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**Universal Mobile Telecommunications System (UMTS);
UTRAN Iupc interface Positioning Calculation
Application Part (PCAP) signalling
(3GPP TS 25.453 version 10.4.0 Release 10)**



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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.
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- [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.
In this version of the specification, Galileo Assistance Data elements are not used.
- [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 <i>Information Element Name</i> 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. <i>Request Type</i> 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 lupo 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 | IIINFORMATION EXCHANGE INITIATION REQUEST | INFORMATION EXCHANGE INITIATION RESPONSE | INFORMATION EXCHANGE INITIATION FAILURE |
| Position Initiation | POSITION INITIATION REQUEST | POSITION INITIATION RESPONSE | POSITION INITIATION FAILURE |
| Position Activation | POSITION ACTIVATION REQUEST | POSITION ACTIVATION RESPONSE | POSITION ACTIVATION FAILURE |

Table 3: Class 2

| Elementary Procedure | Message |
|----------------------------------|--|
| Information Reporting | INFORMATION REPORT |
| Information Exchange Termination | INFORMATION EXCHANGE TERMINATION REQUEST |
| Information Exchange Failure | INFORMATION EXCHANGE FAILURE INDICATION |
| Error Indication | ERROR INDICATION |
| Position Parameter Modification | POSITION PARAMETER MODIFICATION |
| Abort | ABORT |
| Position Periodic Report | POSITION PERIODIC REPORT |
| Position Periodic Result | POSITION PERIODIC RESULT |
| Position Periodic Termination | POSITION PERIODIC TERMINATION |

8.2 Position Calculation

8.2.1 General

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

8.2.2 Successful Operation

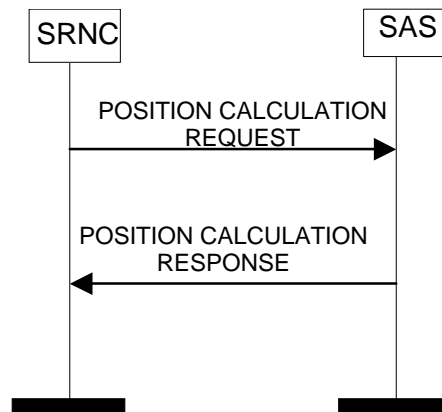


Figure 1: Position Calculation procedure, Successful Operation

The procedure is initiated with a POSITION CALCULATION REQUEST message sent from the SRNC to the SAS. When the SAS receives the POSITION CALCULATION REQUEST message, it shall calculate the UE position and, if supported and requested, velocity based on the provided measurement data. This procedure may be repeated by the SRNC as needed for periodic location. If the POSITION CALCULATION REQUEST message is part of periodic location, this message may include the *Periodic Position Calculation Info* IE to enable the SAS to better fulfill future such requests.

If the *Initial UE Position Estimate* IE is included in the POSITION CALCULATION REQUEST message, the SAS shall use this value for the calculation of the UE Position Estimate in case of A-GPS 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

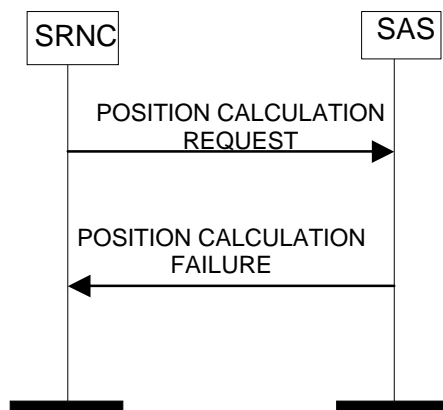


Figure 2: Position Calculation procedure, Unsuccessful Operation

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

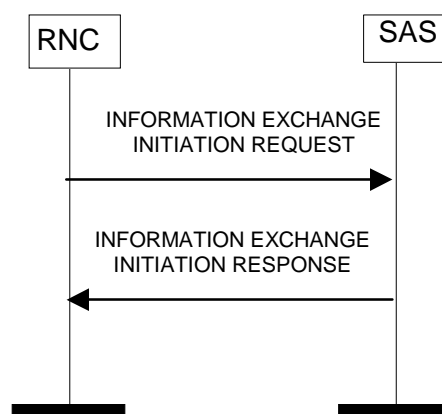


Figure 3: Information Exchange Initiation procedure, Successful Operation

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_i 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_i , 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

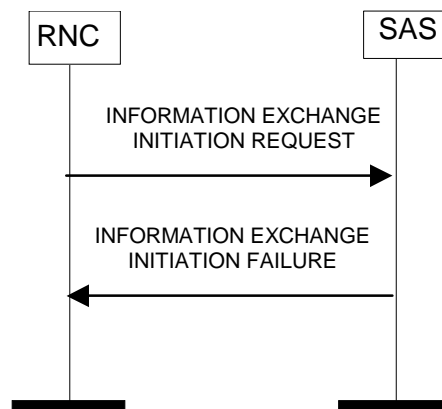


Figure 4: Information Exchange Initiation procedure, Unsuccessful Operation

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

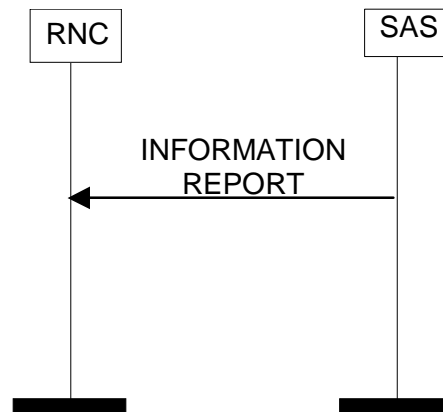


Figure 5: Information Reporting procedure, Successful Operation

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

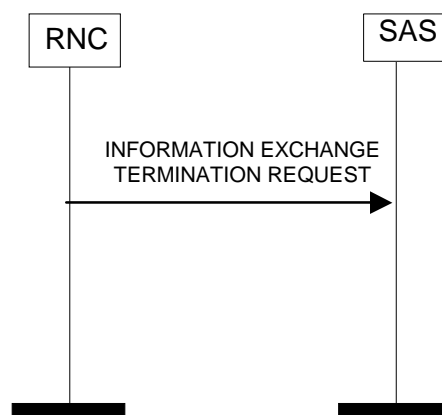


Figure 6: Information Exchange Termination procedure, Successful Operation

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

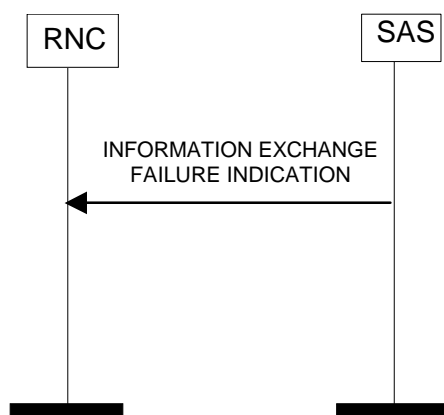


Figure 7: Information Exchange Failure procedure, Successful Operation

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

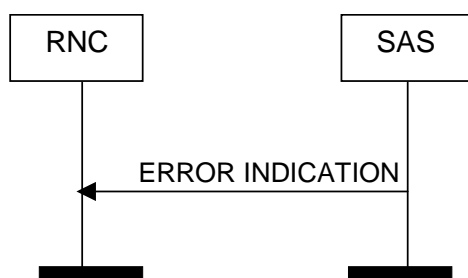


Figure 8: Error Indication procedure, SAS Originated, Successful Operation

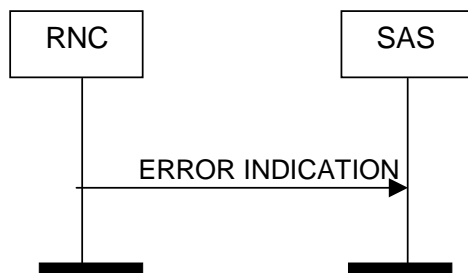


Figure 9: Error Indication procedure, RNC Originated, Successful Operation

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

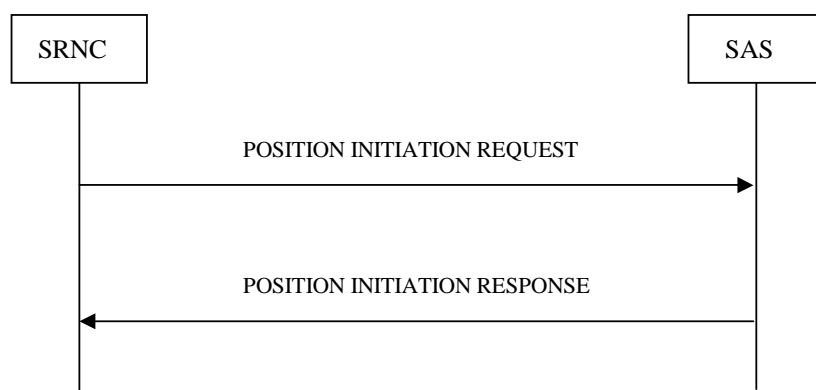


Figure 9a: Position Initiation procedure, Successful Operation

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

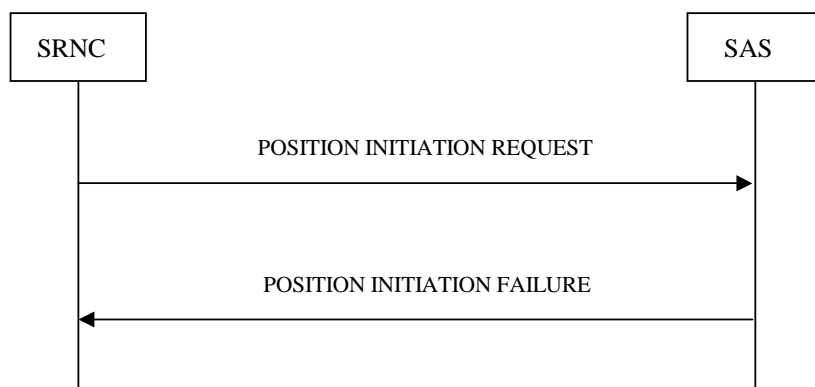


Figure 9b: Position Initiation procedure, Unsuccessful Operation

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

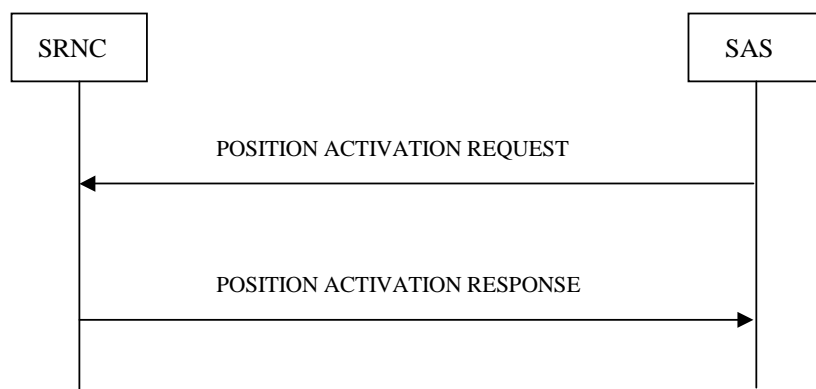


Figure 9c: Position Activation procedure, Successful Operation

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 Method* IE with value 'Cell ID' the *Amount of Reporting* IE shall not be included.

If the POSITION ACTIVATION REQUEST message contains the *Position Method* IE with value "Cell ID", the RNC may include the measurements requested in the *Requested Cell-ID Measurements* IE in the POSITION ACTIVATION RESPONSE message. If 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

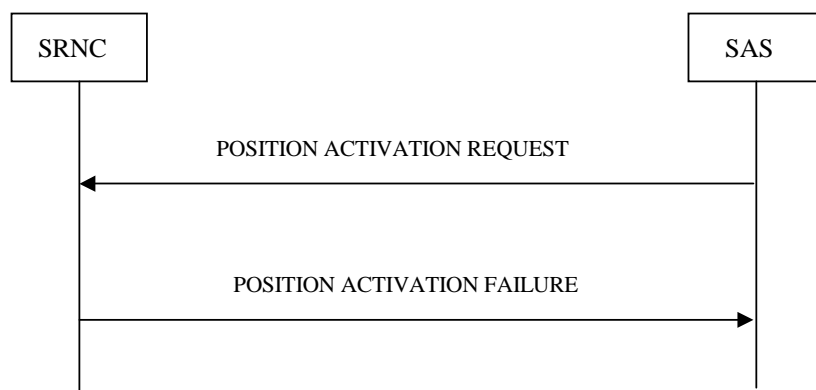


Figure 9d: Position Activation procedure, Unsuccessful Operation

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

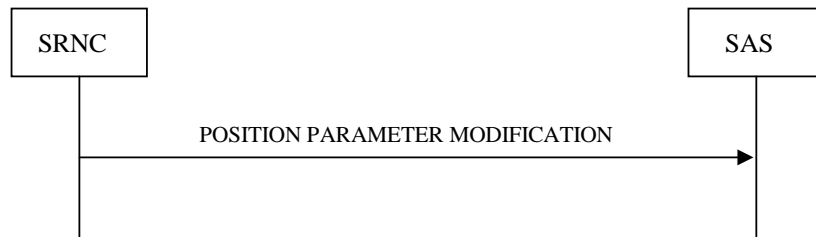


Figure 9e: Position Parameter Modification procedure, Successful Operation

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

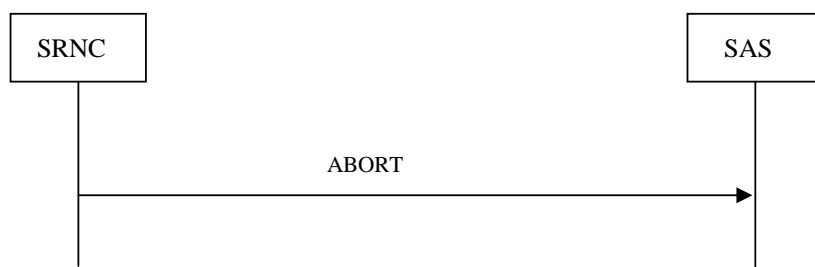


Figure 9f: Abort procedure, Successful Operation

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

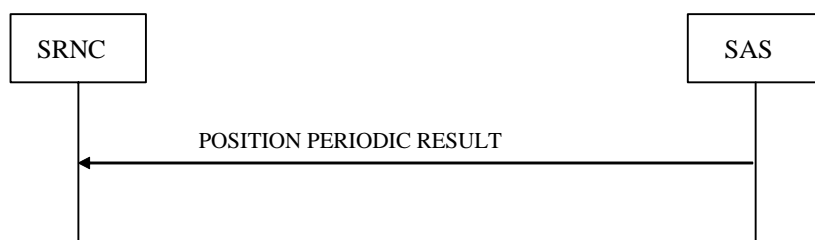


Figure 9h: Position Periodic Result procedure, Successful Operation

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

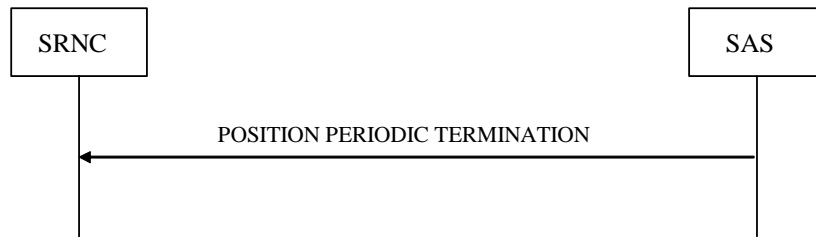


Figure 9i: Position Periodic Termination procedure, SAS Originated, Successful Operation

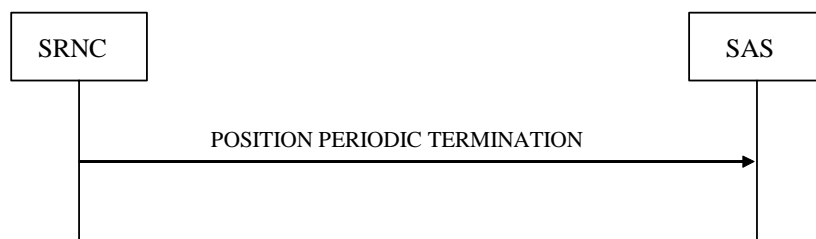


Figure 9k: Position Periodic Termination procedure, RNC Originated, Successful Operation

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..<maxNoOfMeasurementsCell> | | | – | |
| >>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 <i>Information Exchange Object Type</i> | M | | | | YES | reject |
| > <i>Reference Position</i> | | | | | – | |
| >>Reference Position Estimate/UE Initial Position | M | | Geographical Area 9.2.2.6 | For RNC-centric mode. | – | |
| > <i>Additional Information Exchange Object Types</i> | | | | | | |
| >> <i>Reference Position UC-ID</i> | | | | | | |
| >>>UTRAN Cell Identifier/UE Initial Position | M | | UTRAN Cell Identifier 9.2.2.37 | For SAS-centric mode. | YES | reject |
| >> <i>Cell-ID Measured Results Sets</i> | | | | | | |
| >>> 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 <i>Information Type</i> IE contains GPS-related data |
| GANSS | The IE shall be present if the information requested in the <i>Information Type</i> IE contains GANSS-related data |

Table 11a

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

9.1.7 Information Exchange Initiation Response

Table 12

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

9.1.8 Information Exchange Initiation Failure

Table 13

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

9.1.9 Information Report

Table 14

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

9.1.10 Information Exchange Termination Request

Table 15

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

9.1.11 Information Exchange Failure Indication

Table 16

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

9.1.12 Error Indication

Table 17

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

9.1.13 POSITION INITIATION REQUEST

Table 17a

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
|---------------------------|----------|-------|-----------------------|-----------------------|-------------|----------------------|
| Message Type | M | | 9.2.2.24 | | YES | reject |
| Transaction ID | M | | 9.2.2.28 | | – | |
| Request Type | M | | 9.2.2.50 | | YES | reject |
| UE Positioning Capability | M | | 9.2.2.51 | | YES | reject |
| UTRAN Cell Identifier | M | | 9.2.2.37 | | YES | reject |
| Vertical Accuracy Code | O | | 9.2.2.39 | | YES | ignore |
| Response Time | O | | 9.2.2.52 | | YES | ignore |
| Positioning Priority | O | | 9.2.2.53 | | YES | ignore |
| Client Type | O | | 9.2.2.54 | | YES | ignore |
| Include Velocity | O | | 9.2.2.97 | | YES | ignore |
| Periodic Location Info | O | | 9.2.2.107 | | YES | ignore |
| 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 <i>Amount of Reporting</i> IE is present. | YES | ignore |
| Positioning Priority | O | | 9.2.2.53 | | YES | ignore |
| Environment Characterisation | O | | 9.2.2.62 | | YES | ignore |
| U-TDOA Positioning | | 0..1 | | Only present if Positioning Method is U-TDOA | YES | reject |
| >U-TDOA Bit Count | M | | 9.2.2.56 | Used if UE is in CELL_FACH mode | – | |
| >U-TDOA Time Interval | M | | 9.2.2.57 | Used if UE is in CELL_FACH mode | – | |
| GPS Positioning | | 0..1 | | Only present if Positioning Method is A-GPS | YES | reject |
| >GPS Positioning Instructions | M | | 9.2.2.101 | | – | |
| >Requested Data Value | O | | 9.2.2.26 | | – | |
| OTDOA Assistance Data | | 0..1 | | Only present if Positioning Method is OTDOA | YES | reject |
| >UE Positioning OTDOA Assistance data | M | | 9.2.2.59 | | – | |
| Include Velocity | O | | 9.2.2.97 | | YES | ignore |
| Amount of Reporting | O | | 9.2.2.108 | Amount of reports for periodic reporting. | YES | ignore |
| Cell-ID Positioning | | 0..1 | | Only present if Positioning Method is Cell-ID | YES | ignore |
| >Requested Cell-ID Measurements | M | | 9.2.2.112 | | – | |
| GANSS Positioning | | 0..1 | | Only present if Positioning Method is GNSS | YES | reject |
| >GANSS Positioning Instructions | M | | 9.2.2.120 | | – | |

| | | | | | | |
|-----------------------|---|--|----------|--|---|--|
| >Requested Data Value | O | | 9.2.2.26 | | - | |
|-----------------------|---|--|----------|--|---|--|

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 | | <i>0..<maxNoOfSets></i> | | | GLOBAL | reject |
| >GPS Measured Results | M | | 9.2.2.12 | | – | |
| Cell-ID Measured Results Sets | | <i>0..<maxNoOfMeasurements></i> | | | GLOBAL | reject |
| >Cell-ID Measured Results Info List | M | | 9.2.2.31 | | – | |
| OTDOA Measured Results Sets | | <i>0..<maxNoOfMeasurements></i> | | | 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 | | <i>0..<maxNoOfSets></i> | | | 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 | | <i>0..<maxNoOfIRATMeasurements></i> | | | 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 | | <i>0..<maxNoOfSets></i> | | | GLOBAL | ignore |
| >GPS Measured Results | M | | 9.2.2.12 | | – | |
| Cell-ID Measured Results Sets | | <i>0..<maxNoOfMeasurements></i> | | | GLOBAL | ignore |
| >Cell-ID Measured Results Info List | M | | 9.2.2.31 | | – | |
| OTDOA Measured Results Sets | | <i>0..<maxNoOfMeasurements></i> | | | GLOBAL | ignore |
| >OTDOA Measured Results Info List | M | | 9.2.2.32 | | – | |
| Cause | O | | 9.2.2.3 | | YES | ignore |
| GANSS Measured Results | | <i>0..<maxNoOfSets></i> | | | GLOBAL | ignore |
| >GANSS Measured Results | M | | 9.2.2.117 | | – | |
| 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 | | <i>0..<maxNoOfIRATMeasurements></i> | | | 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 | | <i>0..<maxnoof errors></i> | | |
| >IE Criticality | M | | ENUMERATED (reject, ignore, notify) | The IE Criticality is used for reporting the criticality of the triggering IE. The value 'Ignore' shall never be used. |
| >IE Id | M | | INTEGER (0..65535) | The IE Id of the not understood or missing IE as defined in the ASN.1 part of the specification. |
| >Repetition Number | O | | INTEGER (0..255) | <p>The <i>Repetition Number</i> IE gives</p> <ul style="list-style-type: none"> - in case of a not understood IE: The number of occurrences of the reported IE up to and including the not understood occurrence - in case of a missing IE: The number of occurrences up to but not including the missing occurrence. <p>Note: All the counted occurrences of the reported IE must have the same top-down hierarchical message structure of IEs with assigned criticality above them.</p> |
| >Message Structure | O | | 9.2.2.23 | The <i>Message Structure</i> IE describes the structure where the not understood or missing IE was detected. This IE is included if the not understood IE is not the top level of the message. |
| >Type of Error | M | | ENUMERATED (not understood, missing, ...) | |

Table 26

| Range bound | Explanation |
|---------------|---|
| maxnooferrors | Maximum number of IE errors allowed to be reported with a single message. The value for maxnooferrors is 256. |

9.2.2.5 DGPS Corrections

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

Table 27

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | 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 <i>Status/Health</i> IE is not equal to "no data" or "invalid data" |

Table 29

| Range bound | Explanation |
|-------------|---|
| maxSat | Maximum number of satellites for which data is included in this IE. 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 |
|--|----------|--------------------|---------------------------------|--|
| <i>CHOICE Geographical Area</i> | | | | |
| > <i>Point</i> | | | | Ellipsoid point |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| > <i>Point With Uncertainty</i> | | | | Ellipsoid point with uncertainty circle |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| >>Uncertainty Code | M | | INTEGER (0..127) | The uncertainty "r" expressed in meters is derived from the "Uncertainty Code" k by $r = 10x(1.1^{k-1})$ |
| > <i>Polygon</i> | | | | List of Ellipsoid points |
| >> Polygon | | 1..<maxnoofPoints> | | |
| >>>Geographical Coordinates | M | | 9.2.2.7 | |
| > <i>Ellipsoid point with uncertainty Ellipse</i> | | | | |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| >>Uncertainty Ellipse | M | | 9.2.2.30 | |
| >>Confidence | M | | INTEGER (0..100) | In percentage |
| > <i>Ellipsoid point with altitude</i> | | | | |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| >>Altitude and direction | M | | 9.2.2.2 | |
| > <i>Ellipsoid point with altitude and uncertainty Ellipsoid</i> | | | | |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| >>Altitude and direction | M | | 9.2.2.2 | |
| >>Uncertainty Ellipse | M | | 9.2.2.30 | |
| >>Uncertainty Altitude | M | | INTEGER (0..127) | The uncertainty altitude 'h' expressed in metres is derived from the 'Uncertainty Altitude' k, by: $h=45x(1.025^{k-1})$ |
| >>Confidence | M | | INTEGER (0..100) | In percentage |
| > <i>Ellipsoid Arc</i> | | | | |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| >>Inner radius | M | | INTEGER (0..2 ¹⁶ -1) | The relation between the value (N) and the radius (r) in meters it describes is $5N \leq r < 5(N+1)$, except for $N=2^{16}-1$ for which the range is extended to include all greater values of (r). |
| >>Uncertainty radius | M | | INTEGER (0..127) | The uncertainty "r" is derived from the "Uncertainty radius" k by $r = 10x(1.1^{k-1})$ |

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

Table 31

| Range bound | Explanation |
|---------------|--|
| maxnoofPoints | Maximum no. of points in polygon. Value is 15. |

9.2.2.7 Geographical Coordinates

This IE contains the geographical coordinates.

Table 32

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

9.2.2.8 GPS Acquisition Assistance

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

Table 33

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
|--|----------|-------------|--|---|-------------|----------------------|
| GPS TOW msec | M | | INTEGER (0..6.048*10 ⁸ -1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). | – | |
| Satellite information | | 1..<maxSat> | | | – | |
| >SatID | M | | INTEGER (0..63) | Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in ICD-GPS-200 [10]. | – | |
| >Doppler (0 th order term) | M | | INTEGER (-2048..2047) | Scaling factor 2.5Hz | – | |
| >Extra Doppler | | 0..1 | | | – | |
| >>Doppler (1 st order term) | M | | INTEGER (-42..21) | Scaling factor 1/42 | – | |
| >>Doppler Uncertainty | M | | ENUMERATED (12.5,25,50,100,200,...) | In Hz | – | |
| >Code Phase | M | | INTEGER (0..1022) | In Chips, specifies the centre of the search window | – | |
| >Integer Code Phase | M | | INTEGER (0..19) | Number of 1023 chip segments | – | |
| >GPS Bit number | M | | INTEGER (0..3) | Specifies GPS bit number (20 1023 chip segments) | – | |
| >Code Phase Search Window | M | | ENUMERATED (1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192) | Specifies the width of the search window. | – | |
| >Azimuth and Elevation | | 0..1 | | | – | |
| >>Azimuth | M | | INTEGER (0..31) | Scaling factor 11.25 Degrees | – | |
| >>Elevation | M | | INTEGER (0..7) | Scaling factor 11.25 Degrees | – | |
| >>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 | | $1..<maxS atAlmanac>$ | | | – | |
| >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 <i>UTRAN GPS reference time Result</i> is present, this IE shall be set to 0 by the transmitter and ignored by the receiver. | – | |
| Measurement Parameters | | 1..<maxSat> | | | – | |
| >Satellite ID | M | | INTEGER (0..63) | Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in ICD-GPS-200 [10]. | – | |
| >C/N ₀ | M | | INTEGER (0..63) | The estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (Typical levels will be in the range of 20 – 50 dB-Hz). | – | |
| >Doppler | M | | INTEGER (-32768..-32768) | Hz, scale factor 0.2. | – | |
| >Whole GPS Chips | M | | INTEGER (0..1022) | Unit in GPS chips | – | |
| >Fractional GPS Chips | M | | INTEGER (0..(2 ¹⁰ -1)) | Scale factor 2 ⁻¹⁰ | – | |
| >Multipath Indicator | M | | ENUMERATED (NM, low, medium, high) | See NOTE 1 | – | |
| >Pseudorange RMS Error | M | | INTEGER (0..63) | See NOTE 2 | – | |
| UTRAN GPS Reference Time Result | O | | 9.2.2.104 | This IE may only be present if SAS operates in SAS-centric mode. | YES | ignore |
| 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 | $0.5 \leq P < 0.5625$ |
| i | X | Y | $0.5 * (1 + x/8) * 2^y$ | $x_{i-1} \leq P < x_i$ |
| 62 | 110 | 111 | 112 | $104 \leq P < 112$ |
| 63 | 111 | 111 | -- | $112 \leq P$ |

9.2.2.13 GPS Navigation Model

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

Table 43

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|---|---------------------------|--------------------------|--|--|
| Satellite information | | <i>1..<maxSat></i> | | |
| >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 | <i>C-Satellite status</i> | | 9.2.2.10 | |
| NOTE: The UE shall interpret enumerated symbols as follows. | | | | |

Table 44

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

Table 45

| Condition | Explanation |
|-------------------------|---|
| <i>Satellite status</i> | The IE shall be present if the <i>Satellite Status</i> IE is not set to ES_SN |

Table 46

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

9.2.2.14 GPS Real Time Integrity

Table 47

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|---------------------------------------|----------|-----------------|-----------------------|--|
| CHOICE <i>Bad Satellites Presence</i> | | | | |
| >Bad Satellites | | | | |
| >>Satellite information | | 1..<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 <i>Information Report Periodicity</i> | C-Periodic | | | Indicates the frequency with which the SAS shall send broadcast data reports. |
| > <i>Min</i> | | | | |
| >>Minutes | M | | INTEGER (1..60, ...) | |
| > <i>Hour</i> | | | | |
| >>Hours | M | | INTEGER (1..24, ...) | |

Table 57

| Condition | Explanation |
|-----------|--|
| Periodic | This IE shall be present if the <i>Information Report Characteristics Type</i> IE indicates 'periodic' |

9.2.2.22 Information Type

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

Table 58

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
|---------------------------------------|----------|-----------------------|-----------------------|--|-------------|----------------------|
| CHOICE <i>Information Type</i> | | | | | – | |
| >Implicit | | | | | – | |
| >>Method Type | M | | 9.2.2.25 | | – | |
| >Explicit | | | | | – | |
| >>Explicit Information | | 1..<max noofExp Info> | | | – | |
| >>>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..<max Sat> | | | – | |
| >>>>>>>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..<max GANSS > | | | – | |
| >>>>>>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 | | | – | |
| >>>>>>>>>GAN SS Signal ID | M | | BIT STRING(8) | Coded as defined in TS 25.331 [4] | – | |
| >>>>>>>>>GAN SS 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: $r = 0.1 \times 2^K$ Value $K=15$ means that the time interval is not specified. | | |
| >>>>>>>>>Satellite Information | | <i>0..<max GANSS Sat></i> | | | – | |
| >>>>>>>>>Sat ID | M | | INTEGER (0..63) | Defined in TS 25.331 [4]. | – | |
| >>>>>>>>>DGANSS Corrections | | <i>0..1</i> | | | – | |
| >>>>>>>>>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 | | <i>0..1</i> | | | – | |
| >>>>>>>>>GANSS Time Indicator | O | | 9.2.2.127 | | – | |
| >>>>>>>>>GANSS Reference Measurement Information | | <i>0..1</i> | | | – | |
| >>>>>>>>>GANSS Time Indicator | O | | 9.2.2.127 | | – | |
| >>>>>>>>>GANSS UTC Model | | <i>0..1</i> | | | – | |
| >>>>>>>>>GANSS Time Indicator | O | | 9.2.2.127 | | – | |
| >>>>>>>>>GANSS Time Model GNSS-GNSS | | <i>0..1</i> | | | – | |
| >>>>>>>>>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 |
|-----------------|---|
| maxnoofExplInfo | Maximum number of Explicit Information supported in one Information Exchange. The value of maxnoofExplInfo is 32. |
| maxSat | Maximum number of satellites for which data is included in this IE. The value of maxSat is 16. |
| maxGANSS | Maximum number of GANSS systems for which data is included in this IE. The value of maxGANSS is 8. |
| maxGANSSSat | Maximum number of satellites for which data is included in this IE. The value of maxGANSSSat is 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 | | <i>1..<maxnooflevels></i> | | The first repetition of the <i>Message Structure</i> IE corresponds to the top level of the message. The last repetition of the <i>Message Structure</i> IE corresponds to the level above the reported level for the occurred error of the message. |
| >IE ID | M | | INTEGER (0..65535) | The IE ID of this level's IE containing the not understood or missing IE. |
| >Repetition Number | O | | INTEGER (1..256) | The <i>Repetition Number</i> IE gives, if applicable, the number of occurrences of this level's reported IE up to and including the occurrence containing the not understood or missing IE. Note: All the counted occurrences of the reported IE must have the same top-down hierarchical message structure of IEs with assigned criticality above them. |

Table 61

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

9.2.2.24 Message Type

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

Table 62

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|-----------------|----------|-------|---|--|
| Procedure Code | M | | INTEGER(0..255) | '1' = Position Calculation '2' = Information Exchange Initiation '3' = Information Reporting '4' = Information Exchange Termination, '5' = Information Exchange Failure '6' = Error Indication '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..<max GANSS > | | | 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 Navigation Models | O | | 9.2.2.118A | | YES | ignore |
| >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 <i>GANSS ID</i> 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 <i>Information Availability Indicator</i> | M | | | | – | |
| > <i>Information Available</i> | | | | | – | |
| >>Requested Data Value | M | | 9.2.2.26 | | – | |
| > <i>Information not Available</i> | | | NULL | | – | |

9.2.2.28 Transaction ID

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

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

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

Table 66

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|-------------------------------------|----------|-------|-----------------------|--|
| CHOICE <i>Transaction ID Length</i> | | | | The Transaction ID shall be interpreted for its integer value, not for the type of encoding ("short" or "long"). |
| > <i>Short</i> | | | | |
| >>Transaction ID Value | M | | INTEGER (0..127) | |
| > <i>Long</i> | | | | |
| >>Transaction ID Value | M | | INTEGER (0..32767) | |

9.2.2.29 Transmission TOW Indicator

Table 67

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|----------------------------|----------|-------|--|-----------------------|
| Transmission TOW Indicator | | | ENUMERATE D (requested, not requested) | |

9.2.2.30 Uncertainty Ellipse

This IE contains the uncertainty ellipse of a geographical area.

Table 68

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|---------------------------|----------|-------|-----------------------|---|
| Uncertainty semi-major | M | | INTEGER (0..127) | The uncertainty "r" is derived from the "uncertainty code" k by $r = 10 \times (1.1^{k-1})$ |
| Uncertainty semi-minor | M | | INTEGER (0..127) | The uncertainty "r" is derived from the "uncertainty code" k by $r = 10 \times (1.1^{k-1})$ |
| Orientation of major axis | M | | INTEGER (0..89) | The relation between the IE value (N) and the angle (a) in degrees it describes is $2N \leq a < 2(N+1)$ |

9.2.2.31 Cell-ID Measured Results Info List

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

Table 69

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
|--|----------|------------------------------------|-------------------------|--|-------------|----------------------|
| Cell-ID Measured Results Info | | <i>1..<maxNoOfMeasNCell></i> | | | – | |
| >UC-ID | M | | 9.2.2.37 | The identifier of the measured cell. | – | |
| >UTRAN Access Point Position with Altitude | M | | 9.2.2.36 | Exact geographical position of the base station antenna. If the SAS operates in SAS-centric mode, the values of this IE shall be set to 0 by the transmitter and shall be ignored by the receiver. | – | |
| >Geographical Area | O | | 9.2.2.6 | May only be present if the SAS operates in RNC-centric mode. | – | |
| >Round Trip Time Info | | <i>0..1</i> | | FDD only | – | |
| >>UE Rx-Tx Time Difference Type 2 | M | | INTEGER (0..8191) | According to mapping in 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 <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the <i>Round Trip Time</i> IE | YES | ignore |
| >Rx Timing Deviation Info | | <i>0..1</i> | | 3.84Mcps TDD only | – | |
| >>Rx Timing Deviation | M | | INTEGER (0..8191) | According to mapping in TS 25.123 [14]. | – | |
| >>Timing Advance | M | | INTEGER (0..63) | According to TS 25.331 [4]. | – | |
| >Rx Timing Deviation LCR Info | | <i>0..1</i> | | 1.28Mcps TDD only | – | |

| | | | | | | |
|---|---|------|-------------------------|---|-----|--------|
| >>Rx Timing Deviation LCR | M | | INTEGER (0..511) | According to mapping in 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 <i>Extended Timing Advance LCR</i> 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 <i>Cell measured results</i> 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 <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the <i>Round Trip Time</i> IE | – | |
| >Additional UE Measurement Info | | 0..1 | | FDD only | YES | ignore |
| >>CPICH RSCP | O | | INTEGER (-5..91) | According to CPICH_RSCP in TS 25.133 [13]. | – | |

| | | | | | | |
|--------------------------|---|------|---|---|-----|--------|
| >>CPICH Ec/No | 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 | | <i>1..<Maxno ofMeasNCel></i> | | | – | |
| >UC-ID | M | | 9.2.2.37 | The identifier of the neighbour cell. | – | |
| >UE SFN-SFN Observed Time Difference Type 2 Info | | <i>1</i> | | | – | |
| >>SFN-SFN Observed Time Difference Type 2 | M | | INTEGER (0..40961) | Gives the observed timing of the neighbour cell relative to the reference cell. | – | |
| >>UE Positioning Measurement Quality | M | | 9.2.2.35 | Quality of the observed time difference measurement. | – | |
| >>Measurement Delay | M | | INTEGER (0..65535) | <p>The interval of time, in units of 10ms frames, spanning the following two events:</p> <p>1) Time of applicability of the SFN-SFN Value or TUTRAN-GPS/SFN relationship provided for the corresponding neighbour cell in 9.2.2.33 or TUTRAN-GANSS/SFN relationship provided for the corresponding neighbour cell in 9.2.2.33.</p> <p>2) The point in time when this corresponding SFN-SFN observed time difference measurement was captured by the UE.</p> <p>If the SAS operates in SAS-centric mode, 1) above shall be set to zero. I.e., in SAS-centric mode this IE</p> | – | |

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

Table 72

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

9.2.2.33 OTDOA Neighbour Cell Info

Table 73

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

| | | | | |
|---|---|---|-------------------------|--|
| | | | | at a lower frequency than GPS clock. |
| >>T _{UTRAN-GPS} Drift Rate Quality | O | | INTEGER (0..50) | Indicates the standard deviation (std) of the T _{UTRAN-GPS} drift rate measurements in 1/256 chip per second. $T_{UTRAN-GPS} \text{ Drift Rate Quality} = \sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GPS} Drift Rate, where x is the reported T _{UTRAN-GPS} Drift Rate and $\mu = E[x]$ is the expectation value of x. |
| >T _{UTRAN-GANSS} Measurement Value Information | | | | |
| >>GANSS ID | O | | 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. $T_{UTRAN-GANSS} \text{ Quality} = \sqrt{E[(x-\mu)^2]}$ = 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. $T_{UTRAN-GANSS} \text{ Drift Rate Quality} = \sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Drift Rate, where x is the reported T _{UTRAN-GANSS} Drift Rate and $\mu = E[x]$ is the expectation value of x. |

9.2.2.34 OTDOA Reference Cell Info

Table 74

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

| | | | | | | |
|--|---|------|------------------------|---|--------|--------|
| | | | | x. | | |
| T_{UTRAN-GANSS} Measurement Value Information | | 0..1 | | | GLOBAL | ignore |
| >GANSS ID | O | | 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 $\mu = E[x]$ 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 | | <i>0..1</i> | | 1.28Mcps TDD only | – | |
| >>AOA LCR | M | | INTEGER (0..719) | According to mapping in TS 25.123 [14] | – | |
| >>AOA LCR Accuracy Class | M | | ENUMERA TED (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) | <p>Std of Measurements field includes sample standard deviation of measurements (when number of measurements is reported in 'Number of Measurements' field) or standard deviation of the reported measurement value = $\sqrt{E[(x-\mu)^2]}$, where x is the reported value and $\mu = E[x]$ is the expectation value (i.e. the true value) of x (when '000' is given in 'Number of Measurements' field).</p> <p>Following linear 5 bit encoding is used:</p> <p>'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.</p> |
|---------------------|---|--|-------------------|---|

9.2.2.36 UTRAN Access Point Position with Altitude

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

Table 76

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

9.2.2.37 UTRAN Cell Identifier (UC-ID)

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

Table 77

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

9.2.2.37A Extended RNC-ID

This is the identifier of one RNC in UTRAN.

Table 77A

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

9.2.2.38 Horizontal Accuracy Code

Table 78

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

9.2.2.39 Vertical Accuracy Code

Table 79

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

9.2.2.40 Accuracy Fulfilment Indicator

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

Table 80

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

9.2.2.41 Uplink DPCH information

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

Table 81

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

9.2.2.42 Frequency information

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

Table 82

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description |
|------------------------|----------|-------|-----------------------|--|
| CHOICE mode | M | | | |
| > <i>FDD</i> | | | | |
| >>UARFCN uplink (Nu) | O | | INTEGER (0..16383) | If this IE is not present, the default duplex distance defined for the operating frequency band shall be used (TS 25.101 [20]) |
| >>UARFCN downlink (Nd) | M | | INTEGER (0 .. 16383) | TS 25.101 [20] |
| > <i>TDD</i> | | | | |
| >>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 .. <maxP RACH> | | |
| >PRACH information | M | | 9.2.2.47 | |
| >TFS | M | | 9.2.2.48 | |
| > TFCS | | 1..<max TFC> | | |
| >>CTFC | M | | 9.2.2.49 | |

Table 84

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

9.2.2.44 Compressed Mode Assistance Data

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

Table 85

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description |
|--|----------|-------|-----------------------|-----------------------|
| 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 | | |
| >Transmission Gap Pattern Sequence Information | M | | 9.2.2.66 | |
| >Active Pattern Sequence Information | M | | 9.2.2.67 | |
| >CFN | M | | 9.2.2.68 | |

9.2.2.45 C-RNTI

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

Table 86

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

9.2.2.46 Primary Scrambling Code

This IE gives the DL scrambling code of a cell.

Table 87

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

9.2.2.47 PRACH information

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

Table 88

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|-----------------------------------|----------|-------|---------------------------------------|---|
| CHOICE mode | M | | | |
| >FDD | | | | |
| >>Available Signature | M | | BIT STRING (16) | Each bit indicates availability for a signature, where the signatures are numbered "signature 0" up to "signature 15". The value 1 of a bit indicates that the corresponding signature is available and the value 0 that it is not available. |
| >>Available SF | M | | ENUMERATED (32,64,128,256, ...) | In chips per symbol Defines the minimum allowed SF (i.e. the maximum rate) |
| >>Preamble scrambling code number | M | | INTEGER (0..15) | Identification of scrambling code see 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.. <maxT F> | | |
| >RLC Size | M | | INTEGER (129..5055) | Unit is bits |
| >Number of TBs and TTI List | | 1.. <maxT F> | | Present for every valid number of TB's (and TTI) for this RLC Size. |
| >>Transmission time interval | C-dynamicTTI | | ENUMERATED(10, 20, 40, 80, dynamic,...) | In ms. The value dynamic is only used in TDD mode. |
| >>Number of Transport blocks | M | | INTEGER (0..512) | |
| Semi-static Transport Format Information | M | | 9.2.2.61 | |

Table 90

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

Table 91

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

9.2.2.49 CTFC

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

Table 92

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|------------------------------------|----------|--------------|------------------------|-----------------------|
| <i>CHOICE CTFC Size</i> | | | | |
| <i>>2 bit CTFC</i> | | | | |
| >>CTFC information-2 | | 1..<max TFC> | | |
| >>>ctfc2Bit | M | | INTEGER (0..3) | |
| <i>>4 bit CTFC</i> | | | | |
| >>CTFC information-4 | | 1..<max TFC> | | |
| >>>ctfc4Bit | M | | INTEGER (0..15) | |
| <i>>6 bit CTFC</i> | | | | |
| >>CTFC information-6 | | 1..<max TFC> | | |
| >>>ctfc6Bit | M | | INTEGER (0..63) | |
| <i>>8 bit CTFC</i> | | | | |
| >>CTFC information-8 | | 1..<max TFC> | | |
| >>>ctfc8Bit | M | | INTEGER (0..255) | |
| <i>>12 bit CTFC</i> | | | | |
| >>CTFC information-12 | | 1..<max TFC> | | |
| >>>ctfc12Bit | M | | INTEGER (0..4095) | |
| <i>>16 bit CTFC</i> | | | | |
| >>CTFC information-16 | | 1..<max TFC> | | |
| >>>ctfc16Bit | M | | INTEGER (0..65535) | |
| <i>>24 bit CTFC</i> | | | | |
| >>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(S top Change of service area, Direct, Change of service area, Stop Direct, ..., Periodic, Stop Periodic) | Requests related to service area reporting are not supported in the current version of this specification. |
| Report Area | M | | ENUMERATED(S ervice Area, Geographical Area, ...) | |
| Horizontal Accuracy Code | O | | INTEGER(0..127) | The requested accuracy "r" is derived from the "accuracy code" k by $r = 10 \times (1.1^k - 1)$. |

9.2.2.51 UE Positioning Capability

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

Table 94

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
|---|----------|-----------------------------|--|--|-------------|----------------------|
| Standalone location method(s) supported | M | | BOOLEAN | Defines if a UE can measure its location by some means unrelated to UTRAN. TRUE means supported | – | |
| UE based OTDOA supported | M | | BOOLEAN | TRUE means supported | – | |
| Network Assisted GPS support | M | | ENUMERATED (Network based, UE based, Both, None,...) | Defines if the UE supports network based or UE based GPS methods. | – | |
| Support for GPS timing of cell frames measurement | M | | BOOLEAN | Defines if a UE has the capability to perform the UE GPS timing of cell frames measurement (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 | | <i>0..<max GANSS></i> | | | 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 <i>GANSS ID</i> 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 | | ENUMERATE D(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 <i>Selected Position Method</i> IE value is set to "GNSS" or 'OTDOA or GNSS' |

9.2.2.56 U-TDOA Bit Count

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

Table 99

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

9.2.2.57 U-TDOA Time Interval

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

Table 100

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

9.2.2.58 Additional Method Type

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

Table 101

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

9.2.2.59 UE Positioning OTDOA Assistance Data

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

Table 102

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
|--|----------|-------|----------------------------------|--|-------------|----------------------|
| UE Positioning OTDOA Reference Cell Info | O | | | | – | |
| >SFN | O | | INTEGER (0..4095) | Time stamp (SFN of Reference Cell) of the SFN-SFN relative time differences and SFN-SFN drift rates. Included if any SFN-SFN drift value is included in IE <i>UE positioning OTDOA neighbour cell info</i> . | – | |
| >CHOICE mode | | | | | – | |
| >>Fdd | | | | | – | |
| >>>Primary CPICH Information | M | | Primary scrambling code 9.2.2.46 | | – | |
| >>Tdd | | | | | – | |
| >>>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 <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the <i>Round Trip Time</i> IE. | YES | ignore |
| >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 | | ENUMERATE D (A, B, C, D, E, | According to mapping in TS 25.123 [14] | – | |

| | | | | | | |
|---|---|------------------|--|---|--|---|
| | | | F, G, H,...) | | | |
| UE Positioning OTDOA Neighbour Cell List | O | | | | | – |
| >UE positioning 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 | | – |

| | | | | | | |
|----------------------------|---|--|-------------------------|---|-----|--------|
| >>> <i>UE assisted</i> | | | | | – | |
| >>Extended Round Trip Time | O | | INTEGER (32767..103041) | In chips. Included if cell is in active set. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the <i>Round Trip Time</i> IE. | YES | ignore |

Table 103

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

9.2.2.60 UL TrCH information

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

Table 104

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

9.2.2.61 Semi-static Transport Format Information

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

Table 105

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

Table 106

| Condition | Explanation |
|-----------|--|
| Coding | This IE shall be present if Type of channel coding IE is 'Convolutional' or 'Turbo'. |

Table 107

| Constant | Explanation | Value |
|----------|-------------|-------|
|----------|-------------|-------|

| 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) | <p>The positioning data discriminator defines the type of data provided for each positioning method:</p> <p>0000 indicates the presence of the <i>Positioning Data Set</i> IE (that reports the usage of each non-GANSS method that was successfully used to obtain the location estimate)</p> <p>0001 indicates the presence of the 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 <i>Positioning Data Set</i> IE</p> <p>1 octet of data is provided for each positioning method included.</p> <p>All other values are reserved.</p> | – | |
| >Positioning Data Set | C- ifDiscriminator=0 | | | | – | |

| | | | | | | |
|--------------------------------|--|-------------|------------------|--|-----|--------|
| >>Positioning Method and Usage | | 1..<maxSet> | OCTET STRING (1) | <p>Coding of positioning method (bits 8-4): 00000 Reserved 00001 Reserved 00010 Reserved 00011 Reserved 00100 Reserved 00101 Mobile Assisted GPS 00110 Mobile Based GPS 00111 Conventional GPS 01000 U-TDOA 01001 OTDOA 01010 IPDL 01011 RTT 01100 Cell ID 01101 to 01111 reserved for other location technologies 10000 to 11111 reserved for network specific positioning methods</p> <p>Coding of usage (bits 3-1): 000 Attempted unsuccessfully due to failure or interruption - not used. 001 Attempted successfully: results not used to generate location - not used. 010 Attempted successfully: results used to verify but not generate location - not used. 011 Attempted successfully: results used to generate location 100 Attempted successfully: case where MS supports multiple mobile based positioning methods and the actual method or methods used by the MS cannot be determined.</p> | - | |
| >GANSS Positioning Data Set | | | 0..1 | | YES | ignore |

| | | | | | | |
|---|--|---------------------|---------------------|---|---|--|
| >>GANSS Positioning Method and Usage | | 1.<maxGANS SSet> | 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 <i>Positioning Data Discriminator</i> IE is set to "0000" |

Table 113

| Range bound | Explanation |
|--------------|---|
| maxSet | Maximum size of the data set. Value is 9. |
| maxGANSSTSet | 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 |
|--|----------|-------|-----------------------|-----------------------|
| <i>CHOICE Geographical Area</i> | | | | |
| > <i>Point</i> | | | | Ellipsoid point |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| > <i>Ellipsoid point with altitude</i> | | | | |
| >>Geographical Coordinates | M | | 9.2.2.7 | |
| >>Altitude and direction | M | | 9.2.2.2 | |

9.2.2.71 UE Positioning IPDL Parameters

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

Table 121

| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
|-----------------------|----------|-------|---------------------------------------|-----------------------|
| <i>CHOICE mode</i> | | | | |
| > <i>FDD</i> | | | | |
| >>IP Spacing | M | | 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] |
| > <i>TDD</i> | | | | |
| Burst Mode Parameters | O | | 9.2.2.72 | |

9.2.2.72 Burst Mode Parameters

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

Table 122

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

9.2.2.73 SFN-SFN Relative Time 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 <i>RRC State</i> | M | | | |
| > <i>CELL_DCH</i> | | | | |
| >>Uplink DPCH Information | M | | 9.2.2.41 | |
| >>Compressed Mode Assistance Data | O | | 9.2.2.44 | FDD only |
| >> DCH Information | | 0..1 | | |
| >>> TFCS | | 1..<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 | |
| > <i>CELL_FACH</i> | | | | |
| >>PRACH Parameters | M | | 9.2.2.43 | |
| >>C-RNTI | M | | 9.2.2.45 | |
| >>USCH parameters | O | | 9.2.2.95 | TDD only |

Table 125

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

9.2.2.75 Maximum Set of E-DPDCHs

The Maximum Set of E-DPDCHs parameter, as defined in 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 | | <i>0..<maxnoofRefETFCIs></i> | | |
| >Reference E-TFCI | M | | INTEGER (0..127) | |
| >Reference E-TFCI Power Offset | M | | 9.2.2.78 | |

Table 129

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

9.2.2.78 Reference E-TFCI Power Offset

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

Table 130

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
|-------------------------------|----------|-------|-----------------------|--|
| Reference E-TFCI Power Offset | | | INTEGER (0..8) | According to mapping in ref. 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 Offset for each DPCH in this CCTrCH shall be 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 <i>Offset Type</i> | | | | |
| > <i>Initial Offset</i> | | | | |
| >>TDD DPCH Offset Value | M | | INTEGER (0..255) | |
| > <i>No Initial Offset</i> | | | | |
| >>TDD DPCH Offset Value | M | | INTEGER (0..63) | |

9.2.2.86 UL Timeslot Information

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

Table 138

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

Table 138A

| Range Bound | Explanation |
|--------------------|---|
| <i>maxnoofULts</i> | Maximum number of allocated time slots for an UL DPCH. The value of <i>maxnoofULts</i> 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 <i>Burst Type</i> | | | | |
| > <i>Type1</i> | | | | |
| >>Midamble Configuration Burst Type 1 And 3 | M | | INTEGER (4, 8, 16) | As defined in TS 25.221 [19]. |
| >>CHOICE <i>Midamble Allocation Mode</i> | M | | | |
| >>>Default <i>Midamble</i> | | | NULL | |
| >>>Common <i>Midamble</i> | | | NULL | |
| >>>UE Specific <i>Midamble</i> | | | | |
| >>Midamble Shift Long | M | | INTEGER (0..15) | |
| > <i>Type2</i> | | | | |
| >>Midamble Configuration Burst Type 2 | M | | INTEGER (3,6) | As defined in TS 25.221 [19]. |
| >>CHOICE <i>Midamble Allocation Mode</i> | M | | | |
| >>>Default <i>Midamble</i> | | | NULL | |
| >>>Common <i>Midamble</i> | | | NULL | |
| >>>UE Specific <i>Midamble</i> | | | | |
| >>Midamble Shift Short | M | | INTEGER (0..5) | |
| > <i>Type3</i> | | | | UL only |
| >>Midamble Configuration Burst Type 1 And 3 | M | | INTEGER (4, 8, 16) | As defined in TS 25.221 [19]. |
| >>CHOICE <i>Midamble Allocation Mode</i> | M | | | |
| >>>Default <i>Midamble</i> | | | NULL | |
| >>>UE Specific <i>Midamble</i> | | | | |
| >>Midamble Shift Long | M | | INTEGER (0..15) | |

9.2.2.89 TFCI Presence

The TFCI Presence parameter indicates whether the TFCI shall be included. [TDD - If it is present in the timeslot, it will be mapped to the channelisation code defined by 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..<maxno ofDPCHs> | | |
| >TDD Channelisation Code | M | | 9.2.2.91 | |

Table 143

| Range Bound | Explanation |
|--------------|---------------------------------------|
| maxnoofDPCHs | Maximum number of DPCHs in one CCTrCH |

9.2.2.91 TDD Channelisation Code

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

Table 144

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

9.2.2.92 Special Burst Scheduling

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

Table 145

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

9.2.2.93 Max PRACH Midamble Shift

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

Table 146

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

9.2.2.94 PRACH Midamble

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

Table 147

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

9.2.2.95 USCH Parameters

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

Table 148

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

Table 149

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

9.2.2.96 USCH Scheduling Offset

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

Table 150

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

9.2.2.97 Include Velocity

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

Table 151

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

9.2.2.98 Velocity Estimate

The *Velocity Estimate* IE is used to describe the UE's velocity. The reference system is the same as used in TS 23.032 [11].

Table 152

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

9.2.2.99 Horizontal Speed and Bearing

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

Table 153

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

9.2.2.100 Vertical Velocity

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

Table 154

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

9.2.2.101 GPS Positioning Instructions

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

Table 155

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

9.2.2.102 UE Position Estimate Info

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

Table 156

| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description | Criticality | Assigned Criticality |
|---|----------|-------|--|---|-------------|----------------------|
| CHOICE <i>Reference Time</i> | M | | | | – | |
| >UTRAN GPS <i>reference time Result</i> | | | 9.2.2.104 | | – | |
| >GPS <i>reference time only</i> | | | | | – | |
| >>GPS TOW msec | M | | INTEGER (0..6.048*10 ⁸ -1, ...) | GPS Time of Week in milliseconds. | – | |
| >Cell <i>timing</i> | | | | | – | |
| >>SFN | M | | INTEGER (0..4095) | SFN during which the position was calculated. | – | |
| >>UC-ID | M | | UTRAN Cell Identifier 9.2.2.37 | Identifies the reference cell for SFN. | – | |
| >UTRAN GANSS <i>reference time result</i> | | | | | – | |
| >>UTRAN-GANSS Reference Time Result | M | | 9.2.2.136 | | YES | ignore |
| >GANSS <i>reference time only</i> | | | | | – | |
| >>GANSS <i>reference time only</i> | M | | | | YES | ignore |
| >>>GANSS TOD msec | M | | INTEGER(0..35 99999) | 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 1/16 th 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 $T_{\text{UTRAN-GPS}}$ Drift Rate

Table 159

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

9.2.2.106 Periodic Position Calculation Info

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

Table 160

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

9.2.2.107 Periodic Location Info

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

Table 161

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

9.2.2.108 Amount of Reporting

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

Table 162

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

9.2.2.109 Measurement Instructions Used

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

Table 163

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

9.2.2.110 RRC State Change

Table 164

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

9.2.2.111 Periodic Position Termination Cause

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

Table 165

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

9.2.2.112 Requested Cell-ID Measurements

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

Table 166

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

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

Table 167

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description | Criticality | Assigned Criticality |
|-------------------------------------|-------------------------|-------------------------------|---|---|-------------|----------------------|
| DGNSS Reference Time | M | | INTEGER (0..3570 by step of 30) | Seconds. Time in GNSS system time (modulo 3600 s) when the DGNSS corrections were calculated | – | |
| DGNSS Information | | <i>1..<maxSgnType></i> | | | – | |
| >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) | | – | |
| >DGNSS Signal Information | C- <i>Status/Health</i> | <i>1..<maxGANSSSat></i> | | | – | |
| >>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 |
|----------------------|---|
| <i>Status/Health</i> | This IE shall be present if the Status/Health IE value is not equal to "no data" or "invalid data". |

9.2.2.114 GANSS Almanac and Satellite Health

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

Table 168

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description | 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 <i>Almanac Model</i> | M | | | | – | |
| > <i>Keplerian Parameters</i> | | | | 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.. <maxG ANSSS atAlmanac> | | 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 <i>Keplerian Parameters</i> | | | | 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 | | 1.. | | | – | |

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description | Criticality | Assigned Criticality |
|--|----------|-------------------------------------|-----------------------|--|-------------|----------------------|
| NAV-KP | | <maxG 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.. <maxG ANSSS atAlmanac> | | | – | |
| >>>>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]) | – | |

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description | Criticality | Assigned Criticality |
|--------------------------------------|----------|-------------------------------------|-----------------------|--|-------------|----------------------|
| >>>>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 [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.. <maxG ANSSS atAlmanac> | | | – | |
| >>>>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]) | – | |

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description | Criticality | Assigned Criticality |
|--------------------------------------|----------|-------------------------------------|-----------------------|---|-------------|----------------------|
| >>>>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]) | – | |
| >GLONASS Keplerian Parameters | | | | Model 5 | | |
| >>Keplerian GLONASS | M | | | | YES | ignore |
| >>>>Satellite information GLO-KP | | 1.. <maxG ANSSS atAlmanac> | | | – | |
| >>>>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 _{gn} ^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] | – | |
| >>>>ΔT_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.. <maxG ANSSS atAlmanac> | | | – | |
| >>>>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]) | – | |

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description | Criticality | Assigned Criticality |
|-----------------------------------|----------|-------|-----------------------|---|-------------|----------------------|
| >>>>Y _G Rate-of-Change | M | | BIT STRING (3) | meters/sec (DTFA01-96-C-00025 [26]) | – | |
| >>>>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 | | <i>1..<maxGANSSClockMod></i> | | 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 <i>Additional Clock Models</i> | | | | |
| >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]) |
| >>UR _{Aoc} 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]) |
| >>UR _{Aoc1} 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]) |
| >>UR _{Aoc2} 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_{Gf0} | M | | BIT STRING (12) | (seconds) (DTFA01-96-C-00025 [26]) |
| > a_{Gr1} | 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 ₁₀ | M | | BIT STRING(12) | This parameter is used as defined in OS SIS ICD [22] |
| a ₁₁ | M | | BIT STRING(12) | This parameter is used as defined in OS SIS ICD [22] |
| a ₁₂ | 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 |
|--|----------|---------------|---|---|-------------|----------------------|
| <i>CHOICE Reference Time</i> | M | | | | – | |
| > <i>UTRAN Reference Time</i> | | | | 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 GANSS 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. | – | |
| > <i>GANSS Reference Time Only</i> | | | | | – | |
| >>GANSS TOD msec | M | | INTEGER(0..3599999) | GANSS Time of Day (modulo 1 hour) in milliseconds (rounded down to the nearest millisecond unit). | – | |
| >>GANSS Time ID | O | | 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..<max GANSS | | | – | |

| 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..<max SgnType> | | | – | |
| >>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..<maxGANSS at> | | | – | |
| >>>Sat ID | M | | INTEGER(0..63) | Defined in TS 25.331 [4]. | – | |
| >>>C/N ₀ | M | | INTEGER(0..63) | the estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (typical levels will be in the range of 20 – 50 dB-Hz). | – | |
| >>>Multipath Indicator | M | | ENUMERATED(NM, low, medium, high) | Coding as in 9.2.2.12 | – | |
| >>>Carrier Quality Indicaton | O | | BIT STRING(2) | Coded as defined in 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 | – | |

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description | Criticality | Assigned Criticality |
|---------------|----------|-------|-----------------------|---|-------------|----------------------|
| | | | | UE for the 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 | | <i>1..<maxGANSSSat></i> | | |
| >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 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 additional 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 |
|-------------------------------|----------|-------|-----------------------|---|
| <i>CHOICE Orbit Model</i> | M | | | |
| > <i>Keplerian Parameters</i> | | | | 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]) |
| >>ldot | M | | BIT STRING(14) | Rate of Inclination Angle (semi-circles/sec) (OS SIS ICD [22]) |

| IE/Group name | Presence | Range | IE Type and Reference | Semantics description |
|----------------------|----------|-------|-----------------------|--|
| >>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]) |
| >>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 |
|---------------------------------------|----------|-------|-----------------------|--|
| <i>CHOICE Additional Orbit Models</i> | | | | |
| <i>>NAV-Keplerian Parameters</i> | | | | 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]) |

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

Table 173B

| Condition | Explanation |
|-------------------|--|
| <i>ClockModel</i> | This IE shall be present if 'SBAS Satellite Clock Model' (Model-5) in IE <i>GANSS Additional Clock Models</i> is not included in <i>GANSS Additional Navigation Models</i> 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 | | <i>1..<maxGANS SSat></i> | | | – | |
| >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 <i>nominal</i> wavelength of the assisted signal. | – | |
| >Extra Doppler | | <i>0..1</i> | | | – | |
| >>Doppler (1 st order term) | M | | INTEGER (-42..21) | Scaling factor 1/210 m/s ² | – | |
| >>Doppler Uncertainty | M | | ENUMERATED (40,20,10,5,2.5) | m/s. The Doppler experienced by a stationary UE is in the range 'Doppler – Doppler Uncertainty' to 'Doppler + Doppler Uncertainty'. | – | |
| >Code Phase | M | | INTEGER(0..1023) | ms, scaling factor 2 ⁻¹⁰ <i>Nominal</i> chipping rate of the GNSS signal shall be used in conversion. Increasing binary values of the field signify increasing predicted pseudoranges. | – | |
| >Integer Code Phase | M | | INTEGER(0..127) | ms. Integer code phase (expressed modulo 128 ms) currently being transmitted at the GANSS Reference Time, as seen by a receiver at the Reference Location | – | |
| >Code Phase Search Window | M | | INTEGER(0..31) | Expected code-phase is in the range 'Code Phase – Code Phase Search Window' to 'Code Phase + Code Phase Search Window'. Coded as defined in TS 25.331 [4]. | – | |
| >Azimuth and Elevation | | <i>0..1</i> | | | – | |
| >>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 $x \leq a < x+0.703125$ 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 $y \leq e < y+0.703125$ 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 | | <i>0..1</i> | | 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 <i>GANSS TOD IE</i> . 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-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 GANSS_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} | – | |
| GANSS_TO_ID | M | | ENUMERATED(GP S,..., 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 |
|-------------------|----------|-------|-----------------------|---------------------------|
| 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 |
|-------------------------------------|----------|-------|-----------------------|---|
| <i>CHOICE Additional UTC Models</i> | | | | |
| <i>>Model Set 1</i> | | | | |
| >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]) |
| <i>>Model Set 2</i> | | | | |
| >N ^A | M | | BIT STRING (11) | Calendar 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] |
| <i>>Model Set 3</i> | | | | |
| >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 | | | ENUMERATE D (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 <i>Data Bits</i> IE, in seconds. |
| Data Bit Assistance List | | 1..<maxGANS SSat> | | |
| >Sat ID | M | | INTEGER(0..63) | Defined in TS 25.331 [4]. |
| >Data Bit Assistance Sgn List | | 1..<maxSgnTy pe> | | |
| >>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 | | <i>0..1</i> | | |
| >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 | | <i>0..<maxSat></i> | | |
| >>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 | | <i>1..<max>S</i> | | | – | |
| >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 | | <i>0..1</i> | | | – | |
| >>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 | | <i>0..1</i> | | | – | |
| >>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 |

| | | | | | | |
|---|---|--|-----------|--|-----|--------|
| >GANSS Auxiliary Information | O | | 9.2.2.148 | | 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 <i>UE positioning GANSS additional assistance data request</i> 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) | <p>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"].</p> <p>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 $x = 0.18$.</p> <p>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.</p> |

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]) |
| $\Delta UT1$ | M | | BIT STRING (31) | UT1-UTC difference at reference time (seconds) (IS-GPS-200 [23]) |
| $\Delta UT1_dot$ | 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 <i>GANSS-ID</i> | | | | |
| > <i>GANSS-ID-1</i> | | | | 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]. |
| > <i>GANSS-ID-3</i> | | | | 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 <i>Sat ID</i> , 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..34559 9999999,...) | 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 <i>UE positioning GANSS additional assistance data request</i> 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 <i>UE positioning GANSS additional assistance data request</i> IE of TS 25.331 [4]. |
| >Clock Model ID | O | | INTEGER(0..7) | Coded as defined in the <i>UE positioning GANSS additional assistance data request</i> IE of TS 25.331 [4]. |
| >UTC Model ID | O | | INTEGER(0..7) | Coded as defined in the <i>UE positioning GANSS additional assistance data request</i> IE of TS 25.331 [4]. |
| >Almanac Model ID | O | | INTEGER(0..7) | Coded as defined in the <i>UE positioning GANSS additional assistance data request</i> 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 | | <i>1..<maxNoOfMeasurements></i> | | |
| >Cell-ID Measured Results Info List | M | | 9.2.2.31 | For SAS-centric mode. |

Table 209A

| Range Bound | Explanation |
|----------------------------|---|
| <i>maxNoOfMeasurements</i> | Maximum number of Measurements of <i>Cell-ID Measured Results Info List</i> and <i>OTDOA Measured Results Info List</i> included in the Position Calculation Request message. The value for <i>maxNoOfMeasurements</i> 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 <i>Time of Validity for UDRE Growth Rate</i> field is the value of this field times the value of UDRE provided in <i>DGPS Corrections</i> or <i>DGANSS corrections</i> 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 <i>UDRE Growth Rate</i> 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..65 535) | Location Area Code |
| CI | M | | INTEGER(0..65 535) | Cell Identifier |

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)) | <ul style="list-style-type: none"> - 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 <p>-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.</p> |

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)) | <ul style="list-style-type: none"> - 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 <p>Number of hexadecimal digits shall be 15.</p> |

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,
    UTDOPositioning,
    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
      PRESENCE optional },
    ...
  }

InformationExchangeObjectType-InfEx-Rqst ::= CHOICE {
  referencePosition
  ...,
  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 ::= {
    optional { 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,  
maxNrOfEDPCCCH-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-roundTripTimeInfoWithTypel,
id-AddMeasurementInfo,
id-Extended-RNC-ID,
id-GANSS-CommonAssistanceData,
id-GANSS-GenericAssistanceDataList,
id-GANSS-PositioningDataSet,
id-GNSS-PositioningMethod,
id-NetworkAssistedGANSSSupport,
id-TUTRANGANSSMeasurementValueInfo,
id-angleOfArrivalLCR,
id-extendedTimingAdvanceLCR,
id-additionalMeasurementInfoLCR,
id-timingAdvanceLCR-R7,
id-rxTimingDeviationLCR,
id-GPSReferenceTimeUncertainty,
id-GANSS-AddIonosphericModelReq,
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, -- FDD only
    roundTripTimeInfo                    RoundTripTimeInfo           OPTIONAL, -- 3.84Mcps TDD 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 ::=
  ue-RxTxTimeDifferenceType2          SEQUENCE {
  ue-PositioningMeasQuality           UE-RxTxTimeDifferenceType2,
  roundTripTime                       UE-PositioningMeasQuality,
  iE-Extensions                       RoundTripTime,
  ...                                  ProtocolExtensionContainer { { RoundTripTimeInfo-ExtIEs } }    OPTIONAL,
}

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

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

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

UE-RxTxTimeDifferenceType2 ::=
  INTEGER (0..8191)

UE-RxTxTimeDifferenceType1 ::=
  INTEGER (768..1280)

UE-PositioningMeasQuality ::=
  stdResolution                       SEQUENCE {
  numberOfMeasurements                BIT STRING (SIZE (2)),
  stdOfMeasurements                   BIT STRING (SIZE (3)),
  iE-Extensions                       BIT STRING (SIZE (5)),
  ...                                  ProtocolExtensionContainer { { UE-PositioningMeasQuality-ExtIEs } }    OPTIONAL,
}

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

```

```

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

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

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
    TDD only
    PRESENCE optional }, -- 1.28Mcps
    ...
}

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-Extensstions                      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-Extensstions                      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-Extensions          ProtocolExtensionContainer { { GERANCellGlobalID-ExtIEs }}          OPTIONAL,
    ...
}

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

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

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

GERANPhysicalCellID ::=          SEQUENCE {
    bsc                          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,
        roundTripTimeInfoWithTypelWanted  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 (8))

-- IMSI

IMSI ::=
    OCTET STRING (SIZE (3..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-lmsec                INTEGER (0..604799999),
    satelliteInformationList      AcquisitionSatInfoList,
    iE-Extensions                ProtocolExtensionContainer { { GPS-AcquisitionAssistance-ExtIEs } }    OPTIONAL,

```



```

}
...
}
GPS-AcquisitionAssistance-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  {ID id-UTRAN-GPSReferenceTime      CRITICALITY ignore  EXTENSION  UTRAN-GPSReferenceTime      PRESENCE optional} |
  {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-SBAscefcList      GANSS-SAT-Info-Almanac-SBAscefcList,
    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 } }
    ...
}

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 } }
    ...
}

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 } }
    ...
}

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

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

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
  mandatory} |
  { 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)),
  pmXdots             BIT STRING (SIZE (15)),
  pmY                 BIT STRING (SIZE (21)),
  pmYdots             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 }|
    optional }|
    { ID id-GANSS-Auxiliary-Information          CRITICALITY ignore EXTENSION GANSS-Auxiliary-Information          PRESENCE optional }|
    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-omegazerow-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)),
    gloAlmDeltaTA          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-SBAsSecef-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SAT-Info-Almanac-SBAsSecef-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 ::= {

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```

...
}

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

GANSS-Time-Model ::= SEQUENCE {
    ganss-time-model-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 } }
    ...
}

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

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

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

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

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

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-GLONASSsecef ::= 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-SBAsSecef ::= 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)),
    sbasYgDotDot     BIT STRING (SIZE (10)),
    sbasZgDotDot     BIT STRING (SIZE (10)),
    ie-Extensions    ProtocolExtensionContainer { { NavModel-SBAsSecef-ExtIEs } } OPTIONAL,
    ...
}

```

```

NavModel-SBAsceef-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)),
    utcWNof         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 {
    utcAlwnt        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..34559999999),
    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)),
  sflRevd                   SubFrame1Reserved,
  t-GD                      BIT STRING (SIZE (8)),

```

```

t-oc          BIT STRING (SIZE (16)),
af2           BIT STRING (SIZE (8)),
af1           BIT STRING (SIZE (16)),
af0           BIT STRING (SIZE (22)),
c-rs         BIT STRING (SIZE (16)),
delta-n      BIT STRING (SIZE (16)),
m0           BIT STRING (SIZE (32)),
c-uc         BIT STRING (SIZE (16)),
e            BIT STRING (SIZE (32)),
c-us         BIT STRING (SIZE (16)),
a-Sqrt       BIT STRING (SIZE (32)),
t-oe         BIT STRING (SIZE (16)),
fitInterval  BIT STRING (SIZE (1)),
aodo         BIT STRING (SIZE (5)),
c-ic         BIT STRING (SIZE (16)),
omega0       BIT STRING (SIZE (32)),
c-is         BIT STRING (SIZE (16)),
i0           BIT STRING (SIZE (32)),
c-rc         BIT STRING (SIZE (16)),
omega        BIT STRING (SIZE (32)),
omegaDot     BIT STRING (SIZE (24)),
iDot         BIT STRING (SIZE (14)),
iE-Extensions ProtocolExtensionContainer { { GPS-ClockAndEphemerisParameters-ExtIEs } } OPTIONAL,
...
}

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

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

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

GPS-Ionospheric-Model ::= SEQUENCE {
alfa0              BIT STRING (SIZE (8)),
alfal              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
    iE-Extensions
    ...
}

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

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

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

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

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-NO
            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 } }
        ...
    }

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

```

```

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

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

GPS-NavigationModel ::= SEQUENCE (SIZE (1..maxSat)) OF
    NavigationModelSatInfo

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

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

SatelliteStatus ::= ENUMERATED {
    ns-NN,
    es-SN,
    es-NN,
    rev2,
    rev }

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

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

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

```

```

NoBadSatellites ::= NULL

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

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

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

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

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

GPS-ReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-UTRAN-GPSReferenceTime  CRITICALITY ignore EXTENSION UTRAN-GPSReferenceTime  PRESENCE optional} |
    {ID id-GPS-UTRAN-TRU           CRITICALITY ignore EXTENSION GPS-UTRAN-TRU           PRESENCE optional} |
    {ID id-UTRAN-GPS-DriftRate     CRITICALITY ignore EXTENSION UTRAN-GPS-DriftRate     PRESENCE optional} |
    {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 lmin
    hour               INTEGER (1..24, ...),
    -- Unit hour, Step lhour
    ...
}

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

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

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

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

```
DganssCorrectionsReq ::= SEQUENCE {
  transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
  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 ::= {
    ...
}

```

```
}
Gnss-realTimeIntegrityReq ::= SEQUENCE {
    transmissionGnssTimeIndicator  TransmissionGnssTimeIndicator  OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { { Gnss-realTimeIntegrityReq-ExtIEs } } OPTIONAL,
    ...
}

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

Gnss-referenceMeasurementInfoReq ::= SEQUENCE {
    transmissionGnssTimeIndicator  TransmissionGnssTimeIndicator  OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { { Gnss-referenceMeasurementInfoReq-ExtIEs } } OPTIONAL,
    ...
}

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

Gnss-TimeModel-Gnss-Gnss ::= SEQUENCE{
    gnssTimeModelGnssGnssExt      BIT STRING (SIZE(9)),
    transmissionGnssTimeIndicator  TransmissionGnssTimeIndicator  OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { { Gnss-TimeModel-Gnss-Gnss-ExtIEs } } OPTIONAL,
    ...
}

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

TransmissionGnssTimeIndicator ::= 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 ::=
    ms-part          SEQUENCE {
    ls-part          INTEGER (0..16383),
                   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 ::=
    ms-part          SEQUENCE {
    ls-part          INTEGER (0..16383),
                   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             NetworkAssistedGPSSupport,
    supportGPSTimingOfCellFrame           BOOLEAN,
    supportForIPDL                        BOOLEAN,
    supportForRxTxTimeDiff                BOOLEAN,
    supportForUEAGPSinCellPCH             BOOLEAN,
    supportForSFNSFNTimeDiff              BOOLEAN,
    iE-Extensions                         ProtocolExtensionContainer { {UE-PositioningCapability-ExtIEs} } OPTIONAL,
    ...
}

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

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

NetworkAssistedGANSSSupport-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 } ,
    ...
}

NetworkAssistedGPSSupport ::= 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-Parameters      UE-Positioning-IPDL-Parameters  OPTIONAL,
iE-Extensions                        ProtocolExtensionContainer { { UE-Positioning-OTDOAReferenceCellInfo-ExtIEs } } OPTIONAL,
...
}

UE-Positioning-OTDOAReferenceCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-ExtendedRoundTripTime  CRITICALITY ignore  EXTENSION ExtendedRoundTripTime  PRESENCE optional } | -- FDD only
    { 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 {
        ip15, ip110, ... }

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
            primaryCPICH-Info      SEQUENCE {
                PrimaryScramblingCode,
                ...
            },
        tdd
            cellParameterID        SEQUENCE {
                CellParameterID,
                -- coding is FFS
                ...
            },
        ...
    },
    frequencyInfo      FrequencyInfo      OPTIONAL,
    ue-positioning-IPDL-Parameters 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
            relativeNorth      INTEGER (-20000..20000)      OPTIONAL,
            relativeEast        INTEGER (-20000..20000)      OPTIONAL,
            relativeAltitude     INTEGER (-4000..4000)        OPTIONAL,
            fineSFN-SFN          FineSFN-SFN              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,
        puncturingLimit         PuncturingLimit,
        repetitionPeriod        RepetitionPeriod,
        repetitionLength        RepetitionLength,
        tdd-DPCHOffset          TDD-DPCHOffset,
        uL-Timeslot-Information  UL-Timeslot-Information,
        frameOffset             FrameOffset,
        specialBurstScheduling   SpecialBurstScheduling,
        iE-Extensions           ProtocolExtensionContainer { { UL-DPCHInfoTDD-ExtIEs} } 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,
    ganSS-TodUncertainty   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
maxNrOfTTFs             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
maxGANS               INTEGER ::= 8
maxGANSSSet           INTEGER ::= 9
maxGANSSSatAlmanac   INTEGER ::= 36
maxGANSSClockMod     INTEGER ::= 4
maxGANS-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-NetworkAssistedGANSSSupport | 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 ::= 128 |
| id-IMEI | ProtocolIE-ID ::= 129 |

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.

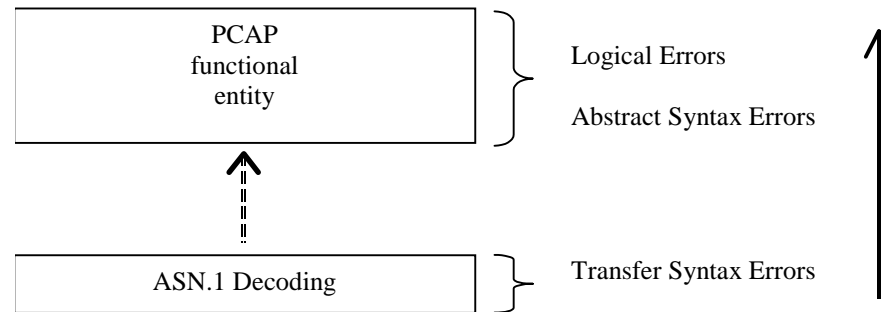


Figure 10: Protocol Errors in PCAP

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, then 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.

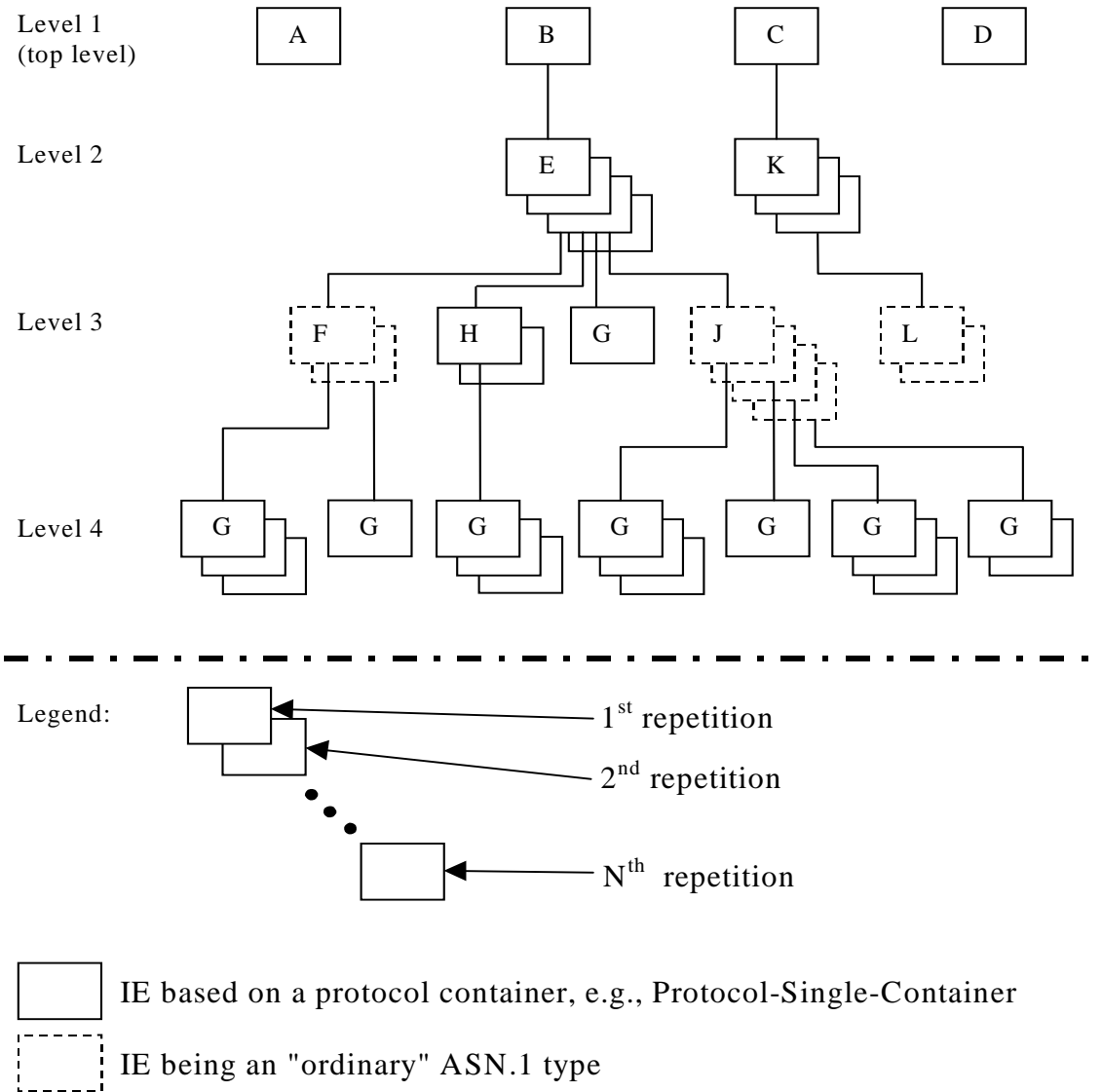


Figure A.1: Example of content of a received PCAP message based on the EXAMPLE MESSAGE

A.3 Content of Criticality Diagnostics

A.3.1 Example 1

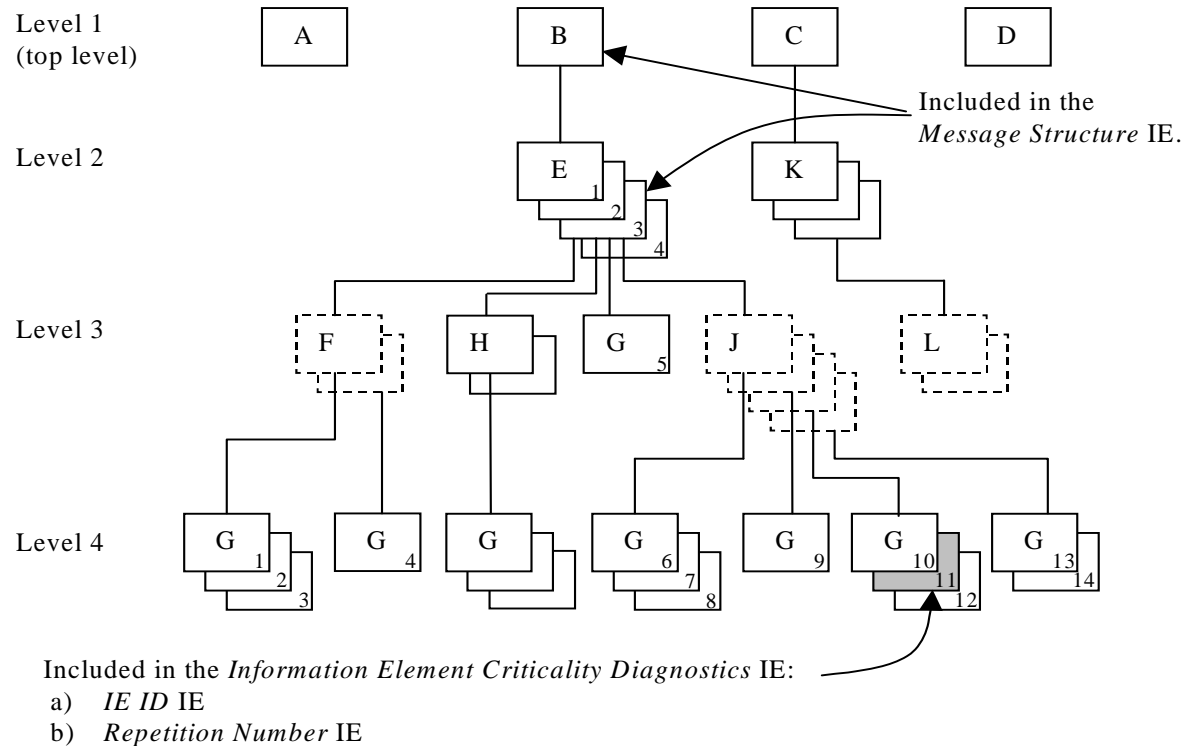


Figure A.2: Example of a received PCAP message containing a not comprehended IE

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

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

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

A.3.2 Example 2

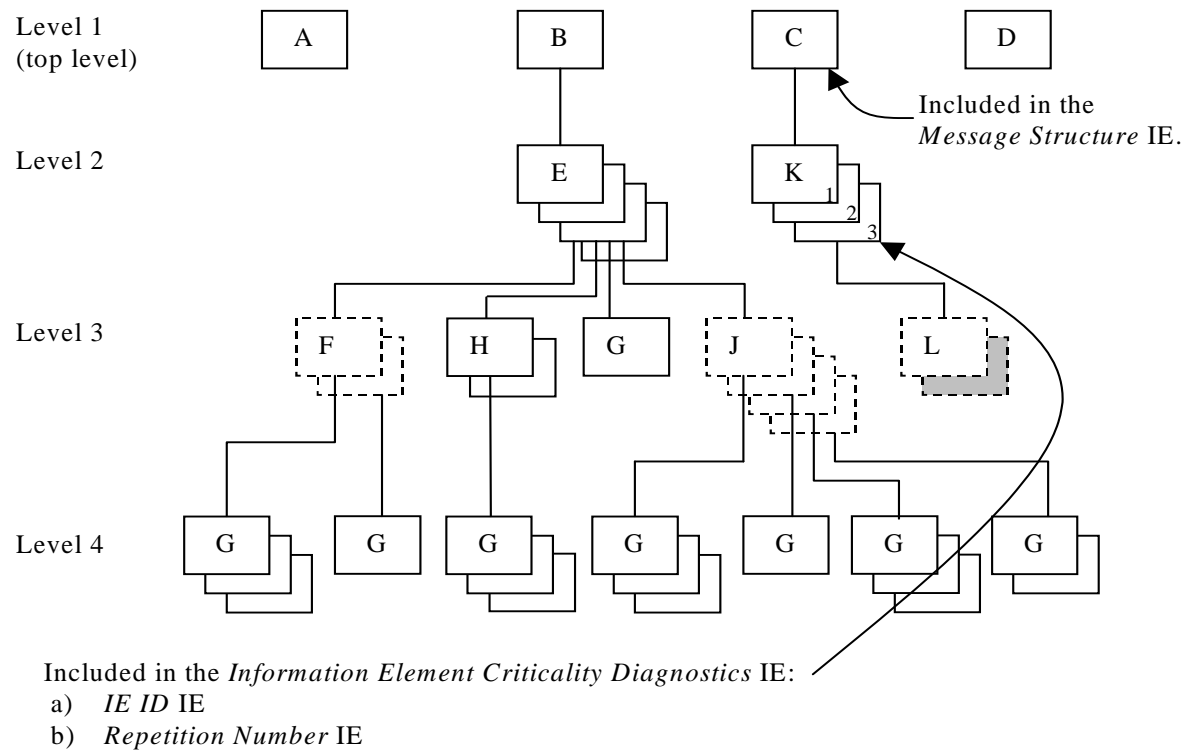


Figure A.3: Example of a received PCAP message containing a not comprehended IE

If there is an error within the second instance (marked as grey) in the sequence (IE L in the tabular format) on level 3 below IE K in the structure shown in the figure A.3, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IE* 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 | |
| <i>Message Structure, first repetition</i> | | |
| >IE ID | id-C | IE ID from the lowest level above the reported level, i.e. level 1. |

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

A.3.3 Example 3

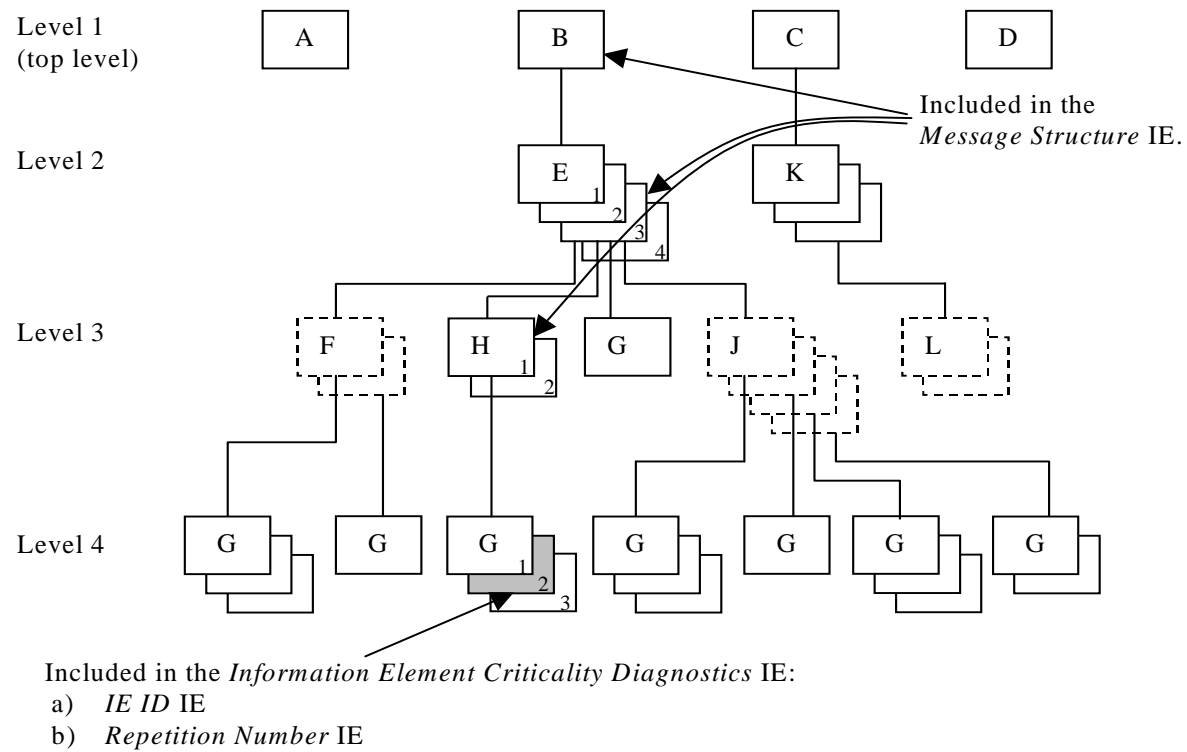


Figure A.4: Example of a received PCAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE H shown in the figure A.4, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics 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 | |
| <i>Message Structure, first repetition</i> | | |
| >IE ID | id-B | IE ID from level 1. |
| <i>Message Structure, second repetition</i> | | |
| >IE ID | id-E | IE ID from level 2. |
| >Repetition Number | 3 | Repetition number from level 2. |
| <i>Message Structure, third repetition</i> | | |
| >IE ID | id-H | IE ID from the lowest level above the reported level, i.e. level 3. |
| >Repetition Number | 1 | Repetition number from the lowest level above the reported level, i.e. level 3. |

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

A.3.4 Example 4

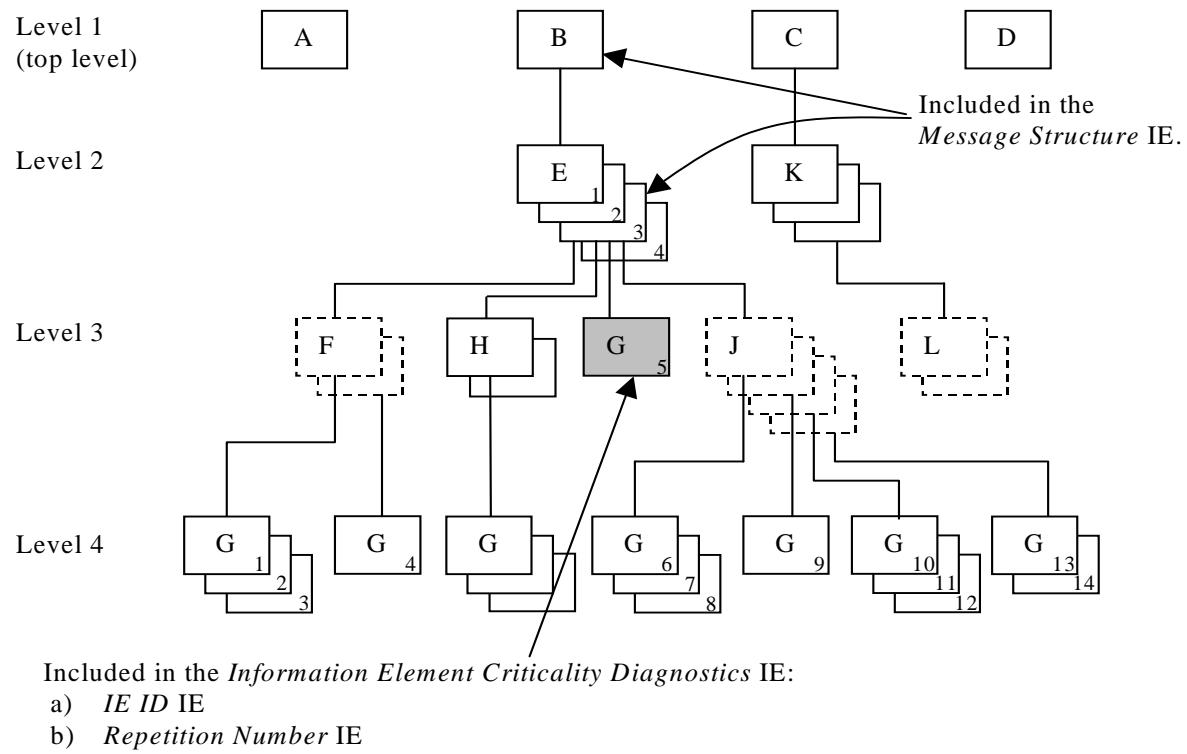


Figure A.5: Example of a received PCAP message containing a not comprehended IE

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

Table A.5

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

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

A.3.5 Example 5

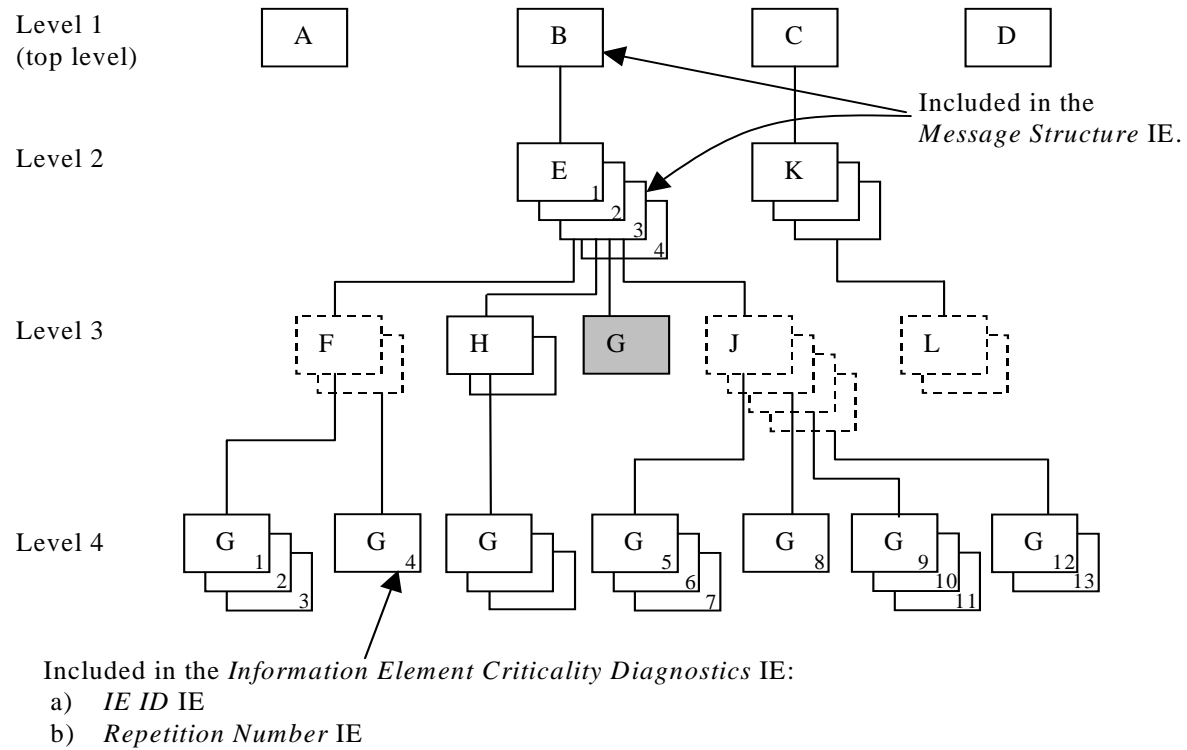


Figure A.6: Example of a received PCAP message with a missing IE

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

Table A.6

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

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

A.4 ASN.1 of EXAMPLE MESSAGE

```

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

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

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

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

```

```

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

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

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

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

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

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

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

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

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

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

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

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

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

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

```

```

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

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

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

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

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

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

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

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

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

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

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

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

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

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

```

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

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

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

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


Annex B (informative): Change History

| 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 | DGNSS 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 |
| 62 | RP-131901 | 0138 | 1 | Correct ASN.1 definitions of IMSI and IMEI | 10.4.0 |
| 62 | RP-131689 | 0145 | 2 | Correction to Galileo Assistance Data Elements | 10.4.0 |

History

| Document history | | |
|-------------------------|--------------|-------------|
| V10.2.0 | April 2011 | Publication |
| V10.3.0 | July 2011 | Publication |
| V10.4.0 | January 2014 | Publication |
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