE (14)),
	a-sqrt-nav							BIT STRING (SIZE (32)),
	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),
	cToNzero					INTEGER(0..63),
	multipathIndicator			ENUMERATED{nM,low,medium,high},
	carrierQualityIndication	BIT STRING(SIZE(2))						OPTIONAL,
	ganssCodePhase				INTEGER(0..2097151),
	ganssIntegerCodePhase		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 ::= {
	{ID id-ganssIntegerCodePhaseExt CRITICALITY ignore  EXTENSION   GanssIntegerCodePhaseExt PRESENCE		optional},
	...
}

GanssIntegerCodePhaseExt ::= SEQUENCE {
	ganssIntegerCodePhase-ext		INTEGER (64..127),
	ie-Extensions					ProtocolExtensionContainer { { GanssIntegerCodePhaseExt-ExtIEs } }		OPTIONAL,
	...
}

GanssIntegerCodePhaseExt-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,
	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				BIT STRING(SIZE(8))						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               GANSS-SignalID                                                              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                 GANSSID                                                         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 ::= {
    {ID id-GANSS-Day-Cycle      CRITICALITY     ignore  EXTENSION   GANSS-Day-Cycle     PRESENCE optional},
    ...
}

GANSS-Day-Cycle         ::= INTEGER(0..7)

GANSS-ReferenceTimeOnly ::= SEQUENCE {
    gANSS-tod                   INTEGER(0..3599999),
    gANSS-timeId                GANSSID         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                            BIT STRING (SIZE(14)),
    a-i2                            BIT STRING (SIZE(12)),
    a-i1                            BIT STRING (SIZE(18)),
    a-i0                            BIT STRING (SIZE(28)),
    t-gd                            BIT STRING (SIZE(10))           OPTIONAL,
    model-id                        INTEGER(0..3)                   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            INTEGER(-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..maxGANSSSatAlmanac)) OF GANSS-SatelliteInformationKPItem


GANSS-SatelliteInformationKPItem ::= SEQUENCE {
    satId                           INTEGER(0..63),
    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-omegazero-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-SatelliteInformationKPItem-ExtIEs } }  OPTIONAL,
    ...
}

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

GANSS-SAT-Info-Almanac-GLOkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-GLOkp

GANSS-SAT-Info-Almanac-GLOkp ::= SEQUENCE {
    gloAlmNA                BIT STRING (SIZE(11)),
    gloAlmnA                BIT STRING (SIZE(5)),
    gloAlmHA                BIT STRING (SIZE(5)),
    gloAlmLambdaA           BIT STRING (SIZE(21)),
    gloAlmTlambdaA          BIT STRING (SIZE(21)),
    gloAlmDeltaIA           BIT STRING (SIZE(18)),
    gloAkmDeltaTA           BIT STRING (SIZE(22)),
    gloAlmDeltaTdotA        BIT STRING (SIZE(7)),
    gloAlmEpsilonA          BIT STRING (SIZE(15)),
    gloAlmOmegaA            BIT STRING (SIZE(16)),
    gloAlmTauA              BIT STRING (SIZE(10)),
    gloAlmCA                BIT STRING (SIZE(1)),
    gloAlmMA                BIT STRING (SIZE(2))
    OPTIONAL,
    ie-Extensions           ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-GLOkp-ExtIEs } }                 OPTIONAL,
    ...
}

GANSS-SAT-Info-Almanac-GLOkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SAT-Info-Almanac-MIDIkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-MIDIkp

GANSS-SAT-Info-Almanac-MIDIkp ::= SEQUENCE {
    svID                    INTEGER(0..63),
    midiAlmE                BIT STRING (SIZE (11)),
    midiAlmDeltaI           BIT STRING (SIZE (11)),
    midiAlmOmegaDot         BIT STRING (SIZE (11)),
    midiAlmSqrtA            BIT STRING (SIZE (17)),
    midiAlmOmega0           BIT STRING (SIZE (16)),
    midiAlmOmega            BIT STRING (SIZE (16)),
    midiAlmMo               BIT STRING (SIZE (16)),
    midiAlmaf0              BIT STRING (SIZE (11)),
    midiAlmaf1              BIT STRING (SIZE (10)),
    midiAlmL1Health         BIT STRING (SIZE (1)),
```

```
			midiAlmL2Health			BIT STRING (SIZE (1)),
	midiAlmL5Health			BIT STRING (SIZE (1)),
	ie-Extensions			ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-MIDIkp-ExtIEs } }					OPTIONAL,
	...
}

GANSS-SAT-Info-Almanac-MIDIkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

GANSS-SAT-Info-Almanac-NAVkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-NAVkp

GANSS-SAT-Info-Almanac-NAVkp ::= SEQUENCE {
	svID					INTEGER(0..63),
	navAlmE					BIT STRING (SIZE (16)),
	navAlmDeltaI			BIT STRING (SIZE (16)),
	navAlmOMEGADOT			BIT STRING (SIZE (16)),
	navAlmSVHealth			BIT STRING (SIZE (8)),
	navAlmSqrtA				BIT STRING (SIZE (24)),
	navAlmOMEGAo			BIT STRING (SIZE (24)),
	navAlmOmega				BIT STRING (SIZE (24)),
	navAlmMo				BIT STRING (SIZE (24)),
	navAlmaf0				BIT STRING (SIZE (11)),
	navAlmaf1				BIT STRING (SIZE (11)),
	ie-Extensions			ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-NAVkp-ExtIEs } }					OPTIONAL,
	...
}

GANSS-SAT-Info-Almanac-NAVkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

GANSS-SAT-Info-Almanac-REDkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-REDkp

GANSS-SAT-Info-Almanac-REDkp ::= SEQUENCE {
	svID					INTEGER(0..63),
	redAlmDeltaA			BIT STRING (SIZE (8)),
	redAlmOmega0			BIT STRING (SIZE (7)),
	redAlmPhi0				BIT STRING (SIZE (7)),
	redAlmL1Health			BIT STRING (SIZE (1)),
	redAlmL2Health			BIT STRING (SIZE (1)),
	redAlmL5Health			BIT STRING (SIZE (1)),
	ie-Extensions			ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-REDkp-ExtIEs } }					OPTIONAL,
	...
}

GANSS-SAT-Info-Almanac-REDkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
```

```
		...
}

GANSS-SAT-Info-Almanac-SBASecefList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-SBASecef

GANSS-SAT-Info-Almanac-SBASecef ::= SEQUENCE {
	sbasAlmDataID			BIT STRING (SIZE(2)),
	svID					INTEGER(0..63),
	sbasAlmHealth			BIT STRING (SIZE(8)),
	sbasAlmXg				BIT STRING (SIZE(15)),
	sbasAlmYg				BIT STRING (SIZE(15)),
	sbasAlmZg				BIT STRING (SIZE(9)),
	sbasAlmXgdot			BIT STRING (SIZE(3)),
	sbasAlmYgDot			BIT STRING (SIZE(3)),
	sbasAlmZgDot			BIT STRING (SIZE(4)),
	sbasAlmTo				BIT STRING (SIZE(11)),
	ie-Extensions			ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-SBASecef-ExtIEs } }			OPTIONAL,
	...
}

GANSS-SAT-Info-Almanac-SBASecef-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

Ganss-Sat-Info-AddNavList ::= SEQUENCE (SIZE (1..maxGANSSSat)) OF SEQUENCE {
	satId						INTEGER (0..63),
	svHealth					BIT STRING (SIZE (6)),
	iod							BIT STRING (SIZE (11)),
	ganssAddClockModels			GANSS-AddClockModels,
	ganssAddOrbitModels			GANSS-AddOrbitModels,
	ie-Extensions				ProtocolExtensionContainer { { Ganss-Sat-Info-AddNavList-ExtIEs } } OPTIONAL,
	...
}

Ganss-Sat-Info-AddNavList-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-SignalID ::= SEQUENCE {
    ganssSignalID       INTEGER(0..3,...,4..7),
    ie-Extensions       ProtocolExtensionContainer { { GANSS-SignalID-ExtIEs } } OPTIONAL,
    ...
}

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

GANSS-StatusHealth ::= ENUMERATED {
   udre-scale-1dot0,
   udre-scale-0dot75,
   udre-scale-0dot5,
   udre-scale-0dot3,
   udre-scale-Odot2,
   udre-scale-0dot1,
   no-data,
   invalid-data
}

GANSS-Time-Model ::= SEQUENCE {
    ganss-time-model-refTime            INTEGER(0..37799),
    ganss-t-a0                          INTEGER(-2147483648..2147483647),
    ganss-t-a1                          INTEGER(-8388608..8388607)                                          OPTIONAL,
    ganss-t-a2                          INTEGER(-64..63)                                                    OPTIONAL,
    gnss-to-id                          ENUMERATED{gps,...,galileo,qzss,glonass},
    ganss-wk-number                     INTEGER(0..8191)                                                    OPTIONAL,
    ie-Extensions                       ProtocolExtensionContainer { { GANSS-Time-Model-ExtIEs } }          OPTIONAL,
    ...
}

GANSS-Time-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-ganss-Delta-T        CRITICALITY     ignore  EXTENSION   GANSS-Delta-T       PRESENCE                    optional},
    ...
}

GANSS-Delta-T   ::= INTEGER(-128..127)

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										GANSSID
	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 } }			OPTIONAL,
	...
}

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,
```

```
        ...
}

GLONASSclockModel ::= SEQUENCE {
    gloTau                  BIT STRING (SIZE (22)),
    gloGamma                BIT STRING (SIZE (11)),
    gloDeltaTau             BIT STRING (SIZE (5))                                       OPTIONAL,
    ie-Extensions           ProtocolExtensionContainer { { GLONASSclockModel-ExtIEs } } OPTIONAL,
    ...
}

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


NAVclockModel ::= SEQUENCE {
    navToc                  BIT STRING (SIZE (16)),
    navaf2                  BIT STRING (SIZE (8)),
    navaf1                  BIT STRING (SIZE (16)),
    navaf0                  BIT STRING (SIZE (22)),
    navTgd                  BIT STRING (SIZE (8)),
    ie-Extensions           ProtocolExtensionContainer { { NAVclockModel-ExtIEs } } OPTIONAL,
    ...
}

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

NavModel-CNAVKeplerianSet ::= SEQUENCE {
    cnavTop                 BIT STRING (SIZE (11)),
    cnavURAindex            BIT STRING (SIZE (5)),
    cnavDeltaA              BIT STRING (SIZE (26)),
    cnavAdot                BIT STRING (SIZE (25)),
    cnavDeltaNo             BIT STRING (SIZE (17)),
    cnavDeltaNoDot          BIT STRING (SIZE (23)),
    cnavMo                  BIT STRING (SIZE (33)),
    cnavE                   BIT STRING (SIZE (33)),
    cnavOmega               BIT STRING (SIZE (33)),
    cnavOMEGA0              BIT STRING (SIZE (33)),
    cnavDeltaOmegaDot       BIT STRING (SIZE (17)),
    cnavIo                  BIT STRING (SIZE (33)),
    cnavIoDot               BIT STRING (SIZE (15)),
    cnavCis                 BIT STRING (SIZE (16)),
    cnavCic                 BIT STRING (SIZE (16)),
    cnavCrs                 BIT STRING (SIZE (24)),
    cnavCrc                 BIT STRING (SIZE (24)),
    cnavCus                 BIT STRING (SIZE (21)),
    cnavCuc                 BIT STRING (SIZE (21)),
```

```
			ie-Extensions			ProtocolExtensionContainer { {			NavModel-CNAVKeplerianSet-ExtIEs } }
	OPTIONAL,
	...
}

NavModel-CNAVKeplerianSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

NavModel-GLONASSecef ::= SEQUENCE {
	gloEn					BIT STRING (SIZE (5)),
	gloP1					BIT STRING (SIZE (2)),
	gloP2					BIT STRING (SIZE (1)),
	gloM					BIT STRING (SIZE (2))									OPTIONAL,
	gloX					BIT STRING (SIZE (27)),
	gloXdot					BIT STRING (SIZE (24)),
	gloXdotdot				BIT STRING (SIZE (5)),
	gloY					BIT STRING (SIZE (27)),
	gloYdot					BIT STRING (SIZE (24)),
	gloYdotdot				BIT STRING (SIZE (5)),
	gloZ					BIT STRING (SIZE (27)),
	gloZdot					BIT STRING (SIZE (24)),
	gloZdotdot				BIT STRING (SIZE (5)),
	ie-Extensions			ProtocolExtensionContainer { { NavModel-GLONASSecef-ExtIEs } }	OPTIONAL,
	...
}

NavModel-GLONASSecef-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

NavModel-NAVKeplerianSet ::= SEQUENCE {
	navURA					BIT STRING (SIZE (4)),
	navFitFlag				BIT STRING (SIZE (1)),
	navToe					BIT STRING (SIZE (16)),
	navOmega				BIT STRING (SIZE (32)),
	navDeltaN				BIT STRING (SIZE (16)),
	navM0					BIT STRING (SIZE (32)),
	navOmegaADot			BIT STRING (SIZE (24)),
	navE					BIT STRING (SIZE (32)),
	navIDot					BIT STRING (SIZE (14)),
	navAPowerHalf			BIT STRING (SIZE (32)),
	navI0					BIT STRING (SIZE (32)),
	navOmegaA0				BIT STRING (SIZE (32)),
	navCrs					BIT STRING (SIZE (16)),
	navCis					BIT STRING (SIZE (16)),
	navCus					BIT STRING (SIZE (16)),
	navCrc					BIT STRING (SIZE (16)),
	navCic					BIT STRING (SIZE (16)),
	navCuc					BIT STRING (SIZE (16)),
```

```
            ie-Extensions           ProtocolExtensionContainer { {         NavModel-NAVKeplerianSet-ExtIEs } }
    OPTIONAL,
    ...
}

NavModel-NAVKeplerianSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NavModel-SBASecef ::= SEQUENCE {
    -- the following IE shall be present if 'SBASclockModel' in 'GANSS-AddClockModels' is not included in 'Ganss-Sat-Info-AddNavList'
    sbasTo                  BIT STRING (SIZE (13))                                          OPTIONAL,
    sbasAccuracy            BIT STRING (SIZE (4)),
    sbasXg                  BIT STRING (SIZE (30)),
    sbasYg                  BIT STRING (SIZE (30)),
    sbasZg                  BIT STRING (SIZE (25)),
    sbasXgDot               BIT STRING (SIZE (17)),
    sbasYgDot               BIT STRING (SIZE (17)),
    sbasZgDot               BIT STRING (SIZE (18)),
    sbasXgDotDot            BIT STRING (SIZE (10)),
    sbagYgDotDot            BIT STRING (SIZE (10)),
    sbasZgDotDot            BIT STRING (SIZE (10)),
    ie-Extensions           ProtocolExtensionContainer { { NavModel-SBASecef-ExtIEs } } OPTIONAL,
    ...
}

NavModel-SBASecef-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SBASclockModel ::= SEQUENCE {
    sbasTo                  BIT STRING (SIZE (13)),
    sbasAgfo                BIT STRING (SIZE (12)),
    sbasAgf1                BIT STRING (SIZE (8)),
    ie-Extensions           ProtocolExtensionContainer { { SBASclockModel-ExtIEs } }    OPTIONAL,
    ...
}

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

UTCmodelSet1 ::= SEQUENCE {
    utcA0               BIT STRING (SIZE(16)),
    utcA1               BIT STRING (SIZE(13)),
    utcA2               BIT STRING (SIZE(7)),
    utcDeltaTls         BIT STRING (SIZE(8)),
    utcTot              BIT STRING (SIZE(16)),
    utcWNot             BIT STRING (SIZE(13)),
    utcWNlsf            BIT STRING (SIZE(8)),
```

```
			utcDN				BIT STRING (SIZE(4)),
	utcDeltaTlsf		BIT STRING (SIZE(8)),
	ie-Extensions		ProtocolExtensionContainer { { UTCmodelSet1-ExtIEs } }	OPTIONAL,
	...
}

UTCmodelSet1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

UTCmodelSet2 ::= SEQUENCE {
	nA					BIT STRING (SIZE(11)),
	tauC				BIT STRING (SIZE(32)),
	deltaUT1			DeltaUT1												OPTIONAL,
	kp					BIT STRING (SIZE(2))									OPTIONAL,
	ie-Extensions		ProtocolExtensionContainer { { UTCmodelSet2-ExtIEs } }	OPTIONAL,
	...
}

UTCmodelSet2-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

UTCmodelSet3 ::= SEQUENCE {
	utcA1wnt			BIT STRING (SIZE(24)),
	utcA0wnt			BIT STRING (SIZE(32)),
	utcTot				BIT STRING (SIZE(8)),
	utcWNt				BIT STRING (SIZE(8)),
	utcDeltaTls			BIT STRING (SIZE(8)),
	utcWNlsf			BIT STRING (SIZE(8)),
	utcDN				BIT STRING (SIZE(8)),
	utcDeltaTlsf		BIT STRING (SIZE(8)),
	utcStandardID		BIT STRING (SIZE(3)),
	ie-Extensions		ProtocolExtensionContainer { { UTCmodelSet3-ExtIEs } }	OPTIONAL,
	...
}

UTCmodelSet3-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

UTRAN-GANSSReferenceTimeDL ::= SEQUENCE {
	utran-GANSSTimingOfCellFrames	INTEGER(0..3999999),
	uC-ID							UC-ID
	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..345599999999),
    gANSS-TimeId                GANSSID                     OPTIONAL,
    gANSS-TimeUncertainty       INTEGER(0..127)             OPTIONAL,
    uC-ID                       UC-ID,
    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 ::= {
    {ID id-completeAlmanacProvided      CRITICALITY ignore  EXTENSION   CompleteAlmanacProvided PRESENCE optional},
    ...
}

CompleteAlmanacProvided ::=     BOOLEAN

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)),
    sf1Revd                         SubFrame1Reserved,
    t-GD                            BIT STRING (SIZE (8)),
    t-oc                            BIT STRING (SIZE (16)),
    af2                             BIT STRING (SIZE (8)),
    af1                             BIT STRING (SIZE (16)),
    af0                             BIT STRING (SIZE (22)),
    c-rs                            BIT STRING (SIZE (16)),
    delta-n                         BIT STRING (SIZE (16)),
    m0                              BIT STRING (SIZE (32)),
    c-uc                            BIT STRING (SIZE (16)),
    e                               BIT STRING (SIZE (32)),
    c-us                            BIT STRING (SIZE (16)),
    a-Sqrt                          BIT STRING (SIZE (32)),
    t-oe                            BIT STRING (SIZE (16)),
    fitInterval                     BIT STRING (SIZE (1)),
    aodo                            BIT STRING (SIZE (5)),
    c-ic                            BIT STRING (SIZE (16)),
    omega0                          BIT STRING (SIZE (32)),
    c-is                            BIT STRING (SIZE (16)),
    i0                              BIT STRING (SIZE (32)),
    c-rc                            BIT STRING (SIZE (16)),
    omega                           BIT STRING (SIZE (32)),
```

```
			omegaDot					BIT STRING (SIZE (24)),
	iDot						BIT STRING (SIZE (14)),
	iE-Extensions				ProtocolExtensionContainer { { GPS-ClockAndEphemerisParameters-ExtIEs } }			OPTIONAL,
	...
}

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

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


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


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

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

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

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

```
GPS-MeasuredResults ::=             SEQUENCE {
    gps-TOW-1msec                       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} |
    {ID id-GPSReferenceTimeUncertainty  CRITICALITY ignore  EXTENSION   GPSReferenceTimeUncertainty      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-1msec                       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}|
    {ID id-GPSReferenceTimeUncertainty  CRITICALITY ignore  EXTENSION   GPSReferenceTimeUncertainty     PRESENCE        optional}|
    {ID id-GPS-Week-Cycle               CRITICALITY ignore  EXTENSION   GPS-Week-Cycle                  PRESENCE        optional},
    ...
}

GPS-Week-Cycle      ::=             INTEGER(0..7)

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 Reference Time Uncertainty
--
-- **************************************************************

GPSReferenceTimeUncertainty ::= SEQUENCE {
    gps-RefTimeUNC      INTEGER(0..127),
    iE-Extensions       ProtocolExtensionContainer { { GPSReferenceTimeUncertainty-ExtIEs } }   OPTIONAL,
    ...
}

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

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

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



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

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

```
	}

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


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

GPS-UTRAN-TRU ::=	ENUMERATED {
						nsec-50,
						nsec-500,
						usec-1,
						usec-10,
						msec-1,
						msec-10,
						msec-100,
						unreliable,
						...}

-- **************************************************************
--
-- Additional GPS Assistance Data Required
--
-- **************************************************************


AdditionalGPSAssistDataRequired ::=		SEQUENCE {
	almanacRequest						BOOLEAN,
	utcModelRequest						BOOLEAN,
	ionosphericModelRequest				BOOLEAN,
	navigationModelRequest				BOOLEAN,
	dgpsCorrectionsRequest				BOOLEAN,
	referenceLocationRequest			BOOLEAN,
	referenceTimeRequest				BOOLEAN,
	aquisitionAssistanceRequest			BOOLEAN,
	realTimeIntegrityRequest			BOOLEAN,
	navModelAddDataRequest				NavModelAdditionalData		OPTIONAL,
	iE-Extensions						ProtocolExtensionContainer { { AdditionalGPSAssistDataRequired-ExtIEs } } OPTIONAL,
	...
}

AdditionalGPSAssistDataRequired-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}
```

```
-- **************************************************************
--
-- Additional GANSS Assistance Data Required
--
-- **************************************************************

AdditionalGanssAssistDataRequired::= SEQUENCE {
    ganssReferenceTime                  BOOLEAN,
    ganssreferenceLocation              BOOLEAN,
    ganssIonosphericModel               BOOLEAN,
    ganssRequestedGenericAssistanceDataList GanssRequestedGenericAssistanceDataList,
    iE-Extensions                       ProtocolExtensionContainer { { AdditionalGanssAssistDataRequired-ExtIEs } } OPTIONAL,
    ...
}

AdditionalGanssAssistDataRequired-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-ganssReq-AddIonosphericModel     CRITICALITY ignore  EXTENSION   GANSSReq-AddIonosphericModel PRESENCE       optional}|
    {ID id-ganssReq-EarthOrientPara         CRITICALITY ignore  EXTENSION   GANSSReq-EarthOrientPara            PRESENCE       optional},
    ...
}
GANSSReq-AddIonosphericModel ::= SEQUENCE {
    ganss-add-iono-mode-req     BIT STRING (SIZE(2)),
    iE-Extensions               ProtocolExtensionContainer { { GANSSReq-AddIonosphericModel-ExtIEs } }   OPTIONAL,
    ...}

GANSSReq-AddIonosphericModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSSReq-EarthOrientPara ::= BOOLEAN

GanssRequestedGenericAssistanceDataList ::= SEQUENCE (SIZE (1..maxGANSS)) OF
                                        GanssReqGenericData

GanssReqGenericData ::=             SEQUENCE {
    ganssId                             GANSSID                                                                 OPTIONAL,
    ganssRealTimeIntegrity              BOOLEAN                                                                 OPTIONAL,
    ganssDifferentialCorrection         DGANSS-Sig-Id-Req                                                       OPTIONAL,
    ganssAlmanac                        BOOLEAN                                                                 OPTIONAL,
    ganssNavigationModel                BOOLEAN                                                                 OPTIONAL,
    ganssTimeModelGnssGnss              BIT STRING (SIZE (9))                                                   OPTIONAL,
    ganssReferenceMeasurementInfo       BOOLEAN                                                                 OPTIONAL,
    ganssDataBits                       GanssDataBits                                                           OPTIONAL,
    ganssUTCModel                       BOOLEAN                                                                 OPTIONAL,
    ganssNavigationModelAdditionalData  NavigationModelGANSS                                                    OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { GanssReqGenericData-ExtIEs } }    OPTIONAL,
    ...}

GanssReqGenericData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-ganssAddNavigationModel-req      CRITICALITY ignore  EXTENSION   GANSS-AddNavigationModel-Req PRESENCE       optional}|
```

```
			{ID id-ganssAddUTCModel-req				CRITICALITY ignore	EXTENSION	GANSS-AddUTCModel-Req						PRESENCE	optional}|
	{ID id-ganssAuxInfo-req				CRITICALITY ignore	EXTENSION	GANSS-AuxInfo-req						PRESENCE	optional}|
	{ID id-GANSS-SBAS-ID				CRITICALITY ignore	EXTENSION	GANSS-SBAS-ID						PRESENCE	optional}|
	{ID id-GANSS-AddADchoices				CRITICALITY ignore	EXTENSION	GANSS-AddADchoices						PRESENCE	optional},
	...
}

GANSS-AddNavigationModel-Req ::= BOOLEAN

GANSS-AddUTCModel-Req ::= BOOLEAN

GANSS-AuxInfo-req ::= BOOLEAN

GANSS-AddADchoices ::= SEQUENCE {
	orbitModelID			INTEGER (0..7)										OPTIONAL,
	clockModelID			INTEGER (0..7)										OPTIONAL,
	utcModelID			INTEGER (0..7)										OPTIONAL,
	almanacModelID			INTEGER (0..7)										OPTIONAL,
	iE-Extensions			ProtocolExtensionContainer { { GANSS-AddADchoices-ExtIEs } }	OPTIONAL,
	...}

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

DGANSS-Sig-Id-Req ::=	BIT STRING (SIZE (8))

GanssDataBits ::=				SEQUENCE {
	ganssTod				INTEGER (0..86399),
	dataBitAssistancelist		ReqDataBitAssistanceList,
	iE-Extensions			ProtocolExtensionContainer { { GanssDataBits-ExtIEs } } OPTIONAL,
	...
}

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


ReqDataBitAssistanceList ::=	SEQUENCE {
	ganssSignalID			BIT STRING (SIZE (8)),
	ganssDataBitInterval		INTEGER(0..15),
	ganssSatelliteInfo		SEQUENCE (SIZE (1..maxGANSSSat)) OF INTEGER(0..63)			OPTIONAL,
	iE-Extensions			ProtocolExtensionContainer { { ReqDataBitAssistanceList-ExtIEs } }	OPTIONAL,
	...
}


ReqDataBitAssistanceList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}
```

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

InformationExchangeID ::= INTEGER (0..1048575)


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

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

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


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

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


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

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

ExplicitInformation ::= CHOICE {
    almanacAndSatelliteHealth           AlmanacAndSatelliteHealth,
    utcModel                            UtcModel,
    ionosphericModel                    IonosphericModel,
    navigationModel                     NavigationModel,
    dgpsCorrections                     DgpsCorrections,
    referenceTime                       ReferenceTime,
    acquisitionAssistance               AcquisitionAssistance,
    realTimeIntegrity                   RealTimeIntegrity,
    almanacAndSatelliteHealthSIB        AlmanacAndSatelliteHealthSIB-InfoType,
    ... ,
    referenceLocation                   ReferenceLocation,
    ganss-Common-DataReq                GANSSCommonDataReq,
    ganss-Generic-DataList              GANSSGenericDataList

}

DganssCorrectionsReq ::= SEQUENCE {
    transmissionGanssTimeIndicator  TransmissionGanssTimeIndicator                               OPTIONAL,
    dganss-sig-id-req               DGANSS-Sig-Id-Req,
    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 } }                    OPTIONAL,
    ...
}

GANSSCommonDataReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-GANSS-AddIonoModelReq        CRITICALITY ignore  EXTENSION   GANSS-AddIonoModelReq            PRESENCE       optional} |
```

```
		{ID id-GANSS-EarthOrientParaReq	CRITICALITY ignore		EXTENSION	GANSS-EarthOrientParaReq		PRESENCE	optional} ,
	...
}

GANSS-AddIonoModelReq ::= SEQUENCE {
	dataID			BIT STRING (SIZE(2)),
	iE-Extensions	ProtocolExtensionContainer { { GANSS-AddIonoModelReq-ExtIEs} }	OPTIONAL,
	...
}

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

GANSS-EarthOrientParaReq ::= SEQUENCE {
	eopReq			ENUMERATED {requested, not-requested},
	iE-Extensions	ProtocolExtensionContainer { { GANSS-EarthOrientParaReq-ExtIEs} }	OPTIONAL,
	...
}

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

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

GANSSGenericDataReq ::= SEQUENCE {
	ganssID								GANSSID										OPTIONAL,
	ganss-realTimeIntegrity				Ganss-realTimeIntegrityReq					OPTIONAL,
	ganss-dataBitAssistance				GanssDataBits								OPTIONAL,
	dganssCorrections					DganssCorrectionsReq						OPTIONAL,
	ganss-almanacAndSatelliteHealth		Ganss-almanacAndSatelliteHealthReq			OPTIONAL,
	ganss-referenceMeasurementInfo		Ganss-referenceMeasurementInfoReq			OPTIONAL,
	ganss-utcModel						Ganss-utcModelReq							OPTIONAL,
	ganss-TimeModel-Gnss-Gnss			Ganss-TimeModel-Gnss-Gnss					OPTIONAL,
	navigationModel						NavigationModelGANSS						OPTIONAL,
	...,
	ganss-AddNavModelsReq				AddNavigationModelsGANSS					OPTIONAL,
	ganss-AddUtcModelsReq				GANSS-AddUtcModelsReq						OPTIONAL,
	ganss-AuxInfoReq					GANSS-AuxInfoReq							OPTIONAL,
	-- the following IE shall be present if GANSSID is '0' (SBAS)
	ganss-SBAS-ID						GANSS-SBAS-ID								OPTIONAL
}

AddNavigationModelsGANSS ::= SEQUENCE {
	ganssWeek					INTEGER(0..4095),
	ganssTOE					INTEGER(0..167),
	t-toe-limit					INTEGER(0..10),
	addSatRelatedDataListGANSS	AddSatelliteRelatedDataListGANSS,
	iE-Extensions				ProtocolExtensionContainer { { AddNavigationModelsGANSS-ExtIEs } }		OPTIONAL,
	...
```

```
        }

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

AddSatelliteRelatedDataListGANSS ::= SEQUENCE (SIZE (0..maxGANSSSat)) OF AddSatelliteRelatedDataGANSS

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

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

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

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

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

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


GANSS-SBAS-ID ::= ENUMERATED    {
                                waas,
                                egnos,
                                msas,
                                gagan,
                                ...
                                }


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

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

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

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 }|
    { ID id-additionalMeasurementInforLCR       CRITICALITY ignore  EXTENSION AdditionalMeasurementInforLCR                            PRESENCE
optional },
     -- 1.28Mcps TDD only
    ...
}

OTDOA-ReferenceCellInfoSAS-centric ::=          SEQUENCE {
    uC-ID                               UC-ID,
    iE-Extensions                       ProtocolExtensionContainer { { OTDOA-ReferenceCellInfoSAS-centric-ExtIEs } }           OPTIONAL,
```

```
		...
}

OTDOA-ReferenceCellInfoSAS-centric-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}

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-SFNSFNTimeDifferenceType2Info	UE-SFNSFNTimeDifferenceType2Info,
	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                             GANSSID                 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)
```

```
        }

AdditionalMeasurementInforLCR ::=   SEQUENCE {
    timingAdvanceLCR-R7         TimingAdvanceLCR-R7,
    rxTimingDeviationLCR        RxTimingDeviationLCR,
    angleOfArrivalLCR           AngleOfArrivalLCR           OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { { AdditionalMeasurementInforLCR-ExtIEs } } OPTIONAL,
    ...
}

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

TimingAdvanceLCR-R7 ::=     INTEGER (0..8191)

-- **************************************************************
--
-- 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-NetworkAssistedGANSSSuport         CRITICALITY ignore  EXTENSION NetworkAssistedGANSSSupport                              PRESENCE
optional },
    ...
}

NetworkAssistedGANSSSupport ::= SEQUENCE (SIZE (1..maxGANSS)) OF SEQUENCE {
```

```
		ganssID						GANSSID								OPTIONAL,
	ganssMode						ENUMERATED {
								networkBased,
								ue-Based,
								both,
								none
							},
	ganssSignalID					GANSS-SignalID							OPTIONAL,
	supportGANSSTimingOfCellFrame		BOOLEAN,
	supportGANSSCarrierPhaseMeasurement BOOLEAN,
	iE-Extensions	ProtocolExtensionContainer { { NetworkAssistedGANSSSuport-ExtIEs} } OPTIONAL,
	...
}

NetworkAssistedGANSSSuport-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	-- the following IE shall be present if 'GANSSID' in 'NetworkAssistedGANSSSupport' is '0' (SBAS)
	{ ID id-GANSS-SBAS-IDs				CRITICALITY ignore	EXTENSION GANSS-SBAS-IDs				PRESENCE optional }|
	{ ID id-GANSS-Signal-IDs			CRITICALITY ignore	EXTENSION GANSS-Signal-IDs				PRESENCE optional }|
	{ ID id-supportGANSSNonNativeADchoices	CRITICALITY ignore	EXTENSION SupportGANSSNonNativeADchoices PRESENCE optional },
	...
}

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

GANSS-SBAS-IDs ::= SEQUENCE {
	ganss-sbas-ids		BIT STRING (SIZE(8)),
	iE-Extensions		ProtocolExtensionContainer { { GANSS-SBAS-IDs-ExtIEs} } OPTIONAL,
	...
}

GANSS-SBAS-IDs-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}


GANSS-Signal-IDs ::= SEQUENCE {
	ganss-signal-ids	BIT STRING (SIZE(8)),
	iE-Extensions		ProtocolExtensionContainer { { GANSS-Signal-IDs-ExtIEs} }	OPTIONAL,
	...
}

GANSS-Signal-IDs-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	...
}
```

```
	SupportGANSSNonNativeADchoices ::= BOOLEAN

-- **************************************************************
--
-- 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 (8)),
	additionalAssistanceDataRequest		BIT STRING (SIZE (8)),
	measurementValidity					MeasurementValidity					OPTIONAL,
	iE-Extensions						ProtocolExtensionContainer { { GANSS-PositioningInstructions-ExtIEs } } OPTIONAL,
	...
}

GANSS-PositioningInstructions-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
	{ID id-GANSScarrierPhaseRequested	CRITICALITY ignore	EXTENSION	GANSScarrierPhaseRequested		PRESENCE optional}|
	{ID id-GANSSMultiFreqMeasRequested	CRITICALITY ignore	EXTENSION	GANSSMultiFreqMeasRequested		PRESENCE optional},
	...
}

GANSScarrierPhaseRequested ::= BIT STRING (SIZE (8))

GANSSMultiFreqMeasRequested ::= BIT STRING (SIZE (8))


-- **************************************************************
--
-- 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{
            cellParameterID                 CellParameterID,
        --- 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-Paremeters              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
    { ID id-timingAdvanceLCR-R7     CRITICALITY ignore  EXTENSION TimingAdvanceLCR-R7           PRESENCE optional }| -- 1.28Mcps TDD only
    { ID id-rxTimingDeviationLCR    CRITICALITY ignore  EXTENSION RxTimingDeviationLCR          PRESENCE optional }| -- 1.28Mcps TDD only
    { ID id-angleOfArrivalLCR       CRITICALITY ignore  EXTENSION AngleOfArrivalLCR             PRESENCE optional }, -- 1.28Mcps TDD 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                       ProtocolExtensionContainer { { UE-Positioning-IPDL-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 {
                                        ipl5, ipl10, ... }

BurstModeParameters ::=             SEQUENCE {
    burstStart                          INTEGER (0..15),
    burstLength                         INTEGER (10..25),
```

```
            burstFreq                          INTEGER (1..16),
    iE-Extensions                     ProtocolExtensionContainer { { BurstModeParameters-ExtIEs } } OPTIONAL,

    ...
}

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                             SEQUENCE {
            primaryCPICH-Info                   PrimaryScramblingCode,
            ...
        },
        tdd                             SEQUENCE{
            cellParameterID                     CellParameterID,
            -- coding is FFS
            ...
        },
        ...
    },
    frequencyInfo                     FrequencyInfo                      OPTIONAL,
    ue-positioning-IPDL-Paremeters    UE-Positioning-IPDL-Parameters     OPTIONAL,
    sfn-SFN-RelTimeDifference         SFN-SFN-RelTimeDifference1,
    sfn-Offset-Validity               SFN-Offset-Validity                OPTIONAL,
    sfn-SFN-Drift                     SFN-SFN-Drift                      OPTIONAL,
    searchWindowSize                  OTDOA-SearchWindowSize,
    positioningMode     CHOICE {
        ueBased                                 SEQUENCE {
            relativeNorth                       INTEGER (-20000..20000)            OPTIONAL,
            relativeEast                        INTEGER (-20000..20000)            OPTIONAL,
            relativeAltitude                    INTEGER (-4000..4000)              OPTIONAL,
            fineSFN-SFN                         FineSFNSFN                         OPTIONAL,
            -- actual value roundTripTime = (IE value * 0.0625) + 876
            roundTripTime                       INTEGER (0.. 32766)                OPTIONAL,
            ...
        },
        ueAssisted                              SEQUENCE {
            ...
        },
        ...
    },
    iE-Extensions                     ProtocolExtensionContainer { { UE-Positioning-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-RRCState,
    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 ::=                SEQUENCE {
    uarfcn-UL                           UARFCN              OPTIONAL,
    uarfcn-DL                           UARFCN,
    iE-Extensions               ProtocolExtensionContainer { { FrequencyInfoFDD-ExtIEs } }      OPTIONAL,
    ...
}

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

FrequencyInfoTDD ::=                SEQUENCE {

    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} } OPTIONAL,
    ...
}

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

UL-DPCHInfo ::=                     CHOICE {
        fdd                                 SEQUENCE {
            scramblingCodeType                  ScramblingCodeType,
            scramblingCode                      UL-ScramblingCode,
            tfci-Existence                      BOOLEAN,
            numberOfFBI-Bits                    NumberOfFBI-Bits,
            iE-Extensions                       ProtocolExtensionContainer { { UL-DPCHInfoFDD-ExtIEs} } OPTIONAL,
            ...

        },
        tdd                                 SEQUENCE {
            cellParameterID                     CellParameterID,
            tFCI-Coding                         TFCI-Coding,
            punctureLimit                       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} } OPTIONAL,
            ...
        },
        ...
```

```
            }

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} } OPTIONAL,
            ...

}

Compressed-Mode-Assistance-DataFDD-ExtIEs       PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DL-InformationFDD ::=               SEQUENCE {
            primaryScramblingCode           PrimaryScramblingCode,
            chipOffset                      ChipOffset,
            frameOffset                     FrameOffset,
            iE-Extensions                   ProtocolExtensionContainer { { DL-InformationFDD-ExtIEs} } OPTIONAL,
            ...
        }

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} } OPTIONAL,
            ...
    }

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} } OPTIONAL,
    ...
}

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} } OPTIONAL,
    ...
}

UL-TrCHInfo-ExtIEs      PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-TrCHType ::=     ENUMERATED {dch, usch, ...}


E-DPCH-Information ::= SEQUENCE {
    maxSet-E-DPDCHs                             Max-Set-E-DPDCHs,
    ul-PunctureLimit                            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 TS 25.212 [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 TS 25.213 [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} } OPTIONAL,
	...
}

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} } OPTIONAL,
	...
}

PRACH-ChannelInfo-ExtIEs		PCAP-PROTOCOL-EXTENSION ::= {
	...
}



PRACH-Info ::=							CHOICE {
		fdd								SEQUENCE {
			availableSignatures					AvailableSignatures,
			availableSF							SF-PRACH,
			preambleScramblingCodeWordNumber	PreambleScramblingCodeWordNumber,
			puncturingLimit						PuncturingLimit,
			availableSubChannelNumbers			AvailableSubChannelNumbers,
			iE-Extensions						ProtocolExtensionContainer { { PRACH-Info-FDD-ExtIEs} } OPTIONAL,
			...
		},
		tdd								SEQUENCE {
			timeSlot								TimeSlot,
			tdd-ChannelisationCode					TDD-ChannelisationCode,
			maxPRACH-MidambleShifts					MaxPRACH-MidambleShifts,
			pRACH-Midamble							PRACH-Midamble,
			iE-Extensions							ProtocolExtensionContainer { { PRACH-Info-TDD-ExtIEs} } OPTIONAL,
			...
		},
		...
}

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,
        numberOfTbsTTIList          SEQUENCE (SIZE (1..maxNrOfTFs)) OF  TbsTTIInfo,
        iE-Extensions               ProtocolExtensionContainer { { TransportFormatSet-DynamicPartList-ExtIEs} }         OPTIONAL,
        ...
    }

TransportFormatSet-DynamicPartList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TbsTTIInfo ::= SEQUENCE {
    tTIInfo             TransportFormatSet-TransmissionTimeIntervalDynamic      OPTIONAL,
    numberOfTbs         TransportFormatSet-NrOfTransportBlocks,
    iE-Extensions       ProtocolExtensionContainer { { TbsTTIInfo-ExtIEs} } OPTIONAL,
    ...
}

TbsTTIInfo-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,
    punctureLimit                       PuncturingLimit,
    repetitionPeriod                    RepetitionPeriod,
    uSCH-SchedulingOffset               USCH-SchedulingOffset,
    uL-Timeslot-Information             UL-Timeslot-Information,
    tFCS                                TFCS,
    trChInfo                            TrChInfoList,
    iE-Extensions   ProtocolExtensionContainer { { UschParameters-ExtIEs} } OPTIONAL,
    ...
}

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 ::= {
    ...
}

--******************************************
--
-- UTRAN-GANSS Reference Time Result
--
--******************************************

UTRAN-GANSSReferenceTimeResult ::= SEQUENCE {
    ue-GANSSTimingOfCell        INTEGER (0..345599999999, ...),
    ganss-Time-ID               GANSSID                                                                          OPTIONAL,
    ganssTodUncertainty         INTEGER(0..127)                                                                  OPTIONAL,
    uC-ID                       UC-ID,
    sfn                         INTEGER (0..4095),
```

```
            iE-Extensions               ProtocolExtensionContainer { {     UTRAN-GANSSReferenceTimeResult-ExtIEs } }   OPTIONAL,
    ...

}

UTRAN-GANSSReferenceTimeResult-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
maxNrOfRefETFCI-PO-QUANTSTEPs		INTEGER ::= 8	-- FFS
maxNrOfRefETFCIs			INTEGER ::= 8
maxSet					INTEGER ::= 9
maxGANSSSat				INTEGER ::= 64
maxSgnType				INTEGER ::= 8
maxGANSS				INTEGER ::= 8
maxGANSSSet				INTEGER ::= 9
maxGANSSSatAlmanac			INTEGER ::= 36
maxGANSSClockMod			INTEGER ::= 4
maxGANSS-1				INTEGER ::= 7
maxNrOfIRATMeasurements			INTEGER ::= 16
maxReportedGERANCells			INTEGER ::= 6
```

```
-- **************************************************************
--
-- 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-NetworkAssistedGANSSSuport                   ProtocolIE-ID ::= 76
id-TUTRANGANSSMeasurementValueInfo              ProtocolIE-ID ::= 77
id-AdditionalGPSAssistDataRequired              ProtocolIE-ID ::= 78
id-AdditionalGanssAssistDataRequired            ProtocolIE-ID ::= 79
id-angleOfArrivalLCR                            ProtocolIE-ID ::= 80
id-extendedTimingAdvanceLCR                     ProtocolIE-ID ::= 81
id-additionalMeasurementInforLCR                ProtocolIE-ID ::= 82
id-timingAdvanceLCR-R7                          ProtocolIE-ID ::= 83
id-rxTimingDeviationLCR                         ProtocolIE-ID ::= 84
id-GPSReferenceTimeUncertainty                  ProtocolIE-ID ::= 85
id-GANSS-AddIonoModelReq                        ProtocolIE-ID ::= 86
id-GANSS-EarthOrientParaReq                     ProtocolIE-ID ::= 87
id-GANSS-Additional-Ionospheric-Model           ProtocolIE-ID ::= 88
id-GANSS-Earth-Orientation-Parameters           ProtocolIE-ID ::= 89
id-GANSS-Additional-Time-Models                 ProtocolIE-ID ::= 90
id-GANSS-Additional-Navigation-Models           ProtocolIE-ID ::= 91
id-GANSS-Additional-UTC-Models                  ProtocolIE-ID ::= 92
id-GANSS-Auxiliary-Information                  ProtocolIE-ID ::= 93
id-GANSS-SBAS-ID                                ProtocolIE-ID ::= 94
id-GANSS-SBAS-IDs                               ProtocolIE-ID ::= 95
id-GANSS-Signal-IDs                             ProtocolIE-ID ::= 96
id-supportGANSSNonNativeADchoices               ProtocolIE-ID ::= 97
id-PositionDataUEbased                          ProtocolIE-ID ::= 98
id-ganssCodePhaseAmbiguityExt                   ProtocolIE-ID ::= 99
id-ganssIntegerCodePhaseExt                     ProtocolIE-ID ::= 100
id-GANSScarrierPhaseRequested                   ProtocolIE-ID ::= 101
id-GANSSMultiFreqMeasRequested                  ProtocolIE-ID ::= 102
id-ganssReq-AddIonosphericModel                 ProtocolIE-ID ::= 103
id-ganssReq-EarthOrientPara                     ProtocolIE-ID ::= 104
```

```
	id-ganssAddNavigationModel-req			ProtocolIE-ID	::= 105
id-ganssAddUTCModel-req					ProtocolIE-ID ::= 106
id-ganssAuxInfo-req						ProtocolIE-ID ::= 107
id-GANSS-AlmanacModelChoice				ProtocolIE-ID ::= 108
id-GANSS-alm-keplerianNAVAlmanac		ProtocolIE-ID ::= 109
id-GANSS-alm-keplerianReducedAlmanac	ProtocolIE-ID ::= 110
id-GANSS-alm-keplerianMidiAlmanac		ProtocolIE-ID ::= 111
id-GANSS-alm-keplerianGLONASS			ProtocolIE-ID ::= 112
id-GANSS-alm-ecefSBASAlmanac			ProtocolIE-ID ::= 113
id-UTRAN-GANSSReferenceTimeResult		ProtocolIE-ID ::= 114
id-GANSS-Reference-Time-Only			ProtocolIE-ID ::= 115
id-GANSS-AddADchoices					ProtocolIE-ID ::= 116
id-OTDOA-ReferenceCellInfo				ProtocolIE-ID ::= 117
id-DGNSS-ValidityPeriod					ProtocolIE-ID ::= 118
id-AzimuthAndElevationLSB				ProtocolIE-ID ::= 119
id-completeAlmanacProvided				ProtocolIE-ID ::= 120
id-GPS-Week-Cycle						ProtocolIE-ID ::= 121
id-GANSS-Day-Cycle						ProtocolIE-ID ::= 122
id-ganss-Delta-T						ProtocolIE-ID ::= 123
id-requestedCellIDGERANMeasurements		ProtocolIE-ID ::= 124
id-CellId-IRATMeasuredResultsSets		ProtocolIE-ID ::= 125
id-IMSI									ProtocolIE-ID ::= 126
id-IMEI									ProtocolIE-ID ::= 127

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 ITU-T Rec. X.691 [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.

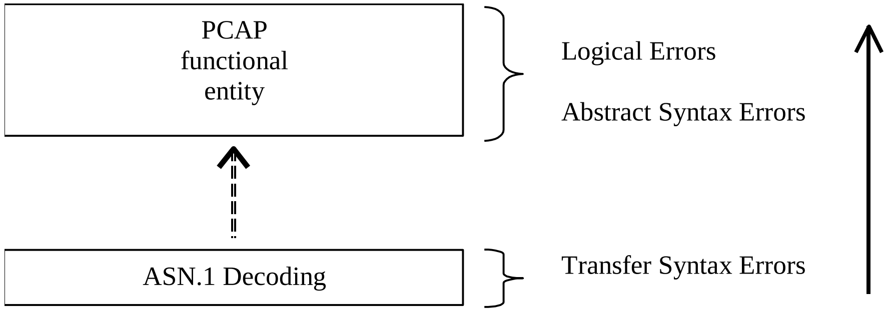

Figure 10: Protocol Errors in PCAP

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.

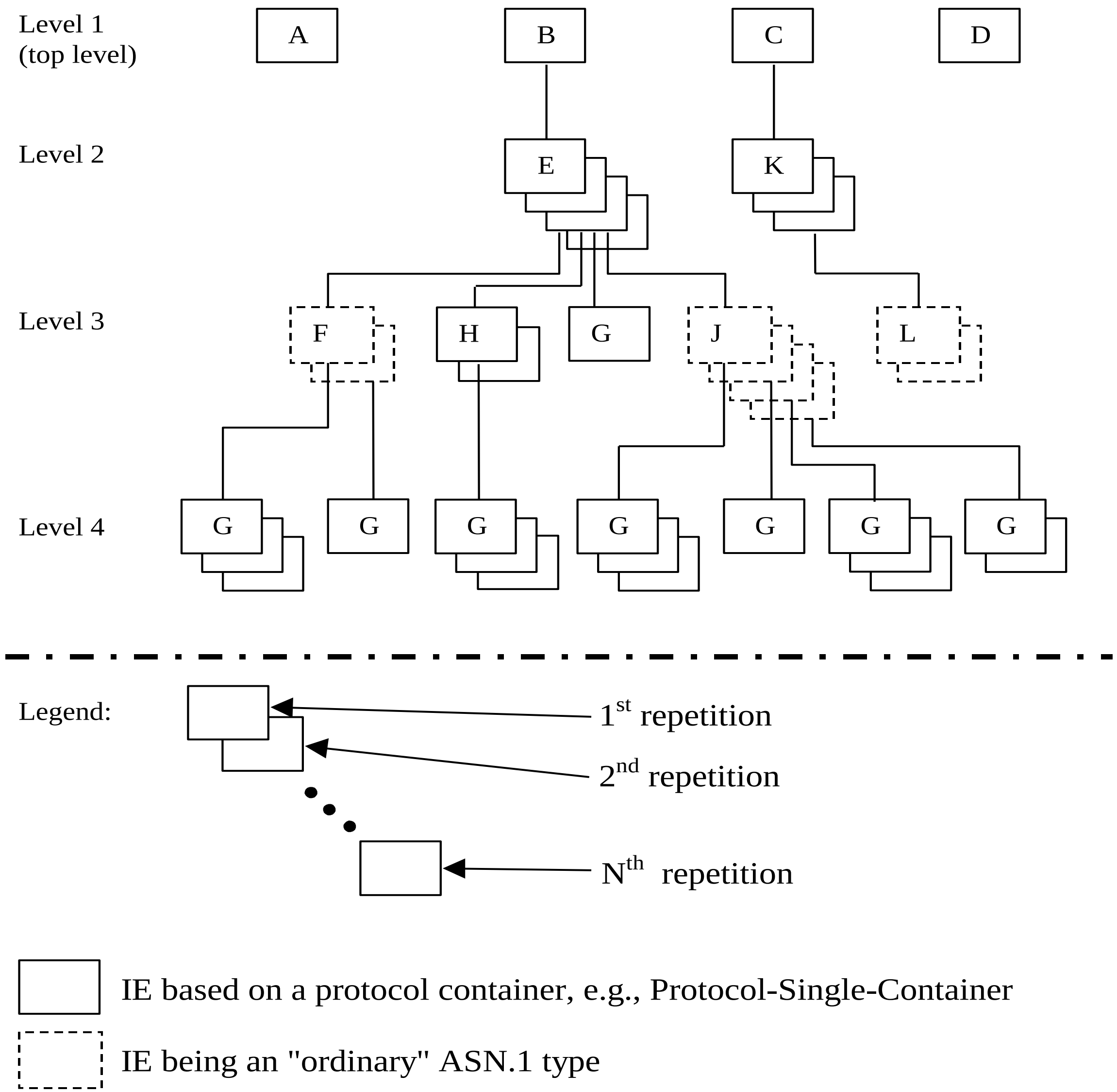

Figure A.1: Example of content of a received PCAP message based on the EXAMPLE MESSAGE

A.3 Content of Criticality Diagnostics

A.3.1 Example 1

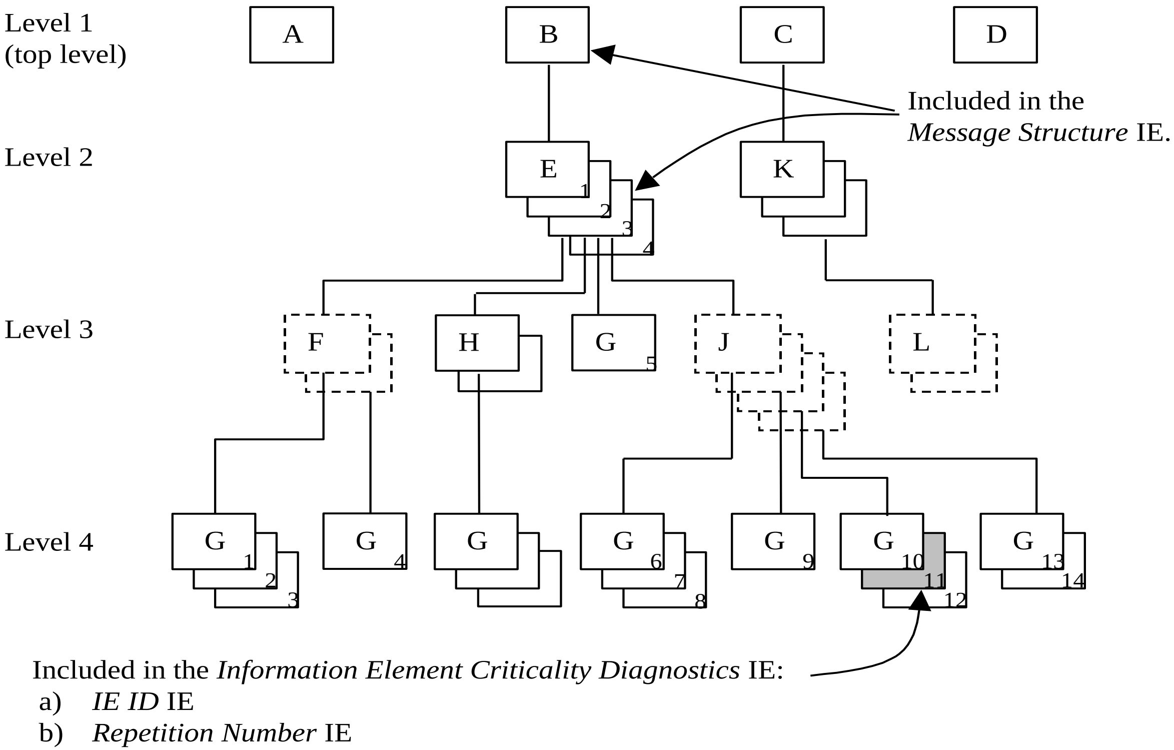

Figure A.2: Example of a received PCAP message containing a not comprehended IE

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* IE 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 *Message Structure* IE this is the eleventh occurrence of IE G within the IE E (level 2).
Type of Error	not understood	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

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

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

A.3.2 Example 2

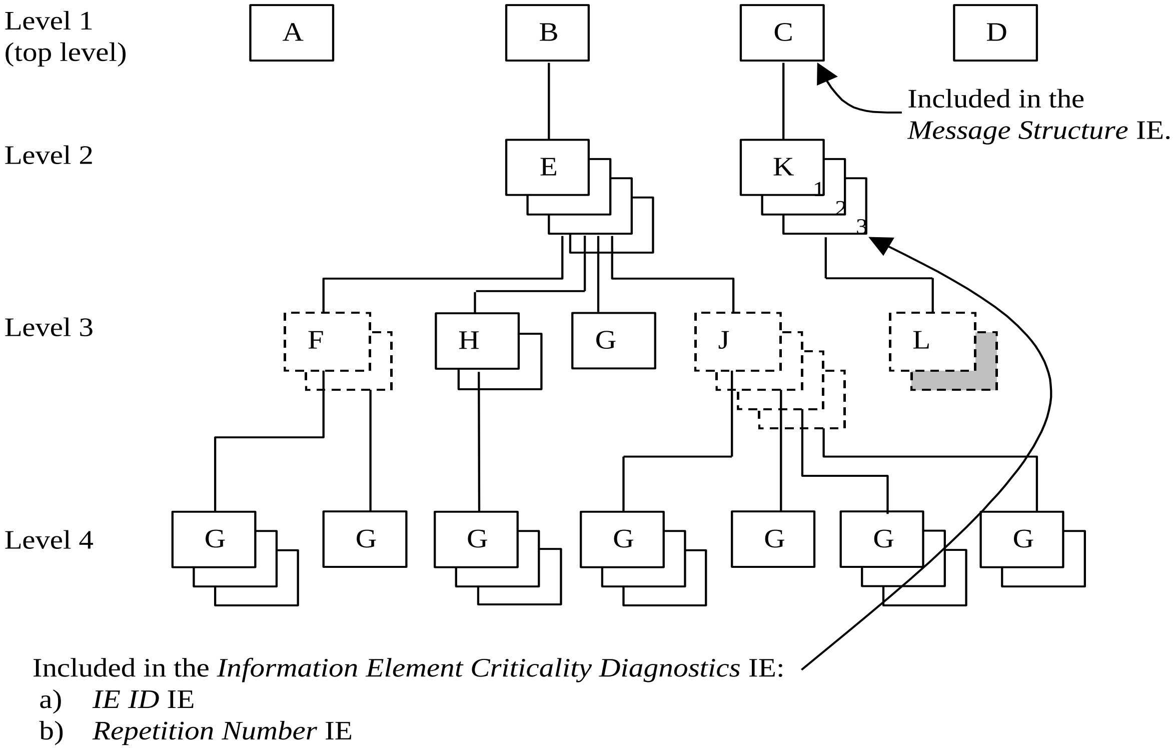

Figure A.3: Example of a received PCAP message containing a not comprehended IE

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 as in table A.3.

Table A.3

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

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

A.3.3 Example 3

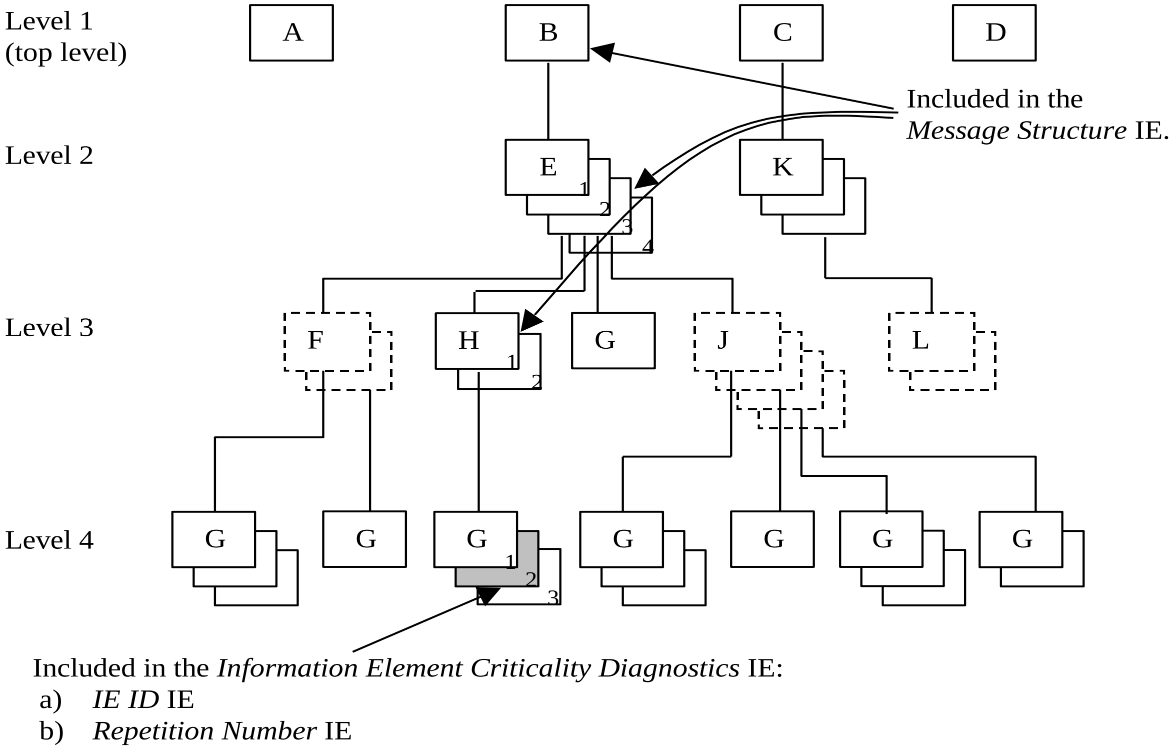

Figure A.4: Example of a received PCAP message containing a not comprehended IE

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* IE as 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	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from level 2.
>Repetition Number	3	Repetition number from level 2.
Message Structure, *third repetition*		
>IE ID	id-H	IE ID from the lowest level above the reported level, i.e. level 3.
>Repetition Number	1	Repetition number from the lowest level above the reported level, i.e. level 3.

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

A.3.4 Example 4

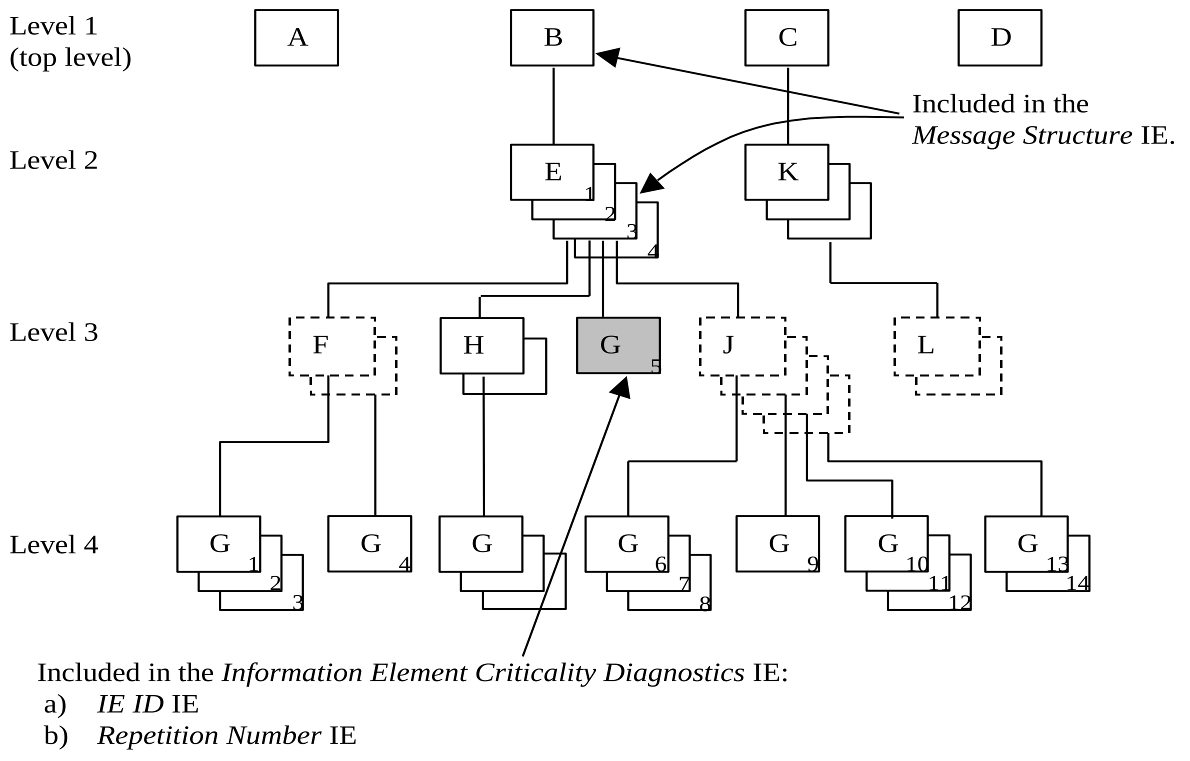

Figure A.5: Example of a received PCAP message containing a not comprehended IE

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 *Message Structure* IE this is the fifth occurrence of IE G within the IE E (level 2).
Type of Error	not understood	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

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

A.3.5 Example 5

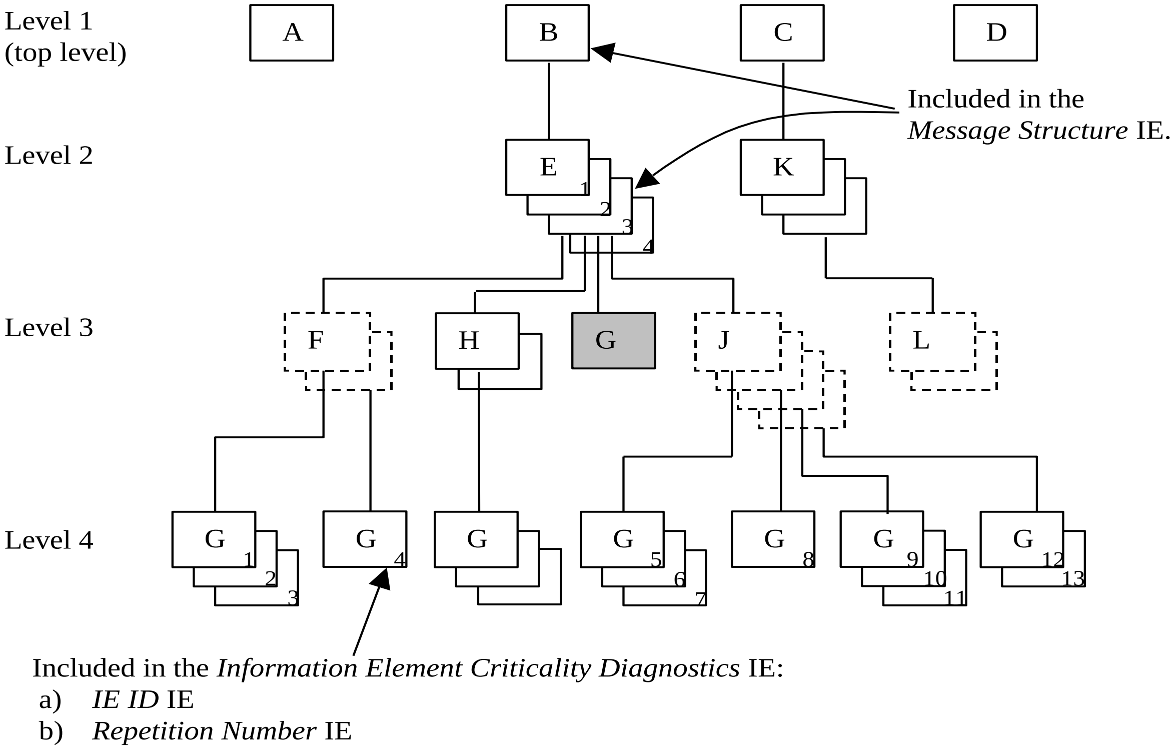

Figure A.6: Example of a received PCAP message with a missing IE

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 *Message Structure* IE there have been four occurrences of IE G within the IE E (level 2) up to the missing occurrence.
Type of Error	missing	
Message Structure, *first repetition*		
>IE ID	id-B	IE ID from level 1.
Message Structure, *second repetition*		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

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

A.4 ASN.1 of EXAMPLE MESSAGE

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

ExampleMessage-IEs 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

TSG #	TSG Doc.	CR	Rev	Subject/Comment	New
12/2008	-	-	-	Creation of Rel-8 version based on v 7.11.0	8.0.0
42	RP-080852	0115	1	Support for additional navigation satellite systems in PCAP	8.0.0
43	RP-090076	0117		PCAP Review	8.1.0
43	RP-090076	0118		Correction to Additional GANSS Assistance Data Required IE	8.1.0
45	RP-090770	0119	1	Correction on Cell-ID Measured Results Sets in INFORMATION EXCHANGE INITIATION REQUEST	8.2.0
12/2009	-	-	-	Creation of Rel-9 version based on v 8.2.0	9.0.0
47	RP-100229	0120		Correction to OTDOA in SAS-centric mode	9.1.0
47	RP-100230	0121	1	Addition of DGNSS Validity Period in PCAP	9.1.0
49	RP-100907	0124	1	DGANSS ASN.1 correction	9.2.0
09/2010				Creation of Rel-10 version based on v 9.2.0	
49	RP-100910	0123	1	Small Technical Enhancements and Improvements for GNSS (PCAP)	10.0.0
50	RP-101276	0127	6	IRAT measurement for enhanced positioning capability	10.1.0
50	RP-101276	0128	1	Clarification of reporting of CellID measurements	10.1.0
SP-49	SP-100629			Clarification on the use of References (TS 21.801 CR#0030)	10.2.0
51	RP-110229	0129	2	PCAP ASN.1 Cleanup	10.2.0
51	RP-110226	0134	5	Adding of IMSI and IMEI to PERFORM LOCATION REQUEST message	10.2.0
52	RP-110686	0135	2	ASN.1 corrections and cleanup of 25.453	10.3.0
52	RP-110685	0136		References cleanup (25.453)	10.3.0
09/2012				Update to Rel-11 version (MCC)	11.0.0
60	RP-130638	0137		Clarification on Positioning Data Discriminator IE	11.1.0