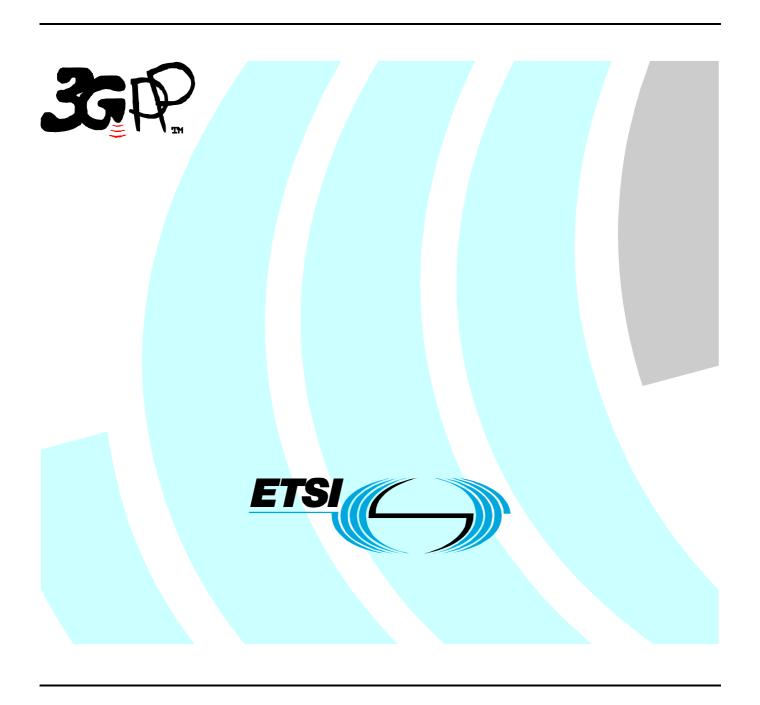
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Technical Specification

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UTRAN lupc interface Positioning Calculation
Application Part (PCAP) signalling
(3GPP TS 25.453 version 7.10.0 Release 7)



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# **Foreword**

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# 1 Scope

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

# 2 References

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

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

[1]	3GPP TS 25.450: "UTRAN Iupc interface general aspects and principles".
[2]	3GPP TS 25.451: "UTRAN Iupc interface layer 1".
[3]	3GPP TS 25.452: "UTRAN Iupc interface signalling transport".
[4]	3GPP TS 25.331: "Radio Resource Control (RRC) Protocol Specification".
[5]	3GPP TS 25.401: "UTRAN Overall Description".
[6]	3GPP TS 25.305: "Stage 2 functional specification of UE positioning in UTRAN".
[7]	$ITU-T\ Recommendation\ X.680\ (07/2002): "Information\ technology\ -\ Abstract\ Syntax\ Notation\ One\ (ASN.1): Specification\ of\ basic\ notation".$
[8]	ITU-T Recommendation X.681 07/2002): "Information technology - Abstract Syntax Notation One (ASN.1): Information object specification".
[9]	ITU-T Recommendation X.691 (07/2002): "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".
[10]	ICD-GPS-200: (12 April 2000) "Navstar GPS Space Segment/Navigation User Interface".
[11]	3GPP TS 23.032: "Universal Geographical Area Description (GAD)".
[12]	3GPP TR 25.921: "Guidelines and principles for protocol description and error handling".
[13]	3GPP TS 25.133: "Requirements for support of Radio Resource management (FDD)".
[14]	3GPP TS 25.123: "Requirements for support of Radio Resource management (TDD)".
[15]	3GPP TS 22.071: "Location Services (LCS); Service Description; Stage1".
[16]	3GPP TS 25.212: "Multiplexing and Channel Coding (FDD)".
[17]	3GPP TS 25.213: "Spreading and Modulation (FDD)".
[18]	3GPP TS 25.223: "Spreading and Modulation (TDD)".
[19]	3GPP TS 25.221: "Physical channels and mapping of transport channels onto physical channels (TDD)".
[20]	3GPP TS 25.101: "User Equipment (UE) radio transmission and reception (FDD)".

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

#### 3 Definitions and abbreviations

#### 3.1 Definitions

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

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

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

**Elementary Procedure:** PCAP consists of Elementary Procedures (EPs).

An Elementary Procedure is a unit of interaction between the RNC and the SAS. An EP consists of an initiating message and possibly a response message. Two kinds of EPs are used:

- Class 1: Elementary Procedures with response (success or failure).
- Class 2: Elementary Procedures without response.

For Class 1 EPs, the types of responses can be as follows:

#### Successful:

 A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

#### Unsuccessful:

- A signalling message explicitly indicates that the EP failed.

Class 2 EPs are considered always successful.

**Information Exchange Context:** Information Exchange Context is created by the first Information Exchange Initiation Procedure initiated by the RNC and requested from the SAS.

The Information Exchange Context is deleted after the Information Exchange Termination or the Information Exchange Failure procedure when there is no more Information Exchange to be provided by the RNC to the SAS. The Information Exchange Context is identified by an SCCP connection as, for Information Exchanges, only the connection oriented mode of the signalling bearer is used.

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

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

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

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

#### 3.2 Abbreviations

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

A-GPS Assisted GPS

ASN.1 Abstract Syntax Notation One

CN Core Network
CRNC Controlling RNC
DGPS Differential GPS
EP Elementary Procedure
FDD Frequency Division Duplex

GANSS Galileo and Additional Navigation Satellite Systems

GNSS Global Navigation Satellite System

GPS Global Positioning System
MSC Mobile services Switching Center
OTDOA Observed Time Difference Of Arrival
PCAP Positioning Calculation Application Part

PRC Pseudorange Correction
RNC Radio Network Controller
RNS Radio Network Subsystem
RRC Radio Resource Control
SAS Stand-Alone SMLC

SCCP Signalling Connection Control Part

SIB System Information Block SMLC Serving Mobile Location Center

SRNC Serving RNC SRNS Serving RNS

TDD Time Division Duplex

TOD Time of Day
TOW Time of Week
UE User Equipment

U-TDOA Uplink Time Difference Of Arrival

UTRAN Universal Terrestrial Radio Access Network

# 4 General

# 4.1 Procedure Specification Principles

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

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

- The procedure text discriminates between:
  - 1) Functionality which "shall" be executed:
    - The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the REQUEST message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.
  - 2) Functionality which "shall, if supported" be executed:
    - The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

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

# 4.2 Forwards and Backwards Compatibility

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

# 4.3 Specification Notations

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

- [FDD] This tagging of a word indicates that the word preceding the tag "[FDD]" applies only to FDD. This tagging of a heading indicates that the heading preceding the tag "[FDD]" and the section following the heading applies only to FDD.
- [TDD] This tagging of a word indicates that the word preceding the tag "[TDD]" applies only to TDD, including 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[TDD]" and the section following the heading applies only to TDD, including 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD.
- [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.
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- [7.68Mcps TDD ...] This tagging indicates that the enclosed text following the "[7.68Mcps TDD " applies only to 7.68Mcps TDD. Multiple sequential paragraphs applying only to 7.68Mcps TDD are enclosed separately to enable insertion of FDD and TDD specific (or common) paragraphs between the 7.68Mcps TDD specific paragraphs.
- Procedure When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Position Calculation procedure.

Message When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. POSITION CALCULATION

REQUEST message.

IE When referring to an information element (IE) in the specification the *Information Element Name* 

is written with the first letters in each word in upper case characters and all letters in Italic font

followed by the abbreviation "IE", e.g. Request Type IE.

Value of an IE When referring to the value of an information element (IE) in the specification the "Value" is

written as it is specified in clause 9.2 enclosed by quotation marks, e.g. "Abstract Syntax Error

(Reject)" or "Geographical Coordinates ".

# 5 PCAP Services

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

- 1. Position Calculation Service: They are related to a single UE and involve the transfer of UE Positioning measurement data and UE position estimate data over the Iupc interface between the SRNC and the SAS. They utilise connectionless signalling transport provided by the Iupc signalling bearer.
- 2. Information Exchange Service: They involve the transfer of GPS or GANSS related data over the Iupc interface between the RNC and the SAS on demand, on modification, or at regular intervals. They utilise connection-oriented signalling transport provided by the Iupc signalling bearer.
- 3. SAS Centric Position Service: They are related to the capability of the SAS to determine the positioning method used for individual positioning events. In this case the SRNC may allow A-GPS, A-GANSS, OTDOA, Cell ID and U-TDOA positioning events for a single UE to be originated by the SAS via PCAP messages. They utilise connection-oriented signalling transport provided by the Iupc signalling bearer.

# 6 Services Expected from Signalling Transport

Signalling transport [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	Initiating	Successful Outcome	Unsuccessful Outcome
Procedure	Message	Response message	Response message
Position Calculation	POSITION CALCULATION REQUEST	POSITION CALCULATION RESPONSE	POSITION CALCULATION FAILURE
Information Exchange Initiation	IINFORMATION EXCHANGE INITIATION REQUEST	INFORMATION EXCHANGE INITIATION RESPONSE	INFORMATION EXCHANGE INITIATION FAILURE
Position Initiation	POSITION INITIATION REQUEST	POSITION INITIATION RESPONSE	POSITION INITIATION FAILURE
Position Activation	POSITION ACTIVATION REQUEST	POSITION ACTIVATION RESPONSE	POSITION ACTIVATION FAILURE

**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** 

Table 3: Class 2

#### 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

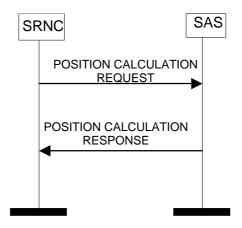


Figure 1: Position Calculation procedure, Successful Operation

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 "Galileo" does not contain the *GANSS Signal ID* IE, the SAS shall assume the value "Galileo L1 OS" (see [22]).
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* 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 [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity* IE.

#### **Response Message:**

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

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

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

#### 8.2.3 Unsuccessful Operation

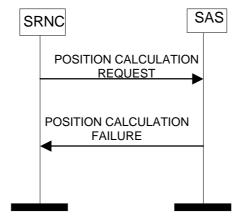


Figure 2: Position Calculation procedure, Unsuccessful Operation

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

Typical cause values are:

- Invalid reference information;
- Position calculation error: invalid GPS or Galileo measured results:
- Initial UE Position Estimate missing;
- Processing Overload;
- Hardware Failure:
- O&M Intervention;
- Invalid U-TDOA measured results;
- U-TDOA positioning method not supported;
- U-TDOA positioning method not supported in specified UTRAN cell;
- SAS unable to perform U-TDOA positioning within Response Time.

#### 8.2.4 Abnormal Conditions

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

If the *RRC State* 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

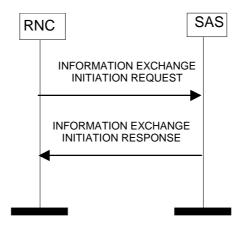


Figure 3: Information Exchange Initiation procedure, Successful Operation

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 or GANSS Reference Location types shall be requested.

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

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

#### **Information Report Characteristics:**

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

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

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

If the *Information Report Characteristics* IE is set to "On-Modification", the SAS shall report the requested information immediately if available. If the requested information is not available at the moment of receiving the INFORMATION EXCHANGE INITIATION REQUEST message, but expected to become available after some acquisition time, the SAS shall initiate the Information Reporting procedure when the requested information becomes available. The SAS shall then initiate the Information Reporting procedure in accordance to the following conditions:

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Almanac and Satellite Health", the SAS shall initiate the Information Reporting procedure for this specific Explicit

Information Type when a change in the  $t_{oa}$  or  $WN_a$  parameter has occurred in almanac/health information for at least one visible satellite.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "UTC Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t<sub>ot</sub> or WN<sub>t</sub> 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<sub>oa</sub>, IOD<sub>a</sub>, 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<sub>ot</sub> or WN<sub>t</sub> 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 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 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 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 any of the above *Information Type* IEs becomes temporarily unavailable, the SAS shall initiate the Information Reporting procedure for this specific Information Item by indicating "Information Not Available" in the *Requested Data Value Information* IE. If the Information becomes available again, the SAS shall initiate the Information Reporting procedure for this specific Information.

#### Response message:

If the SAS is able to determine the information requested by the RNC, it shall respond with the INFORMATION EXCHANGE INITIATION RESPONSE message. The message shall include the same Information Exchange ID that was included in the INFORMATION EXCHANGE INITIATION REQUEST message. When the *Report Characteristics* IE is set to "On Modification" or "Periodic", the INFORMATION EXCHANGE INITIATION RESPONSE message shall contain the *Requested Data Value* IE if the data are available. When the *Report Characteristics* IE is set to "On Demand", the INFORMATION EXCHANGE INITIATION RESPONSE message shall contain the *Requested Data Value* IE.

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

If the Requested DataValue IE contains the GANSS Common Assistance Data IE, at least one of the GANSS Reference Time, GANSS Ionospheric Model or GANSS Reference Location 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 DataValue 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 or GANSS Navigation Model 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 "Galileo" that does not contain the *GANSS Signal ID* IE is by default associated with "Galileo L1 OS" (see [22]).
- The *GANSS Real Time Integrity* IE contains one or several *Satellite Information* IEs, each of them associated with a satellite and a GANSS Signal. A *Satellite Information* IE for "Galileo" that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see [22]).
- The GANSS Reference Measurement Information IE is associated with a GANSS Signal. A GANSS Reference Measurement Information IE for "Galileo" that does not contain the GANSS Signal ID IE is by default associated with "Galileo L1 OS" (see [22]).

#### 8.3.3 Unsuccessful Operation

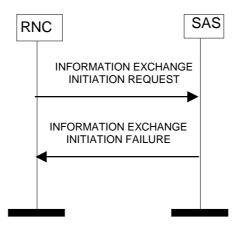


Figure 4: Information Exchange Initiation procedure, Unsuccessful Operation

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

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

Typical cause values are as follows:

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

#### 8.3.4 Abnormal Conditions

If the *Information Exchange Object Type* IE is set to "Reference Position" and the *Information Type* IE set to "Explicit" and the *Explicit Information Item* IE is set to "Reference Location" 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

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

# 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

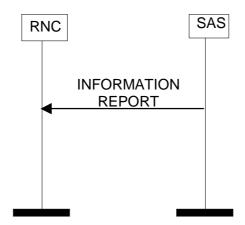


Figure 5: Information Reporting procedure, Successful Operation

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 DataValue IE contains the GANSS Common Assistance Data IE, at least one of the GANSS Reference Time, GANSS Ionospheric Model or GANSS Reference Location IEs shall be present.

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

#### 8.4.3 Abnormal Conditions

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# 8.5 Information Exchange Termination

#### 8.5.1 General

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

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

#### 8.5.2 Successful Operation

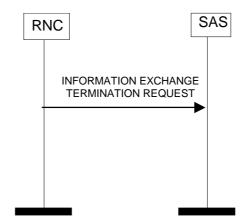


Figure 6: Information Exchange Termination procedure, Successful Operation

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

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

#### 8.5.3 Abnormal Conditions

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# 8.6 Information Exchange Failure

#### 8.6.1 General

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

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

#### 8.6.2 Successful Operation

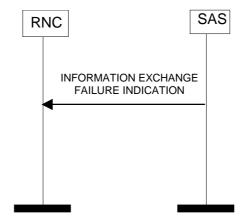


Figure 7: Information Exchange Failure procedure, Successful Operation

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

Typical cause values are as follows:

- Information temporarily not available.

#### 8.7 Error Indication

#### 8.7.1 General

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

#### 8.7.2 Successful Operation

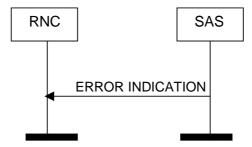


Figure 8: Error Indication procedure, SAS Originated, Successful Operation

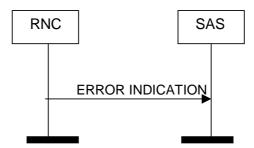


Figure 9: Error Indication procedure, RNC Originated, Successful Operation

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

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

Typical cause values are as follows:

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

#### 8.7.3 Abnormal Conditions

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#### 8.8 Position Initiation

#### 8.8.1 General

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

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

# 8.8.2 Successful Operation

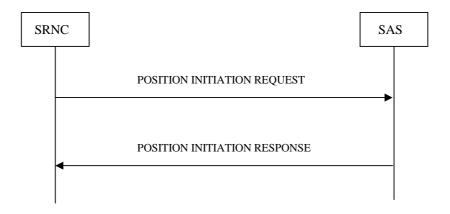


Figure 9a: Position Initiation procedure, Successful Operation

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

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

- If a *Network Assisted GANSS Support* IE does not contain the *GANSS ID* IE, the SAS shall assume that the corresponding GANSS is "Galileo".

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

#### Response Message:

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

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

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

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

#### 8.8.3 Unsuccessful Operation

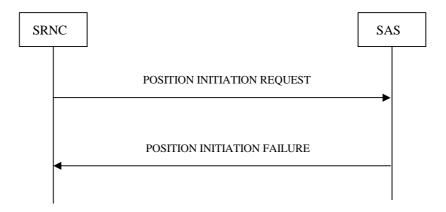


Figure 9b: Position Initiation procedure, Unsuccessful Operation

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

Typical cause values are:

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

#### 8.8.4 Abnormal Conditions

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

#### 8.9 Position Activation

#### 8.9.1 General

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

#### 8.9.2 Successful Operation

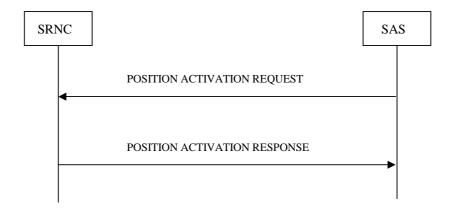


Figure 9c: Position Activation procedure, Successful Operation

The SAS initiates this procedure by sending a POSITION ACTIVATION REQUEST message to the SRNC containing the required positioning method and any assistance data and instructions associated with that positioning method. The SRNC then sends a POSITION ACTIVATION RESPONSE message to the SAS confirming the requested action and providing any information required by the requested positioning method; e.g. UE channel information for the U-TDOA positioning method or A-GPS measurements for UE assisted A-GPS. In the POSITION ACTIVATION RESPONSE message, the SRNC should include either the UE Position Estimate Info IE, GPS Measurement Results IE, 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 both, 'GPS' and 'Galileo', 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 POSITION ACTIVATION REQUEST message contains the *Position Method* IE with value "Cell ID", the *Amount of Reporting* IE shall not be included.

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

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

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

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

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

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

If the RRC State 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 "Galileo" does not contain the *GANSS Signal ID* IE, the SAS shall assume the value "Galileo L1 OS" (see [22]).
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* 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 [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity* IE.

#### 8.9.3 Unsuccessful Operation

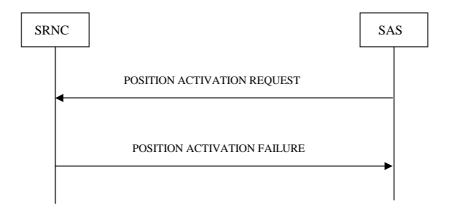


Figure 9d: Position Activation procedure, Unsuccessful Operation

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

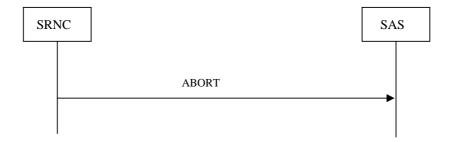


Figure 9f: Abort procedure, Successful Operation

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 "Galileo" does not contain the *GANSS Signal ID* IE, the SAS shall assume the value "Galileo L1 OS" (see [22]).
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* 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 [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity* IE.

#### 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

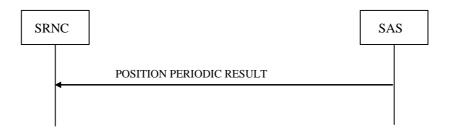


Figure 9h: Position Periodic Result procedure, Successful Operation

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 terminatation of an ongoing periodic location, or to inform a node about termination of periodic location in SAS-centric mode. This procedure uses connection-oriented signalling.

#### 8.14.2 Successful Operation

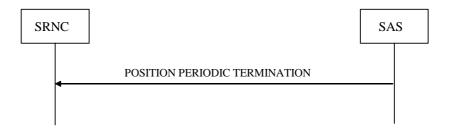


Figure 9i: Position Periodic Termination procedure, SAS Originated, Successful Operation

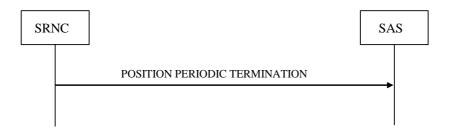


Figure 9k: Position Periodic Termination procedure, RNC Originated, Successful Operation

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

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

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

#### 8.14.3 Abnormal Conditions

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# 9 Elements for PCAP Communication

# 9.1 Message Functional Definition and Content

#### 9.1.1 General

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

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

### 9.1.2 Message Contents

#### 9.1.2.1 Presence

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

Table 4: Meaning of abbreviations used in PCAP messages

Abbreviation	Meaning	
M	IEs marked as Mandatory (M) shall always be included in the	
	message.	
0	IEs marked as Optional (O) may or may not be included in the	
	message.	
С	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
	Al to Britain Britain
_	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	0		Geographical		YES	reject
Estimate			Area 9.2.2.6			,
<b>GPS Measured Results</b>		0 <maxnoofsets< td=""><td></td><td></td><td>GLOBAL</td><td>reject</td></maxnoofsets<>			GLOBAL	reject
>GPS Measured Results	М		9.2.2.12		_	
Cell-ID Measured Results Sets		0 <maxnoofmea surements&gt;</maxnoofmea 			GLOBAL	reject
>Cell-ID Measured Results Info List	М		9.2.2.31		_	
OTDOA Measurement		01			YES	reject
Group						,
>OTDOA Reference Cell Info	М		9.2.2.34		_	
>OTDOA Neighbour Cell Info List		1 <maxnoofmea sNCell&gt;</maxnoofmea 			-	
>>OTDOA Neighbour Cell Info	М		9.2.2.33		_	
>OTDOA Measured		1 <maxnoofmea< td=""><td></td><td></td><td>_</td><td></td></maxnoofmea<>			_	
Results Sets		surements>				
>>OTDOA Measured Results Info List	М		9.2.2.32		_	
Horizontal Accuracy Code	0		9.2.2.38		YES	ignore
Vertical Accuracy Code	0		9.2.2.39		YES	ignore
UTDOA Group	0		9.2.2.74		YES	reject
SAS Response Time	0		Positioning Response Time 9.2.2.69	Indicates the interval allowed for a SAS response for U-TDOA positioning.	YES	ignore
Include Velocity	0		9.2.2.97		YES	ignore
Periodic Position Calculation Info	0		9.2.2.106		YES	ignore
GANSS Measured Results		0 <maxnoofsets< td=""><td></td><td></td><td>GLOBAL</td><td>reject</td></maxnoofsets<>			GLOBAL	reject
>GANSS Measured Results	М		9.2.2.117		_	

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

## 9.1.4 POSITION CALCULATION RESPONSE

Table 8

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		_	
UE Position Estimate	M		Geographical Area 9.2.2.6		YES	ignore
Criticality Diagnostics	0		9.2.2.4		YES	ignore
Accuracy Fulfilment Indicator	0		9.2.2.40		YES	ignore
Velocity Estimate	0		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	М		9.2.2.24		YES	reject
Transaction ID	М		9.2.2.28		-	
Cause	М		9.2.2.3		YES	ignore
Criticality Diagnostics	0		9.2.2.4		YES	ignore

# 9.1.6 INFORMATION EXCHANGE INITIATION REQUEST

Table 10

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		_	-
Information Exchange ID	M		9.2.2.19		YES	reject
CHOICE Information	M				YES	reject
Exchange Object Type						
>Reference Position					_	
>>Reference Position	M		Geographi	For RNC-	_	
Estimate/UE Initial			cal Area	centric		
Position			9.2.2.6	mode.		
>Additional Information						
Exchange Object Types						
>>Reference Position						
UC-ID						
>>>UTRAN Cell	M		UTRAN	For SAS-	_	
Identifier/UE Initial			Cell	centric		
Position			Identifier	mode.		
>>Cell-ID Measured		0	9.2.2.37		GLOBAL	:
>>Cell-ID Measured Results Sets		0 <max NoOfM</max 			GLOBAL	ignore
Results Sets		easure				
		ments>				
>>>Cell-ID	M	111011107	9.2.2.31	For SAS-	_	
Measured Results	IVI		0.2.2.01	centric		
Info List				mode.		
Information Type	М	1	9.2.2.22		YES	reject
Information Report	M		9.2.2.21		YES	reject
Characteristics						. 0,000
GPS-UTRAN Time	C-GPS		9.2.2.18		YES	reject
Relationship Uncertainty						.,
GANSS-UTRAN Time	C-GANSS		9.2.2.121		YES	reject
Relationship Uncertainty						<b>'</b>

#### 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	М		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		_	
Information Exchange ID	M		9.2.2.19		YES	ignore
CHOICE Information Exchange Object Type	0				YES	ignore
>Reference Position					_	
>>Requested Data Value	М		9.2.2.26		_	
Criticality Diagnostics	0		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	М		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	0		9.2.2.4		YES	ignore

### 9.1.9 INFORMATION REPORT

Table 14

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

## 9.1.10 INFORMATION EXCHANGE TERMINATION REQUEST

Table 15

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		_	
Information Exchange ID	М		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	М		9.2.2.24		YES	ignore
Transaction ID	М		9.2.2.28		_	
Information Exchange ID	М		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	0		9.2.2.3		YES	ignore
Criticality Diagnostics	0		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	0		9.2.2.39		YES	ignore
Response Time	0		9.2.2.52		YES	ignore
Positioning Priority	0		9.2.2.53		YES	ignore
Client Type	0		9.2.2.54		YES	ignore
Include Velocity	0		9.2.2.97		YES	ignore
Periodic Location Info	0		9.2.2.107		YES	ignore

### 9.1.14 POSITION INITIATION RESPONSE

Table 17b

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		_	
UE Position Estimate	M		Geographi cal Area 9.2.2.6		YES	reject
Position Data	М		9.2.2.65		YES	ignore
Accuracy Fulfilment Indicator	0		9.2.2.40		YES	ignore
Velocity Estimate	0		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	М		9.2.2.24		YES	reject
Transaction ID	М		9.2.2.28		_	
Cause	М		9.2.2.3		YES	ignore
Criticality Diagnostics	0		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	М		9.2.2.24		YES	reject
Transaction ID	М		9.2.2.28		1	-
Positioning Method	M		9.2.2.55		YES	reject
RNC Response Time	M		Positioning Response Time 9.2.2.69	Indicates the interval allowed for a RNC response, or the periodic reporting interval if Amount of Reporting IE is present.	YES	ignore
Positioning Priority	0		9.2.2.53		YES	ignore
Environment Characterisation	0		9.2.2.62		YES	ignore
U-TDOA Positioning		01		Only present if Positioning Method is U- TDOA	YES	reject
>U-TDOA Bit Count	М		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	I	
GPS Positioning		01		Only present if Positioning Method is A- GPS	YES	reject
>GPS Positioning Instructions	M		9.2.2.101		_	
>Requested Data Value	0		9.2.2.26		_	
OTDOA Assistance Data		01		Only present if Positioning Method is OTDOA	YES	reject
>UE Positioning OTDOA Assistance data	M		9.2.2.59		_	
Include Velocity	0		9.2.2.97		YES	ignore
Amount of Reporting	0		9.2.2.108	Amount of reports for periodic reporting.	YES	ignore
Cell-ID Positioning		01		Only present if Positioning Method is Cell-ID	YES	ignore
>Requested Cell-ID Measurements	M		9.2.2.112		_	
GANSS Positioning		01		Only present if Positioning Method is GNSS	YES	reject
>GANSS Positioning Instructions	M		9.2.2.120		1	

>Requested Data Value	0	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	М		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28			. 0,001
UE Position Estimate Info	0		9.2.2.102	Position information for UE based positioning methods	YES	ignore
GPS Measured Results		0 <ma xNoOfS ets&gt;</ma 			GLOBAL	reject
>GPS Measured Results	M		9.2.2.12		-	
Cell-ID Measured Results Sets		0 <ma xNoOf Measur ements &gt;</ma 			GLOBAL	reject
>Cell-ID Measured Results Info List	М		9.2.2.31		-	
OTDOA Measured Results Sets		0 <ma xNoOf Measur ements</ma 			GLOBAL	reject
>OTDOA Measured Results Info List	М		9.2.2.32		-	
UTDOA Group	0		9.2.2.74		YES	reject
Velocity Estimate	0		9.2.2.98		YES	ignore
Measurement Instructions Used	0		9.2.2.109		YES	ignore
GANSS Measured Results		0 <ma xNoOfS ets&gt;</ma 			GLOBAL	reject
>GANSS Measured Results	М		9.2.2.117		-	
Required GPS Assistance Data	0		Additional GPS Assistance Data Required 9.2.2.128		YES	ignore
Required GANSS Assistance Data	0		Additional GANSS Assistance Data Required 9.2.2.129		YES	ignore

#### Table 17f

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

## 9.1.18 POSITION ACTIVATION FAILURE

### Table 17g

IE/Group Name	Presence	Range	IE type	Semantics	Criticality	Assigned
			and	description		Criticality
			reference			
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	0		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	0		9.2.2.37		YES	reject
UTDOA Group	0		9.2.2.74		YES	reject
RRC State Change	0		9.2.2.110		YES	ianore

### 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	М		9.2.2.24		YES	ignore
Transaction ID	М		9.2.2.28		_	<u> </u>
UE Position Estimate Info	0		9.2.2.102		YES	ignore
Velocity Estimate	0		9.2.2.98		YES	ignore
<b>GPS Measured Results</b>		0 <ma xNoOfS ets&gt;</ma 			GLOBAL	ignore
>GPS Measured Results	M		9.2.2.12		_	
Cell-ID Measured Results Sets		0 <ma xNoOf Measur ements &gt;</ma 			GLOBAL	ignore
>Cell-ID Measured Results Info List	М		9.2.2.31		_	
OTDOA Measured Results Sets		0 <ma xNoOf Measur ements &gt;</ma 			GLOBAL	ignore
>OTDOA Measured Results Info List	М		9.2.2.32		_	
Cause	0		9.2.2.3		YES	ignore
GANSS Measured Results		0 <ma xNoOfS ets&gt;</ma 			GLOBAL	ignore
>GANSS Measured Results	М		9.2.2.117		_	
Required GPS Assistance Data	0		Additional GPS Assistance Data Required 9.2.2.128		YES	ignore
Required GANSS Assistance Data	0		Additional GANSS Assistance Data Required 9.2.2.129		YES	ignore

Table 17.I

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

#### 9.1.22 POSITION PERIODIC RESULT

Table 17.m

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.2.24		YES	ignore
Transaction ID	М		9.2.2.28		_	J
UE Position Estimate	0		Geographi cal Area 9.2.2.6		YES	ignore
Velocity Estimate	0		9.2.2.98		YES	ignore
Position Data	0		9.2.2.65		YES	ignore
Accuracy Fulfilment Indicator	0		9.2.2.40		YES	ignore
Cause	0		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	0		9.2.2.111		YES	ignore
Termination Cause						

### 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	М		9.2.2.9	
SatMask	М		BIT STRING(132)	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	М		ENUMERATED (Height, Depth)	
Altitude	M		INTEGER ( 02 <sup>15</sup> -1)	The relation between the value (N) and the altitude (a) in meters it describes is $N \le a < N+1$ , 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				2000.1011
>Radio Network Layer				
,	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, 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, position calculation error: U-TDOA positioning method not supported, 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: Not enough GPS Satellites, UE Positioning Error: Undefined Error, position calculation error: invalid Galileo measured results, position calculation error: invalid Galileo measured results, position calculation error: Not enough Galileo Satellites, UE Positioning Error: Not enough Galileo Timing of Cell	
			Frames, UE Positioning Error: Assistance Data Missing	
			)	
>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	М	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	The SAS does not support provision of the requested information
for the object	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	The SAS cannot calculate position due to invalid Cell-ID measured
Cell-ID measured results	results
Position calculation error: invalid	The SAS cannot calculate position due to invalid OTDOA
OTDOA measured results	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	The SAS cannot calculate position because it does not support the
positioning method not supported	Cell-ID positioning method
Position calculation error: OTDOA	The SAS cannot calculate position because it does not support the
positioning method not supported	OTDOA positioning method
Position calculation error: invalid U-	The SAS cannot calculate position due to invalid U-TDOA
TDOA measured results	measured results
Position calculation error: U-TDOA	The SAS cannot calculate position because it does not support the
positioning method not supported Position calculation error: U-TDOA	U-TDOA positioning method The SAS cannot calculate position because it does not support the
positioning method not supported	U-TDOA positioning method in the specified UTRAN cell
in specified UTRAN cell	o 120/1 positioning method in the specified o 117/114 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	The SAS did not send a U-TDOA position estimate within the
positioning within Response Time	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	The SRNC cannot deliver the requested positioning measurement
OTDOA cells	due to UE positioning error reported by the UE with error reason
	"Not enough OTDOA cells".
UE Positioning Error: Not enough	The SRNC cannot deliver the requested positioning measurement
GPS Satellites	due to UE positioning error reported by the UE with error reason
UE Positioning Error: Reference	"Not enough GPS Satellites".  The SRNC cannot deliver the requested positioning measurement
Cell not serving cell	due to UE positioning error reported by the UE with error reason
Con not conving con	"Reference Cell not serving cell"
UE Positioning Error: Not	The SRNC cannot deliver the requested positioning measurement
Accomplished GPS Timing of Cell	due to UE positioning error reported by the UE with error reason
Frames	"Not Accomplished GPS Timing of Cell Frames"
UE Positioning Error: Undefined	The SRNC cannot deliver the requested positioning measurement
Error	due to UE positioning error reported by the UE with error reason "Undefined Error"
Position calculation error: invalid	The SAS cannot calculate position due to invalid Galileo measured
Galileo measured results	results
Position calculation error: A-Galileo	The SAS cannot calculate position because it does not support the
positioning method not supported	A-Galileo positioning method
UE Positioning Error: Not enough	The SRNC cannot deliver the requested positioning measurement
Galileo Satellites	due to UE positioning error reported by the UE with error reason "Not enough Galileo Satellites".
UE Positioning Error: Not	The SRNC cannot deliver the requested positioning measurement
Accomplished Galileo Timing of	due to UE positioning error reported by the UE with error reason
Cell Frames	"Not Accomplished Galileo Timing of Cell Frames"
UE Positioning Error: Assistance	The SRNC cannot deliver the requested positioning measurement
Data Missing	due to UE positioning error reported by the UE with error reason
	"Assistance Data Missing"

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	The received message contained IEs or IE groups in wrong order
constructed message)	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	0		INTEGER (0255)	
Triggering Message	0		ENUMERAT ED (initiating message, successful outcome, unsuccessful outcome, outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication.
Procedure Criticality	0		ENUMERAT ED (reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Transaction ID Information Element	0	O manna of	9.2.2.28	
Criticality Diagnostics		0 <maxnoof errors=""></maxnoof>		
>IE Criticality	М		ENUMERAT ED (reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value 'Ignore' shall never be used.
>IE ld	M		INTEGER (065535)	The IE Id of the not understood or missing IE as defined in the ASN.1 part of the specification.
>Repetition Number	0		INTEGER (0255)	The Repetition Number IE gives  - in case of a not understood IE:     The number of occurrences of the reported IE up to and including the not understood occurrence - in case of a missing IE:     The number of occurrences up to but not including the missing occurrence.  Note: All the counted occurrences of the reported IE must have the same top-down hierarchical message structure of IEs with assigned criticality above them.
>Message Structure	0		9.2.2.23	The Message Structure IE describes the structure where the not understood or missing IE was detected. This IE is included if the not understood IE is not the top level of the message.
>Type of Error	М		ENUMERAT ED(not understood, missing,)	

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

### 9.2.2.5 DGPS Corrections

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

Table 27

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS TOW sec	М		INTEGER (0604799)	In seconds GPS time-of-week when the DGPS corrections were calculated
Status/Health	М		ENUMERAT ED (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/Hea Ith	1 <maxsat &gt;</maxsat 	,	
>SatID	M		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>IODE	М		INTEGER (0255)	
>UDRE	M		ENUMERAT ED (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 (- 20472047.)	Scaling factor 0.32 Meters
>Range Rate Correction	М		INTEGER (- 127127)	Scaling factor 0.032 meters/sec

Table 28

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

Table 29

Range bound	Explanation
maxSat	Maximum number of satellites for which data is included in this IE.
	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 [11].

Table 30

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Geographical Area				
>Point				Ellipsoid point
>>Geographical Coordinates	M		9.2.2.7	
>Point With Uncertainty				Ellipsoid point with uncertainty circle
>>Geographical Coordinates	М		9.2.2.7	
>>Uncertainty Code	M		INTEGER ( 0127)	The uncertainty "r" expressed in meters is derived from the "Uncertainty Code" k by r = 10x(1.1 <sup>k</sup> -1)
>Polygon				List of Ellipsoid points
>>Polygon		1 <maxnoofpoints></maxnoofpoints>		
>>>Geographical Coordinates	M		9.2.2.7	
>Ellipsoid point with uncertainty Ellipse				
>>Geographical Coordinates	М		9.2.2.7	
>>Uncertainty Ellipse	М		9.2.2.30	
>>Confidence	М		INTEGER ( 0100)	In percentage
>Ellipsoid point with altitude			0100)	
>>Geographical Coordinates	М		9.2.2.7	
>>Altitude and direction	М		9.2.2.2	
>Ellipsoid point with altitude and uncertainty Ellipsoid				
>>Geographical Coordinates	М		9.2.2.7	
>>Altitude and direction	М		9.2.2.2	
>>Uncertainty Ellipse	М		9.2.2.30	
>>Uncertainty Altitude	M		INTEGER ( 0127)	The uncertainty altitude "h" expressed in metres is derived from the "Uncertainty Altitude" <i>k</i> , by: h=45x(1.025 <sup>k</sup> -1)
>>Confidence	М		INTEGER ( 0100)	In percentage
>Ellipsoid Arc				
>>Geographical Coordinates	М		9.2.2.7	
>>Inner radius	M		INTEGER ( 02 <sup>16</sup> -1)	The relation between the value (N) and the radius (r) in meters it describes is $5N \le r < 5(N+1)$ , except for $N=2^{16}-1$ for which the range is extended to include all grater values of (r).
>>Uncertainty radius	M		INTEGER ( 0127)	The uncertainty "r" is derived from the "Uncertainty radius" k by r = 10x(1.1 <sup>k</sup> -1)

IE/Group Name	Presence	Range	IE type and reference	Semantics description
>>Offset angle	M		INTEGER ( 0179)	The relation between the value (N) and the angle (a) in degrees it describes is 2N≤ a <2(N+1)
>>Included angle	M		INTEGER ( 0179)	The relation between the value (N) and the angle (a) in degrees it describes is 2N< a ≤2(N+1)
>>Confidence	М		INTEGER ( 0100)	

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	М		INTEGER ( 02 <sup>23</sup> -1)	The IE value (N) is derived by this formula: N≤2 <sup>23</sup> X /90 < N+1 X being the latitude in degree (0° 90°)
Degrees Of Longitude	М		INTEGER ( -2 <sup>23</sup> 2 <sup>23</sup> -1)	The IE value (N) is derived by this formula: N≤2 <sup>24</sup> 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 (06.048*10 <sup>8</sup> -1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).	-	
Satellite information		1 <ma xSat&gt;</ma 			_	
>SatID	М		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	-	
>Doppler (0 <sup>th</sup> order term)	M		INTEGER (- 20482047)	Scaling factor 2.5Hz	_	
>Extra Doppler		01	,		_	
>>Doppler (1 <sup>st</sup> order term)	М		INTEGER (- 4221)	Scaling factor 1/42	-	
>>Doppler Uncertainty	М		ENUMERAT ED (12.5,25,50, 100,200,)	In Hz	-	
>Code Phase	М		INTEGER (01022)	In Chips, specifies the centre of the search window	-	
>Integer Code Phase	М		INTEGER (019)	Number of 1023 chip segments	-	
>GPS Bit number	М		INTEGER (03)	Specifies GPS bit number (20 1023 chip segments)	-	
>Code Phase Search Window	М		ENUMRATE D (1023,1,2,3, 4,6,8,12,16,2 4,32,48,64,9 6,128,192)	Specifies the width of the search window.	-	
>Azimuth and Elevation		01			_	
>>Azimuth	М		INTEGER (031)	Scaling factor 11.25 Degrees	_	
>>Elevation	М		INTEGER (07)	Scaling factor 11.25 Degrees	-	
UTRAN GPS Reference Time	0		9.2.2.103	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GPS Reference Time Uncertainty	0		9.2.2.132	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore

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
WNa	M		BIT STRING (8)	
Satellite information		1 <maxsat Almanac&gt;</maxsat 		
>DataID	M		BIT STRING (2)	See [10]
>SatID	М		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>e	M		BIT STRING (16)	Eccentricity [10]
>t <sub>oa</sub>	M		BIT STRING (8)	Reference Time of Almanac [10]
>δi	M		BIT STRING (16)	Correction to Inclination (semi- circles) [10]
>OMEGADOT	M		BIT STRING (16)	Rate of Right Ascension (semi-circles/sec) [10]
>SV Health	M		BIT STRING (8)	[10]
>A <sup>1/2</sup>	M		BIT STRING (24)	Semi-Major Axis (meters) <sup>1/2</sup> [10]
>OMEGA <sub>0</sub>	М		BIT STRING (24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [10]
>M <sub>0</sub>	M		BIT STRING (24)	Mean Anomaly at Reference Time (semi-circles) [10]
>00	M		BIT STRING (24)	Argument of Perigee (semicircles) [10]
>af <sub>0</sub>	М		BIT STRING (11)	apparent clock correction [10]
>af <sub>1</sub>	М		BIT STRING (11)	apparent clock correction [10]
SV Global Health	0		BIT STRING (364)	This enables GPS time recovery and possibly extended GPS correlation intervals

Table 36

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

## 9.2.2.10 GPS Clock and Ephemeris Parameters

The IE contains the GPS clock information and GPS Ephemeris.

Table 37

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
C/A or P on L2	М		BIT STRING (2)	Code(s) on L2 Channel [10]
URA Index	М		BIT STRING (4)	User Range Accuracy [10]
SV Health	М		BIT STRING (6)	[10]
IODC	М		BIT STRING (10)	Issue of Data, Clock [10]
L2 P Data Flag	М		BIT STRING (1)	[10]
SF 1 Reserved	М		BIT STRING (87)	[10]
T <sub>GD</sub>	М		BIT STRING (8)	Estimated group delay differential [10]
toc	М		BIT STRING (16)	apparent clock correction [10]
af <sub>2</sub>	М		BIT STRING (8)	apparent clock correction [10]
af <sub>1</sub>	М		BIT STRING (16)	apparent clock correction [10]
af <sub>0</sub>	М		BIT STRING (22)	apparent clock correction [10]
C <sub>rs</sub>	М		BIT STRING (16)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) [10]
Δη	М		BIT STRING (16)	Mean Motion Difference From Computed Value (semi- circles/sec) [10]
M <sub>0</sub>	М		BIT STRING (32)	Mean Anomaly at Reference Time (semi-circles) [10]
Cuc	М		BIT STRING (16)	Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) [10]
е	М		BIT STRING (32)	Eccentricity [10]
C <sub>us</sub>	М		BIT STRING (16)	Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) [10]
(A) <sup>1/2</sup>	М		BIT STRING (32)	Semi-Major Axis (meters) <sup>1/2</sup> [10]
t <sub>oe</sub>	М		BIT STRING (16)	Reference Time Ephemeris [10]
Fit Interval Flag	М		BIT STRING (1)	[10]
AODO	М		BIT STRING (5)	Age Of Data Offset [10]
C <sub>ic</sub>	М		BIT STRING (16)	Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) [10]
OMEGA <sub>0</sub>	М		BIT STRING (32)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [10]
C <sub>is</sub>	М		BIT STRING (16)	Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) [10]
i <sub>0</sub>	M		BIT STRING (32)	Inclination Angle at Reference Time (semi-circles) [10]
Crc	M		BIT STRING (16)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) [10]

ω	M	BIT STRING	Argument of Perigee (semi-
		(32)	circles) [10]
OMEGAdot	M	BIT STRING	Rate of Right Ascension (semi-
		(24)	circles/sec) [10]
Idot	M	BIT STRING	Rate of Inclination Angle (semi-
		(14)	circles/sec) [10]

### 9.2.2.11 GPS Ionospheric Model

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

Table 38

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
$\alpha_0$	M		BIT STRING (8)	NOTE 1
$\alpha_1$	M		BIT STRING (8)	NOTE 1
0.2	M		BIT STRING (8)	NOTE 1
0(3	M		BIT STRING (8)	NOTE 1
$\beta_0$	M		BIT STRING (8)	NOTE 2
β <sub>1</sub>	M		BIT STRING (8)	NOTE 2
β2	M		BIT STRING (8)	NOTE 2
$\beta_3$	M		BIT STRING (8)	NOTE 2

NOTE 1: The parameters  $\alpha_n$  are the coefficients of a cubic equation representing the amplitude of the vertical delay [10]

NOTE 2: The parameters  $\beta_n$  are the coefficients of a cubic equation representing the period of the ionospheric model [10].

### 9.2.2.12 GPS Measured Results

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

Table 39

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS TOW msec	М		INTEGER (06.048*1 0 <sup>8</sup> -1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).	_	
				If the UTRAN GPS reference time Result is present, this IE shall be set to 0 by the transmitter and ignored by the receiver.		
Measurement		1 <ma< td=""><td></td><td></td><td>_</td><td></td></ma<>			_	
>Satellite ID	M	xSat>	INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	-	
>C/N <sub>o</sub>	M		INTEGER (063)	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	М		INTEGER (-32768 32768)	Hz, scale factor 0.2.	_	
>Whole GPS Chips	М		INTEGER (01022)	Unit in GPS chips	_	
>Fractional GPS Chips	М		INTEGER (0(2 <sup>10</sup> -1))	Scale factor 2 <sup>-10</sup>	_	
>Multipath Indicator	М		ENUMERA TED (NM, low, medium, high)	See NOTE 1	-	
>Pseudorange RMS Error	М		INTÉGER (063)	See NOTE 2	-	
UTRAN GPS Reference Time Result	0		9.2.2.104	This IE may only be present if SAS operates in SAScentric mode.	YES	ignore
GPS Reference Time Uncertainty	0		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 <sub>i</sub>	Pseudorange value, P
0	000	000	0.5	P < 0.5
1	001	000	0.5625	0.5 <= P < 0.5625
i	X	Υ	0.5 * (1 + x/8) * 2y	xi-1 <= P < xi
62	110	111	112	104 <= P < 112
63	111	111		112 <= P

### 9.2.2.13 GPS Navigation Model

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

Table 43

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Satellite information		1 <maxs< td=""><td></td><td></td></maxs<>		
		at>		
>SatID	M		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>Satellite Status	М		ENUMERAT ED (NS_NN, ES_SN, ES_NN, REVD)	See NOTE
>GPS Clock and Ephemeris	C-Satellite		9.2.2.10	
parameters	status			

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

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

#### Table 46

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

## 9.2.2.14 GPS Real Time Integrity

#### Table 47

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

#### Table 48

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

### 9.2.2.15 GPS Reference Time

Table 49

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS Week	М		INTEGER (01023)		_	
GPS TOW msec	М		INTEGER (06.048*10 <sup>8</sup> -1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).	-	
GPS TOW Assist		0 <maxs at&gt;</maxs 			-	
>SatID	М		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	-	
>TLM Message	М		BIT STRING (14)		_	
>Anti-Spoof	М		BOOLEAN		_	
>Alert	M		BOOLEAN		_	
>TLM Reserved	М		BIT STRING (2)		-	
UTRAN GPS Reference Time	0		9.2.2.103	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
SFN-TOW Uncertainty	0		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 <sub>UTRAN-GPS</sub> Drift Rate	0		9.2.2.105	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GPS Reference Time Uncertainty	0		9.2.2.132	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore

Table 50

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

#### 9.2.2.16 GPS Transmission TOW

Table 51

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS Transmission TOW			INTEGER (0604799)	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 <sub>1</sub>	M		BIT STRING (24)	sec/sec [10]
$A_0$	M		BIT STRING (32)	seconds [10]
t <sub>ot</sub>	M		BIT STRING (8)	seconds [10]
$\Delta t_{LS}$	M		BIT STRING (8)	seconds [10]
WN <sub>t</sub>	M		BIT STRING (8)	weeks [10]
WN <sub>LSF</sub>	M		BIT STRING (8)	weeks [10]
DN	M		BIT STRING (8)	days [10]
$\Delta t_{LSF}$	M		BIT STRING (8)	seconds [10]

### 9.2.2.18 GPS-UTRAN Time Relationship Uncertainty

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

Table 53

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

### 9.2.2.19 Information Exchange ID

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

Table 54

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

### 9.2.2.20 Information Exchange Object Type

Void.

## 9.2.2.21 Information Report Characteristics

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

Table 56

IE/Group Name	Presence	Range	IE Type and	Semantics Description
			Reference	
Information Report	M		ENUMERAT	
Characteristics Type			ED(On	
			Demand,	
			Periodic,	
			On	
			Modification,	
			)	
CHOICE Information Report Periodicity	C-Periodic			Indicates the frequency with which the SAS shall send broadcast data reports.
>Min				
>>Minutes	M		INTEGER	
			(160,)	
>Hour				
>>Hours	M		INTEGER	
			(124,)	

#### Table 57

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

# 9.2.2.22 Information Type

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

Table 58

Presenc e	Range	IE Type and Reference	Semantics Description
M		9.2.2.25	
	1 <maxnoofexpin fo=""></maxnoofexpin>		
М			
		NULL	
М		9.2.2.29	
М		9.2.2.29	
М		9.2.2.29	
	01		
		INITEGER	
		(01023)	
M		INTEGER (0167)	GPS time of ephemeris in hours of the latest ephemeris set
М		Integer (010)	ephemeris age tolerance in hours
	0 <maxsat></maxsat>		
M		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
М		INTEGER (0255)	Issue of Data Ephemeris for SatID
		NULL	
М		9.2.2.29	
		NULL	This IE may only be present if SAS operates in SAS-centric mode.
			centilic mode.
0		ENLIMERATED/	
		Requested, Not- Requested)	
0		ENUMERATED( Requested, Not-	
	e	M	M   9.2.2.25     M   9.2.2.29     M   9.2.2.29     M   9.2.2.29     M   9.2.2.29     M   9.2.2.29     M   9.2.2.29     M   INTEGER (01023)     INTEGER (0167)     M   INTEGER (0167)     M   INTEGER (0167)     M   INTEGER (010)     O   INTEGER (0255)     NULL     NULL     NULL     NULL     NULL     NULL     NULL     O   ENUMERATED( Requested)     ENUMERATED( Requested)     ENUMERATED( EN

		1	T	
>>>>GANSS	0		ENUMERATED(	This IE may only be
Reference Location			Requested, Not-	present if SAS operates in
			Requested)	SAS-centric mode.
>>>GANSS Generic				
Data				
>>>>GANSS		1 <maxganss></maxganss>		
Generic Data Item				
>>>>GANSS ID	0		9.2.2.130	Absence of this IE means Galileo.
>>>>GANSS		01		Gaineo.
Real Time		01		
Integrity				
>>>>GANSS	0		0.0.0.407	
	U		9.2.2.127	
Time Indicator		0.4		
>>>>GANSS		01		
Data Bits				
>>>>GANSS	M		INTEGER	The GANSS TOD for which
TOD			(086399)	the data bits are requested.
>>>>Data Bit		1 <maxsgntype></maxsgntype>		
Assistance				
>>>>GAN	M		BOOLEAN	TRUE means requested
SS Data Bit				•
Assistance				
>>>>DGANSS		01		
Corrections		• • • • • • • • • • • • • • • • • • • •		
>>>> GANSS	0		9.2.2.127	
Time Indicator			J.Z.Z.121	
>>>> GANSS		01		
		01		
Almanac and				
Satellite Health				
>>>>GANSS	0		9.2.2.127	
Time Indicator				
>>>>GANSS		01		
Reference				
Measurement				
Information				
>>>>GANSS	0		9.2.2.127	
Time Indicator				
>>>>GANSS		01		
UTC Model				
>>>>GANSS	0		9.2.2.127	
Time Indicator			0.2.2.121	
>>>>GANSS		01		
Time Model		01		
GNSS-GNSS			DIT OTDINO(0)	D. C
>>>> GNSS-	M		BIT STRING(9)	Defines the time model
GNSS Time ext				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.
				Other bits are reserved.
>>>>GANSS	0		9.2.2.127	
Time Indicator				
>>>>GANSS	1	01		
Navigation Model				
>>>>GANSS	M		INTEGER(040	
	IVI			
Week	N4		95) INTEGER(016	
>>>>>GANSS	M		INTEGER(016	
Toe	<b>.</b>		7)	
>>>>GANSS	M		INTEGER(010)	
T-Toe Limit	ļ			
>>>>Satellit		0 <maxgansss< td=""><td></td><td></td></maxgansss<>		
e Related Data	<u> </u>	at>		

>>>>Sat ID	М	INTEGER(063)	
>>>>>IOD	M	BIT STRING(10)	

Range Bound	Explanation
maxnoofExpInfo	Maximum number of Explicit Information supported in one
	Information Exchange. The value of maxnoofExpInfo is 32.
maxSat	Maximum number of satellites for which data is included in this IE.
	The value of maxSat is 16.
maxGANSS	Maximum number of GANSS systems for which data is included in
	this IE. The value of maxGANSS is 8.
maxGANSSSat	Maximum number of satellites for which data is included in this IE.
	The value of maxGANSSSat is 64
maxSgnType	Maximum number of signals for which data is included in this IE.
	The value of maxSgnType is 8

### 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 occured error (reported in the *Information Element Criticality Diagnostics* IE).

Table 60

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Message structure		1 <maxnoo flevels&gt;</maxnoo 	reference	The first repetition of the Message Structure IE corresponds to the top level of the message. The last repetition of the Message Structure IE corresponds to the level above the reported level for the occurred error of the message.
>IE ID	М		INTEGER (065535)	The IE ID of this level's IE containing the not understood or missing IE.
>Repetition Number	0		INTEGER (1256)	The Repetition Number IE gives, if applicable, the number of occurrences of this level's reported IE up to and including the occurrence containing the not understood or missing IE.  Note: All the counted occurrences of the reported IE must have the same top-down hierarchical message structure of IEs with assigned criticality above them.

### Table 61

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

## 9.2.2.24 Message Type

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

Table 62

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Procedure Code	M		INTEGER(0255)	"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	0		9.2.2.9		_	
GPS UTC Model	0		9.2.2.17		_	
GPS Ionospheric Model	0		9.2.2.11		_	
GPS Navigation Model	0		9.2.2.13		_	
DGPS Corrections	0		9.2.2.5			
GPS Reference Time	0		9.2.2.15			
GPS Acquisition	0		9.2.2.13			
Assistance			9.2.2.0		_	
GPS Real Time Integrity	0		9.2.2.14			
Almanac and Satellite	0		9.2.2.14		_	
	U		9.2.2.1		_	
Health SIB GPS Transmission TOW	0	-	0.0.0.40		_	
	0		9.2.2.16	This IT		
GPS Reference Location	0		Geo- graphical Area 9.2.2.6	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GANSS Common		01			YES	ignore
Assistance Data						
>GANSS Reference Time	0		9.2.2.124		_	
>GANSS Ionospheric Model	0		9.2.2.116		_	
>GANSS Reference Location	0		Geo- graphical Area 9.2.2.6	This IE may only be present if SAS operates in SAS-centric mode.	-	
GANSS Generic Assistance Data		0 <max GANSS &gt;</max 		mode.	GLOBAL	ignore
>GANSS ID	0		9.2.2.130	Absence of this IE means Galileo.	_	
>GANSS Real Time Integrity	0		9.2.2.122		_	
>GANSS Data Bit Assistance	0		9.2.2.127A		_	
>DGANSS Corrections	0	†	9.2.2.113		_	
>GANSS Almanac and Satellite Health	0		9.2.2.114		_	
>GANSS Reference Measurement Information	0		9.2.2.123		_	
>GANSS UTC Model	0		9.2.2.126		_	
>GANSS Time Model	0		9.2.2.125		_	
>GANSS Navigation Model	0		9.2.2.118		_	

#### Table 64A

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

## 9.2.2.27 Requested Data Value Information

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

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

Table 65

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

### 9.2.2.28 Transaction ID

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

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

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

Table 66

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
			Reference	
CHOICE Transaction ID Length				The Transaction ID shall be interpreted for its integer value, not for the type of encoding ("short" or "long").
>Short				, , , , , , , , , , , , , , , , , , ,
>>Transaction ID Value	M		INTEGER (0127)	
>Long				
>>Transaction ID Value	M		INTEGER (032767)	

#### 9.2.2.29 Transmission TOW Indicator

Table 67

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Transmission TOW			ENUMERATE	
Indicator			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 ( 0127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k-1)$
Uncertainty semi-minor	М		INTEGER ( 0127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^k-1)$
Orientation of major axis	M		INTEGER ( 089)	The relation between the IE value (N) and the angle (a) in degrees it describes is 2N≤ 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	Presenc e	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Cell-ID Measured Results Info		1 <maxno OfMeasNC ell&gt;</maxno 			-	
>UC-ID	М		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	0		9.2.2.6	May only be present if the SAS operates in RNC-centric mode.	-	
>Round Trip Time Info		01		FDD only	1	
>>UE Rx-Tx Time Difference Type 2	M		INTEGER (08191)	According to mapping in [13].	ı	
>>UE Positioning Measurement Quality	M		9.2.2.35	Quality of the UE Rx-Tx time difference measurement.	-	
>>Round Trip Time	М		INTEGER (032766)	According to mapping in [13].	-	
>>Extended Round Trip Time	0		INTEGER (3276710 3041)	Continuation of intervals as mapped in [13]. Included only if the Round Trip Time IE above is included with its maximum value and if the actual value is outside the possible range for the Round Trip Time IE	YES	ignore
>Rx Timing Deviation Info		01		3.84Mcps TDD only	_	
>>Rx Timing Deviation	M		INTEGER (08191)	According to mapping in [14].	_	
>>Timing Advance	М		INTEGER (063)	According to [4].	_	
>Rx Timing Deviation LCR Info		01		1.28Mcps TDD only	_	
>>Rx Timing Deviation LCR	M		INTEGER (0511)	According to mapping in [14].	_	
>>Timing Advance LCR	M		INTEGER (02047)	According to [4]. The content of	_	

	_		1			
				this IE shall be ignored if the Extended Timing Advance		
				LCR IE is		
>>Extended Timing Advance LCR	0		INTEGER (2048819 1)	According to [4].	YES	ignore
>Pathloss	0		INTEGER (46158)	Unit: dB downlink pathloss as defined in [4] subclause 10.3.7.3	-	
>Rx Timing Deviation 768Info		01		7.68Mcps TDD only	YES	reject
>>Rx Timing Deviation 7.68Mcps	М		INTEGER (0 65535)	According to mapping in [14].	-	
>>Timing Advance 7.68Mcps	М		INTEGER (0 511)	According to [4].	-	
>Rx Timing Deviation 384ext Info		01		3.84Mcps TDD only	YES	reject
>>Rx Timing Deviation	М		INTEGER (0 32767)	According to mapping in [14].	-	
>>Timing Advance	М		INTEGER (0 255)	According to [4].	_	
>Round Trip Time Info With Type 1		01		FDD only	YES	ignore
>>UE Rx-Tx Time Difference Type 1	M		INTEGER (7681280 )	According to mapping in [13].	-	
>>Round Trip Time	М		INTEGER (032766)	According to mapping in [13].	_	
>>Extended Round Trip Time  >Additional UE	0	01	INTEGER (3276710 3041)	Continuation of intervals as mapped in [13]. Included only if the Round Trip Time IE above is included with its maximum value and if the actual value is outside the possible range for the Round Trip Time IE  FDD only	YES	ignore
Measurement Info		0 1		,		ignore
>>CPICH RSCP	0		INTEGER (-591)	According to CPICH_RSCP in [13].	_	
>>CPICH Ec/N0	0		INTEGER (049)	According to CPICH_Ec/No in [13].	-	
>Angle Of Arrival LCR		01		1.28Mcps TDD only	YES	ignore
>>AOA LCR	М		INTEGER (0719)	According to mapping in [14]	-	
>>AOA LCR Accuracy Class	M		ENUMERA TED ( A, B, C, D, E, F, G, H,)	According to mapping in [14]	_	

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	Presenc e	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
OTDOA Measured Results Info		1 <maxno ofMeasNC ell&gt;</maxno 			ı	
>UC-ID	М		9.2.2.37	The identifier of the neighbour cell.	1	
>UE SFN-SFN Observed Time Difference Type 2 Info		1			ı	
>>SFN-SFN Observed Time Difference Type 2	М		INTEGER (040961)	Gives the observed timing of the neighbour cell relative to the reference cell.	1	
>>UE Positioning Measurement Quality	M		9.2.2.35	Quality of the observed time difference measurement.	ı	
>>Measurement Delay	М		INTEGER (065535)	The interval of time, in units of 10ms frames, spanning the following two events:	-	
				1) Time of applicability of the SFN-SFN Value or TUTRAN-GPS/SFN relationship provided for the corresponding neighbour cell in 9.2.2.33 or TUTRAN-GANSS/SFN relationship provided for the		
				corresponding neighbour cell in 9.2.2.33.		
				2) The point in time when this corresponding SFN-SFN observed time difference measurement was captured by the UE.		
				If the SAS operates in SAS-centric mode, 1) above shall be set to zero. I.e., in SAS-centric mode this IE		

			indicates the SFN during which the corresponding SFN-SFN observed time difference measurement was captured by the UE.		
>Additional OTDOA Measured Results	0		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.	-	

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	М		9.2.2.37	The identifier of the neighbour cell.
UTRAN Access Point Position with Altitude	М		9.2.2.36	Exact geographical position of the base station antenna.
CHOICE Relative Timing Difference Info	М			
>SFN-SFN Measurement				
Value Information			INITEGED	
>>SFN-SFN Value	M		INTEGER (0614399)	
>>SFN-SFN Quality	0		INTEGER (0255)	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	М		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	0		INTEGER (0100)	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.
>T <sub>UTRAN-GPS</sub> Measurement Value Information				
>>SFN	М		INTEGER (04095)	SFN during which the T <sub>UTRAN-GPS</sub> measurement was performed
>>Tutran-gps		1		Indicates the UTRAN GPS Timing of Cell Frame for LCS.
>>>MS	М		INTEGER (016383)	Most significant part
>>>LS	М		INTEGER (042949672 95)	Least significant part
>>Tutran-gps Quality	0		INTEGER (0255)	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.
>>Tutran-gps Drift Rate	М		INTEGER (-50+50)	Indicates the T <sub>UTRAN-GPS</sub> drift rate in 1/256 chip per second. A positive value indicates that

	I			Abo LITDANI ala -l- l- mumi-li
				the UTRAN clock is running at a lower frequency than
				GPS clock.
>>Tutran-gps Drift Rate	0		INTEGER	Indicates the standard
Quality			(050)	deviation (std) of the T <sub>UTRAN</sub> -
				GPS drift rate measurements
				in 1/256 chip per second. T <sub>UTRAN-GPS</sub> Drift Rate Quality
				$= \sqrt{E[(x-\mu)^2]} = \text{std of reported}$
				T <sub>UTRAN-GPS</sub> Drift Rate, where x
				is the reported T <sub>UTRAN-GPS</sub>
				Drift Rate and $\mu = E[x]$ is the
				expectation value of x.
>Tutran-ganss				
Measurement Value Information				
>>GANSS ID	0		9.2.2.130	Absence of this IE means
× 0, 1100 ID			3.2.2.100	Galileo.
>>SFN	М		INTEGER	SFN during which the T <sub>UTRAN</sub> -
			(04095)	GANSS measurement was
>>T <sub>UTRAN-GANSS</sub>		1		performed Indicates the UTRAN GANSS
>> I UTRAN-GANSS		1		Timing of Cell Frame for LCS.
>>>MS	М		INTEGER(0	Most significant part
777			16383)	oct olgoant pant
>>>LS	М		INTEGER(0	Least significant part
T 0 1"			4294967295)	Indicates the state of
>>T <sub>UTRAN-GANSS</sub> Quality	0		INTEGER(0 255)	Indicates the standard deviation (std) of the T <sub>UTRAN</sub> -
			255)	GANSS measurements in 1/16
				chip. T <sub>UTRAN-GANSS</sub> Quality =
				$\sqrt{E[(x-\mu)^2]}$ = std of reported
				T <sub>UTRAN-GANSS</sub> Value, where x is
				the reported T <sub>UTRAN-GANSS</sub>
				Value and $\mu = E[x]$ is the
Duilt Data	N/		INTECED!	expectation value of x.
>>T <sub>UTRAN-GANSS</sub> Drift Rate	M		INTEGER(- 5050)	Indicates the T <sub>UTRAN-GANSS</sub> drift rate in 1/256 chip per
			3030)	second.
				A positive value indicates that
				the UTRAN clock is running
				at a lower frequency than
T 5 1/2 5			INTEGER (C	GANSS clock.
>>T <sub>UTRAN-GANSS</sub> Drift Rate Quality	0		INTEGER(0	Indicates the standard deviation (std) of the T <sub>UTRAN</sub> -
Quality			50)	GANSS drift rate measurements
				in 1/256 chip per second.
				T <sub>UTRAN-GANSS</sub> Drift Rate
				Quality = $\sqrt{E[(x-\mu)^2]}$ = std of
				reported T <sub>UTRAN-GANSS</sub> Drift
				Rate, where x is the reported
				T <sub>UTRAN-GANSS</sub> Drift Rate and μ = E[x] is the expectation
				value of x.
	l	1	1	TAIAO OI AI

## 9.2.2.34 OTDOA Reference Cell Info

Table 74

IE/Group Name	Presen ce	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
UC-ID	М		9.2.2.37	The identifier of the reference cell.	_	
UTRAN Access Point Position with Altitude	М		9.2.2.36	Exact geographical position of the base station antenna.	-	
T <sub>UTRAN-GPS</sub> Measurement Value Information		01			_	
>SFN	М		INTEGER (04095)	SFN during which the T <sub>UTRAN-GPS</sub> measurement was performed	-	
>T <sub>UTRAN-GPS</sub>		1		Indicates the UTRAN GPS Timing of Cell Frame for LCS.	-	
>>MS	М		INTEGER (016383)	Most significant part	_	
>>LS	М		INTEGER (0429496 7295)	Least significant part	_	
>T <sub>UTRAN-GPS</sub> Quality	0		INTEGER (0255)	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 <sub>UTRAN-GPS</sub> Drift Rate	M		INTEGER (-50+50)	Indicates the Tutran-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 <sub>UTRAN-GPS</sub> Drift Rate Quality	0		INTEGER (050)	Indicates the standard deviation (std) of the Tutran-GPS drift rate measurements in 1/256 chip per second. Tutran-GPS Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported Tutran-GPS Drift Rate, where x is the reported Tutran-GPS Drift Rate and $\mu$ = $E[x]$ is the expectation value of	_	

T	-	0.1		X.	CLOBAL	ianore
T <sub>UTRAN-GANSS</sub> Measurement Value Information		01			GLOBAL	ignore
>GANSS ID	0		9.2.2.130	Absence of this IE means Galileo.	_	
>SFN	М		INTEGER (04095)	SFN during which the T <sub>UTRAN-GANSS</sub> measurement was performed	-	
>Tutran-ganss		1		Indicates the UTRAN GANSS Timing of Cell Frame for LCS.	-	
>>MS	М		INTEGER( 016383)	Most significant part	_	
>>LS	М		INTEGER( 04294967 295)	Least significant part	-	
>Tutran-ganss Quality	0		INTEGER( 0255)	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 <sub>UTRAN-GANSS</sub> Drift Rate	M		INTEGER( -5050)	Indicates the T <sub>UTRAN-GANSS</sub> 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.		
>Tutran-ganss Drift Rate Quality	0		INTEGER( 050)	Indicates the standard deviation (std) of the Tutran-Ganss drift rate measurements in 1/256 chip per second.  Tutran-Ganss Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported Tutran-Ganss Drift Rate, where x is the reported Tutran-Ganss Drift Rate and $\mu = E[x]$ is the expectation value of x.	_	
Additional Measurement Information LCR		01		1.28Mcps TDD only	YES	ignore
>Timing Advance LCR R7	М		INTEGER (08191)	According to [4].	_	
>Rx Timing Deviation LCR	М		INTEGER (0511)	According to mapping in [14].	-	

>Angle Of Arrival LCR		01		1.28Mcps TDD only	_	
>>AOA LCR	М		INTEGER	According to	_	
			(0719)	mapping in [14]		
>>AOA LCR Accuracy	M		ENUMERA	According to	_	
Class			TED (	mapping in [14]		
			A, B, C, D,			
			E, F, G,			
			H,)			

# 9.2.2.35 UE Positioning Measurement Quality

Table 75

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Std Resolution	М		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 such as Ec/No or Rx levels can be utilised in this case to evaluate the 'Std of Measurements' reported in this IE.
Std of Measurements	M		BIT STRING (5)	Std of Measurements field includes sample standard deviation of measurements (when number of measurements is reported in 'Number of Measurements' field) or standard deviation of the reported measurement value = $\sqrt{E[(x-\mu)^2]}$ , where x is the reported value and $\mu$ = $E[x]$ is the expectation value (i.e. the true value) of x (when '000' is given in 'Number of Measurements' field). Following linear 5 bit encoding is used: '00000' 0 - (R*1-1) meters '00001' R*1 - (R*2-1) meters '00010' R*2 - (R*3-1) meters

		'11111' R*31 meters or more
		where R is the resolution
		defined by Std Resolution
		field. E.g. R=20 m
		corresponds to 0-19 m, 20-39
		m,,620+ m.

## 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	0		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 (04095)	The identifier of one RNC in UTRAN. If the Extended RNC-ID IE is included in the UC-ID IE, the RNC-ID IE shall be ignored.	-	-
C-ID	M		INTEGER (065535)	The identifier of a cell in one RNS.	-	-
Extended RNC-ID	0		9.2.2.37A	The Extended RNC-ID IE shall be used if the RNC identity has a value larger than 4095.	YES	reject

### 9.2.2.37A Extended RNC-ID

This is the identifier of one RNC in UTRAN.

Table 77A

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

## 9.2.2.38 Horizontal Accuracy Code

#### Table 78

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Horizontal Accuracy Code	M		INTEGER( 0127)	The requested accuracy "r" is derived from the "Horizontal Accuracy Code" k by r = 10x(1.1 <sup>k</sup> -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( 0127)	The requested accuracy "v" is derived from the "Vertical Accuracy Code" k by $v = 45x(1.025^k-1)$ .

## 9.2.2.40 Accuracy Fulfilment Indicator

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

Table 80

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

## 9.2.2.41 Uplink DPCH information

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

Table 81

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Choice mode	M			
>FDD				
>>Scrambling code type	M		ENUMERATED	
			(short, long)	
>>Scrambling code number	M		INTEGER(016	
-			777215)	
>>TFCI existence	M		BOOLEAN	TRUE means existence.
>>Number of FBI bits	M		INTEGER(02)	In bits.
>TDD				
>>Cell Parameter ID	M		9.2.2.81	
>>TFCI Coding	M		9.2.2.82	
>>Puncture Limit	M		9.2.2.76	
>>Repetition Period	M		9.2.2.84	
>>Repetition Length	M		9.2.2.83	
>>TDD DPCH Offset	М		9.2.2.85	
>>UL Timeslot Information	М		9.2.2.86	
>>Frame Offset	M		9.2.2.64	
>>Special Burst Scheduling	М		9.2.2.92	

## 9.2.2.42 Frequency information

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

Table 82

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE mode	M			
>FDD				
>>UARFCN uplink (Nu)	0		INTEGER (016383)	If this IE is not present, the default duplex distance defined for the operating frequency band shall be used [20]
>>UARFCN downlink (Nd)	М		INTEGER (0 16383)	[20]
>TDD				
>>UARFCN	М		INTEGER (0 16383)	[21]

## 9.2.2.43 PRACH parameters

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

Table 83

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
PRACH parameters		1 <maxp RACH&gt;</maxp 		
>PRACH information	М		9.2.2.47	
>TFS	М		9.2.2.48	
>TFCS		1 <max TFC&gt;</max 		
>>CTFC	М		9.2.2.49	

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

### 9.2.2.44 Compressed Mode Assistance Data

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

Table 85

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Downlink information		1		
>Primary Scrambling Code	M		9.2.2.46	
>Chip Offset	M		9.2.2.63	
>Frame Offset	M		9.2.2.64	
Uplink information		1		
>Transmisson Gap Pattern Sequence Information	M		9.2.2.66	
>Active Pattern Sequence Information	М		9.2.2.67	
>CFN	М		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(0511)	

## 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	М		INTEGER(015)	Identification of scrambling code see [17]
>>Puncturing Limit	М		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&gt;</maxt 		
>RLC Size	М		INTEGER(12950 55)	Unit is bits
>Number of TBs and TTI List		1 <maxt F&gt;</maxt 		Present for every valid number of TB's (and TTI) for this RLC Size.
>>Transmission time interval	C- dynamicTT I		ENUMERATED(1 0, 20, 40, 80, dynamic,)	In ms. The value dynamic is only used in TDD mode.
>>Number of Transport blocks Semi-static Transport Format Information	M M		INTEGER(0512) 9.2.2.61	

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

### Table 91

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

## 9.2.2.49 CTFC

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

### Table 92

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE CTFC Size				
>2 bit CTFC				
>>CTFC information-2		1 <max TFC&gt;</max 		
>>>ctfc2Bit	M		INTEGER(03)	
>4 bit CTFC				
>>CTFC information-4		1 <max TFC&gt;</max 		
>>>ctfc4Bit	M		INTEGER(015)	
>6 bit CTFC				
>>CTFC information-6		1 <max TFC&gt;</max 		
>>>ctfc6Bit	M		INTEGER(063)	
>8 bit CTFC				
>>CTFC information-8		1 <max TFC&gt;</max 		
>>>ctfc8Bit	M		INTEGER(0255)	
>12 bit CTFC				
>>CTFC information-12		1 <max TFC&gt;</max 		
>>>ctfc12Bit	M		INTEGER(0409 5)	
>16 bit CTFC				
>>CTFC information-16		1 <max TFC&gt;</max 		
>>ctfc16Bit	M		INTEGER(0655 35)	
>24 bit CTFC				
>>CTFC information-24		1 <max TFC&gt;</max 		
>>>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	0		INTEGER(0127)	The requested accuracy "r" is derived from the "accuracy code" k by $r = 10x(1.1^k-1)$ .

# 9.2.2.51 UE Positioning Capability

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

Table 94

IE/Group Name	Presenc e	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	М		BOOLEAN	TRUE means supported	_	
Network Assisted GPS support	М		ENUMERA TED (Network based, UE based, Both, None,)	Defines if the UE supports network based or UE based GPS methods.	-	
Support for GPS timing of cell frames measurement	M		BOOLEAN	Defines if a UE has the capability to perform the UE GPS timing of cell frames measurement [4]. TRUE means capable	_	
Support for IPDL	M		BOOLEAN	Defines if a UE has the capability to use IPDL to enhance its 'SFN-SFN observed time difference –type 2' measurement. TRUE means supported	_	
Support for Rx-Tx time difference type2 measurement	М		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	М		BOOLEAN	TRUE means supported	-	
Network Assisted GANSS Support		0 <max GANSS&gt;</max 			GLOBAL	ignore
>GANSS ID	0	GANOO	9.2.2.130	Absence of this IE means Galileo.	-	
>GANSS mode	M		ENUMERA TED ('Network based', 'UE based', 'Both', 'None')	Defines if the UE supports network based or UE based GANSS methods	_	
>GANSS Signal ID	0		9.2.2.131	Absence of this field means Galileo L1 OS if GANSS ID refers to Galileo.	_	

>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 [4]. TRUE means capable	-	
>Support for GANSS Carrier-Phase Measurement	0	BOOLEAN	Defines if a UE has the capability to perform the UE GANSS Carrier-Phase Measurement. TRUE means capable	I	

#### Table 94A

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

## 9.2.2.52 Response Time

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

## Table 95

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

## 9.2.2.53 Positioning Priority

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

#### Table 96

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

## 9.2.2.54 Client Type

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

Table 97

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

## 9.2.2.55 Positioning Method

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

Table 98

IE/Group Name	Presenc e	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Additional Method Type	М		9.2.2.58	•	_	,
Selected Position Method	М		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  bits 3-9: reserved for future GNSSes  Note: Bit 1 cannot be the only one set to 1.	YES	ignore

#### Table 98A

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

### 9.2.2.56 U-TDOA Bit Count

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

#### Table 99

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
U-TDOA Bit Count			INTEGER (05000)	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 (03000)	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_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	0				_	
>SFN	0		INTEGER (04095)	Time stamp (SFN of Reference Cell) of the SFN-SFN relative time differences and SFN-SFN drift rates. Included if any SFN-SFN drift value is included in IE UE positioning OTDOA neighbour cell info.	_	
>CHOICE mode >>Fdd					_	
>>>Primary CPICH Information	M		Primary scrambling code 9.2.2.46		_ _	
>>Tdd					_	
>>>Cell Parameter ID	M		9.2.2.81		_	
>Frequency Info	0		9.2.2.42	Default value is the existing value of frequency information. This IE shall always be set to default value	ı	
>CHOICE positioning mode					_	
>>UE Based					_	
>>> Cell position	0		Reference Cell Position 9.2.2.70	The position of the antenna that defines the cell.	_	
>>> Round Trip Time	0		INTEGER (032766)	According to mapping in [13].	_	
>>UE Assisted					_	
>UE positioning IPDL parameters	0		9.2.2.71	If this element is not included there are no idle periods present	_	
>Extended Round Trip Time	0		INTEGER (3276710304 1)	According to mapping in [13]. Included only if the Round Trip Time IE above is included with its maximum value and if the actual value is outside the possible range for the the Round Trip Time IE.	YES	ignore
>Timing Advance LCR R7	0		INTEGER (08191)	1.28Mcps TDD only. According to [4].	_	
>Rx Timing Deviation LCR	0		INTEGER (0511)	1.28Mcps TDD only . According to mapping in [14].	_	
>Angle Of Arrival LCR		01		1.28Mcps TDD only	_	
>>AOA LCR	М		INTEGER (0719)	According to mapping in [14]	_	
>>AOA LCR Accuracy Class	M		ENUMERATE D ( A, B, C, D, E, F, G, H,)	According to mapping in [14]	_	

UE Positioning OTDOA Neighbour Cell List	0					
>UE positioing OTDOA Neighbour		1 <ma xCellM</ma 			-	
cell info		eas>				
>>CHOICE mode					_	
>>> <i>FDD</i>					_	
>>>>Primary	M		Primary		_	
CPICH			scrambling			
Information			code			
			9.2.2.46			
>>> <i>TDD</i>					_	
>>>Cell	M		9.2.2.81		_	
Parameter ID						
>>Frequency Info	0		9.2.2.42	Default value is the	_	
				existing value of		
				frequency information		
>>UE positioning	0		9.2.2.71		_	
IPDL parameters						
>>SFN-SFN Relative	М		9.2.2.73		_	
Time difference						
>>SFN Offset Validity	0		ENUMERATE	Absence of this	_	
			D (false)	element means SFN		
			( /	offset is valid. False		
				means SFN offset is		
				not valid.		
>>SFN-SFN Drift	0		ENUMERATE	Indicates the SFN-	_	
			D	SFN drift rate in 1/256		
			(0,1,2,3,4,5,8,	chip per second.		
			10,15,25,35,50	omp per deceria.		
			,65,80,100,-1,-			
			2,-3,-4,-5,-8, -			
			10,-15,-25,-			
			35,-50,-65,-			
			80,-100,)			
>>Search Window	М		ENUMERATE	In chips. If the value	_	
Size	""		D (c20, c40,	is X then the		
0.20			c80, c160,	expected SFN-SFN		
			c320, c640,	observed time		
			c1280,	difference is in the		
			moreThan128	range [RTD-X,		
			0,)	RTD+X] where RTD		
			0,,	is the value of the		
				field SFN-SFN		
				relative time		
				difference.		
>>CHOICE					_	
positioning mode						
>>>UE Based					_	
>>>Relative	0		INTEGER (-	Seconds of angle,	_	
North	-		2000020000)	scale factor 0.03.		
				Relative position		
				compared to		
				reference cell.		
>>>Relative East	0		INTEGER (-	Seconds of angle,	_	
			2000020000)	scale factor 0.03.		
				Relative position		
				compared to		
				reference cell.		
>>>Relative	0		INTEGER (-	Relative altitude in	_	
Altitude			40004000)	meters compared to		
				ref. cell.		
>>>Fine SFN-	0		INTEGER	Gives finer resolution	_	
SFN			(015)			
>>>Round Trip	0		INTEGER	In chips. Included if	_	
Time			(032766)	cell is in active set		
>>> UE assisted			, ,		_	
		•		i .		

>>Extended Round	0	INTEGER	In chips. Included if	YES	ignore
Trip Time		(3276710304	cell is in active set.		
		1)	Included only if the		
			Round Trip Time IE		
			above is included with		
			its maximum value		
			and if the actual value		
			is outside the		
			possible range for the		
			the Round Trip Time		
			IE.		

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

## Table 106

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

#### Table 107

•		
Constant	Explanation	l Value I
Constant		value

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

#### 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(hea vy 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(038399)	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(0255)	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	М				_	
Position Data >Positioning Data Discriminator	M M		BIT STRING (4)	The positioning data discriminator defines the type of data provided for each positioning method:  0000 indicates the presence of the Positioning Data Set IE (that reports the usage of each non-GANSS method that was successfully used to obtain the location estimate)  0001 indicates the presence of the GANSS Positioning Data Set IE (that reports the usage of each GANSS method that was successfully used to obtain the location estimate) and the absence of the Positioning Data Set IE  1 octet of data is provided for each positioning method included.	-	
				All other values are reserved.		
>Positioning Data	C-				_	
Set	ifDiscrimin ator=0					

	<del>.</del>				
>>Positioning Method and Usage	1 <ma xSet&gt;</ma 	OCTET STRING (1)	Coding of positioning method (bits 8-4): 00000 Reserved 00001 Reserved 00010 Reserved 00011 Reserved 00101 Reserved 00101 Mobile Assisted GPS 00110 Mobile Based GPS 00111 Conventional GPS 01000 U-TDOA 01001 OTDOA 01001 IPDL 01011 RTT 01100 Cell ID 01101 to 01111 reserved for other location technologies 10000 to 11111 reserved for network specific positioning methods  Coding of usage (bits 3-1): 000 Attempted unsuccessfully due to failure or interruption - not used. 001 Attempted successfully: results not used to generate location - not used. 010 Attempted successfully: results used to verify but not generate location - not used. 011 Attempted successfully: results used to generate location 100 Attempted successfully: results used to generate location 1010 Attempted successfully: results used to generate location 100 Attempted successfully: case where MS supports multiple mobile based positioning methods and the actual method or methods used by the MS cannot be determined.		
>GANSS Positioning Data Set		01		YES	ignore
>>GANSS Positioning Method and Usage	1 <ma xGANS SSet&gt;</ma 	OCTET STRING (1)	Coding of Method (Bits 8-7): 00: MS-Based 01: MS-Assisted 10: Conventional 11: Reserved  Coding of GANSS ID (Bits 6-4): 000: Galileo other values reserved  Coding of usage (bits 3-1):	_	

	011 Attempted successfully used to ger location 100 Attempted successfully where MS is multiple mo positioning and the act or methods the MS can determined	y: case supports bile based methods ual method used by not be
--	---	---

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

### Table 113

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

## 9.2.2.66 Transmission Gap Pattern Sequence Information

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

Table 114

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Transmission Gap Pattern Sequence Information		1 <maxtgps></maxtgps>		
>TGPS Identifier	М		INTEGER(1ma xTGPS)	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.</maxtgps>
>TGSN	M		INTEGER(014)	Transmission Gap Starting Slot Number: The slot number of the first transmission gap slot within the TGCFN.
>TGL1	M		INTEGER(114)	The length of the first Transmission Gap within the transmission gap pattern expressed in number of slots.
>TGL2	0		INTEGER(114)	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	М		INTEGER(114 4,)	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.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CM Configuration Change CFN	М		CFN 9.2.2.68	
Transmission Gap Pattern Sequence Status		0 <maxtgps></maxtgps>		
>TGPS Identifier	M		INTEGER(1ma xTGPS)	If the group is not present, none of the pattern sequences are activated. References an already defined sequence.
>TGPRC	M		INTEGER(051 1)	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(0255)	

## 9.2.2.69 Positioning Response Time

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

Table 119

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

## 9.2.2.70 Reference Cell Position

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

Table 120

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Geographical Area				
>Point				Ellipsoid point
>>Geographical Coordinates	М		9.2.2.7	
>Ellipsoid point with altitude				
>>Geographical Coordinates	М		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	Semantics description
			reference	
CHOICE mode				
>FDD				
>>IP Spacing	M		ENUMERATED(	See [4]
			5,7,10,15,20,30,	
			40,50,)	
>>IP Length	M		ENUMERATED(	See [4]
			5,10,)	
>>IP Offset	M		INTEGER(09)	See [4]
>>Seed	M		INTEGER(063)	See [4]
>TDD				
Burst Mode Parameters	0		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(015)	
Burst Length	M		INTEGER(102	
-			5)	
Burst Frequency	M		INTEGER(116)	

### 9.2.2.73 SFN-SFN Relative Time Difference

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SFN Offset	М		INTEGER	
			(04095)	
SFN-SFN-Relative Time	M		INTEGER	
Difference			(038399)	

## 9.2.2.74 UTDOA Group

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

Table 124

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UTRAN Cell Identifier	M		9.2.2.37	
Frequency Information	M		9.2.2.42	
Choice RRC State	M			
>CELL_DCH				
>>Uplink DPCH Information	М		9.2.2.41	
>>Compressed Mode Assistance Data	0		9.2.2.44	FDD only
>>DCH Information		01		
>>>TFCS		1 <maxtfc></maxtfc>		
>>>>CTFC	M		9.2.2.49	
>>>TrCH Information		1 <maxtrch></maxtrch>		
List				
>>>>UL TrCH	M		9.2.2.60	
Information				
>>E-DPCH Information		01		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	0		9.2.2.80	
>CELL_FACH				
>>PRACH Parameters	M		9.2.2.43	
>>C-RNTI	М		9.2.2.45	
>>USCH parameters	0		9.2.2.95	TDD only

Table 125

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

## 9.2.2.75 Maximum Set of E-DPDCHs

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

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 (015)	Unit: % Range: 40100 % 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 (14, )	Indicates which standardised E-TFCS Transport Block Size Table shall be used. The related tables are specified in [ref FFS].
Reference E-TFCI Information		0 <maxnoofrefetf Cls&gt;</maxnoofrefetf 		
>Reference E-TFCI	М		INTEGER (0127)	
>Reference E-TFCI Power Offset	М		9.2.2.78	

Table 129

Range Bound	Explanation
maxnoofRefETFCIs	Maximum number of signalled reference E-TFCIs

### 9.2.2.78 Reference E-TFCI Power Offset

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Reference E-TFCI Power Offset			INTEGER (08)	According to mapping in ref. [17] subclause 4.2.1.3

#### 9.2.2.79 E-TTI

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

#### Table 131

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

#### 9.2.2.80 E-DPCCH Power Offset

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

#### Table 132

IE/Group Name	Presence	Range	IE Type and	Semantics Description
			Reference	
E-DPCCH Power Offset			INTEGER (08)	According to mapping in ref. [17] subclause 4.2.1.3.

#### 9.2.2.81 Cell Parameter ID

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

#### Table 133

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Cell Parameter ID			INTEGER (0127,)	

## 9.2.2.82 TFCI Coding

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

#### Table 134

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

### 9.2.2.83 Repetition Length

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

#### Table 135

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Repetition Length			INTEGER (163)	

### 9.2.2.84 Repetition Period

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

Table 136

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

#### 9.2.2.85 TDD DPCH Offset

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

Table 137

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Offset Type				
>Initial Offset				
>>TDD DPCH Offset Value	M		INTEGER (0255)	
>No Initial Offset				
>>TDD DPCH Offset Value	M		INTEGER (063)	

### 9.2.2.86 UL Timeslot Information

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

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

#### 9.2.2.87 Time Slot

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

Table 139

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Time Slot			INTEGER (014)	

### 9.2.2.88 Midamble Shift And Burst Type

This information element indicates burst type and midamble allocation.

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

Three different midamble allocation schemes exist:

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

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

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

Table 140

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Burst Type				
>Type1				
>>Midamble Configuration Burst Type 1 And 3	М		INTEGER (4, 8, 16)	As defined in [19]
>>CHOICE Midamble Allocation Mode	М			
>>>Default Midamble			NULL	
>>>Common Midamble			NULL	
>>>UE Specific Midamble				
>>Midamble Shift Long	M		INTEGER (015)	
>Type2				
>>Midamble Configuration Burst Type 2	М		INTEGER (3,6)	As defined in [19]
>>CHOICE Midamble Allocation Mode	М			
>>>Default Midamble			NULL	
>>>Common Midamble			NULL	
>>>UE Specific Midamble				
>>Midamble Shift Short	M		INTEGER (05)	
>Type3				UL only
>>Midamble Configuration Burst Type 1 And 3	М		INTEGER (4, 8, 16)	As defined in [19]
>>CHOICE Midamble Allocation Mode	М			
>>>Default Midamble			NULL	
>>>UE Specific Midamble				
>>Midamble Shift Long	M		INTEGER (015)	

### 9.2.2.89 TFCI Presence

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

Table 141

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

### 9.2.2.90 TDD UL Code Information

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
TDD UL Code Information		1 <maxno ofDPCHs&gt;</maxno 		
>TDD Channelisation Code	М		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 (1256)	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.

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&gt;</maxtf 		
>CTFC	M		9.2.2.49	
TrCH Information List		1 <maxtr CH&gt;</maxtr 		
>UL TrCH Information	М		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(0255)	

### 9.2.2.97 Include Velocity

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

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

# 9.2.2.98 Velocity Estimate

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

Table 152

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Velocity Estimate				
>Horizontal Velocity				Horizontal speed and bearing (the direction of travel).
>>Horizontal Speed and Bearing	M		9.2.2.99	
>Horizontal with Vertical Velocity				Horizontal speed and bearing (the direction of travel) as well as vertical speed and the direction (upward or downward)
>>Horizontal Speed and Bearing	M		9.2.2.99	
>>Vertical Velocity	M		9.2.2.100	
>Horizontal Velocity with Uncertainty				Horizontal speed, bearing (the direction of travel), and the uncertainty of the reported speed.
>>Horizontal Speed and Bearing	M		9.2.2.99	
>>Uncertainty Speed	М		INTEGER (0255)	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 (0255)	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	М		INTEGER (0255)	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	М		INTEGER (0359)	The direction of movement is given in degrees where '0' represents North, '90' represents East, etc.
Horizontal Speed	М		INTEGER (0< 2 <sup>11</sup> -1)	The relationship between (N) and the horizontal speed (h) in kilometers per hour it describes is: $N \le h < N + 0.5$ (N=0) $N - 0.5 \le h < N + 0.5$ (0 <n<2<sup>11-1)  <math>N - 0.5 \le h</math> (N = 2<sup>11</sup>-1)</n<2<sup>

# 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	М		INTEGER (02 <sup>8</sup> -1)	The relationship between (N) and the vertical speed (v) in kilometers per hour it describes is: $N \le v < N + 0.5$ $(N = 0)$ $N - 0.5 \le v < N + 0.5$ $(0 < N < 2^8 - 1)$ $N - 0.5 \le v$ $(N = 2^8 - 1)$
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	0		9.2.2.38		_	
Vertical Accuracy Code	0		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	М		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	0		ENUMERATED( CELL_DCH, all states except CELL_DCH, all states,)		YES	ignore

## 9.2.2.102 UE Position Estimate Info

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

Table 156

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE Reference Time	M				_	
>UTRAN GPS reference time Result			9.2.2.104		_	
>GPS reference time only					_	
>>GPS TOW msec	М		INTEGER (06.048*10 <sup>8</sup> -1, )	GPS Time of Week in milliseconds.	_	
>Cell timing					_	
>>SFN	М		INTEGER (04095)	SFN during which the position was calculated.	_	
>>UC-ID	М		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for SFN.	_	
UE Position Estimate	M		Geographical Area 9.2.2.6		_	
GPS Reference Time Uncertainty	0		9.2.2.132		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	0		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GPS TOW-SFN relationship.
SFN	M		INTEGER (04095)	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 <sup>th</sup> UMTS chips according to [13].
UC-ID	M		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GPS TOW-SFN relationship
SFN	M		INTEGER(04095)	This IE indicates the SFN at which the UE timing of cell frame is captured.

## 9.2.2.105 T<sub>UTRAN-GPS</sub> Drift Rate

#### Table 159

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
T <sub>UTRAN-GPS</sub> Drift Rate	0		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.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Reference Number	M		INTEGER(032767,)	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 loaction. 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	М		INTEGER(1 8639999,)	This IE indicates the amount of periodic reports.
Reporting Interval	М		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,	Amount of reporting for a
			4, 8, 16, 32, 64,	periodic location procedure.
			Infinity,)	

### 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.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Measurement Validity	М		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	М	3	ENUMERATED( RRC State Transition, Cancelled by SRNC, Cancelled by SAS.	
			Undefined,	

# 9.2.2.112 Requested Cell-ID Measurements

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

Table 166

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

# 9.2.2.113 DGANSS Corrections

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

Table 167

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

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
DGANSS Reference Time	М		INTEGER(0. .3570 by step of 30)	Seconds. Time in GNSS system time (modulo 3600 s) when the DGANSS corrections were calculated
DGANSS Information		1 <maxsg nType&gt;</maxsg 		
>GANSS Signal ID	0		9.2.2.131	Absence of this field means Galileo L1 OS if GANSS ID refers to Galileo.
>Status/Health	M		ENUMERAT ED(UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data)	
>DGANSS Signal Information	C- Status/Hea Ith	1 <maxgan SSSat&gt;</maxgan 		If the Cipher information is included these fields are ciphered.
>>Sat ID	M		INTEGER(063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>>IOD	М		BIT STRING(10)	
>>UDRE	M		ENUMERAT ED(UDRE \le 1.0 m, 1.0m < UDRE \le 4.0m, 4.0m < UDRE \le 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	М		INTEGER(- 20472047)	Scaling factor 0.32 meters
>>RRC	M		INTEGER(- 127127)	Scaling factor 0.032 meters/sec

### Table 167A

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

### Table 167B

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

## 9.2.2.114 GANSS Almanac and Satellite Health

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

Table 168

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Week Number	M		INTEGER(0255)	Almanac reference week , number of weeks since the beginning of GANSS specific system time (mod 256)
CHOICE Almanac Model	M			
>Keplerian Parameters				
>>T <sub>oa</sub>	M		INTEGER(0255)	Scaling factor 2 <sup>12</sup> s Reference time of almanac within week in GANSS TOD time base
>>IOD <sub>a</sub>	М		INTEGER(03)	Issue-Of –Data, common to all satellites
>>Satellite Information KP		1 <maxgan SSSatAlm anac&gt;</maxgan 		Almanacs are in the order of the SV IDs, the smallest ID first.
>>>Sat ID	М		INTEGER(063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>>>e	М		BIT STRING(11)	Eccentricity, dimensionless [22]
>>>δi	M		BIT STRING(11)	semi-circles [22]
>>>OMEGADOT	M		BIT STRING(11)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [22]
>>>SV Health KP	М		BIT STRING(4)	dimensionless
>>>delta A <sup>1/2</sup>	M		BIT STRING(17)	Semi-Major Axis delta (meters) <sup>1/2</sup> [22]
>>>OMEGA <sub>0</sub>	М		BIT STRING(16)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [22]
>>>M <sub>0</sub>	М		BIT STRING(16)	Mean Anomaly at Reference Time (semi-circles) [22]
>>>0	М		BIT STRING(16)	Argument of Perigee (semi- circles) [22]
>>>af <sub>0</sub>	М		BIT STRING(14)	Seconds [22]
>>>af <sub>1</sub>	М		BIT STRING(11)	sec/sec [22]

Table 168A

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

### 9.2.2.115 GANSS Clock Model

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

Table 169

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Satellite Clock Model		1 <maxga NSSClock Mod&gt;</maxga 		There may be more than one clock model included if defined in SIS ICD (e.g. two for Galileo)
>t <sub>oc</sub> _LSB	М		INTEGER(0511)	Least significant bits of Time- of-Clock in seconds
>a <sub>i2</sub>	M		BIT STRING(12)	defined in [22]
>a <sub>i1</sub>	M		BIT STRING(18)	defined in [22]
>a <sub>i0</sub>	M		BIT STRING(28)	defined in [22]
>T <sub>GD</sub>	0		BIT STRING(10)	defined in [22]
>Model ID	0		INTEGER(03)	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
Gailleo	2	Reserved
	3	Reserved

# 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	Semantics description
			Reference	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
a <sub>i0</sub>	M		BIT STRING(12)	This parameter is used as defined in [22]
a <sub>i1</sub>	M		BIT STRING(12)	This parameter is used as defined in [22]
a <sub>i2</sub>	M		BIT STRING(12)	This parameter is used as defined in [22]
GANSS Ionosphere Regional Storm Flags		01		
>Storm Flag 1	M		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 2	М		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 3	M		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 4	M		BOOLEAN	This parameter is used as defined in [22]
>Storm Flag 5	M		BOOLEAN	This parameter is used as defined in [22]

# 9.2.2.117 GANSS Measured Results

Table 171

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE Reference Time	М			
>UTRAN Reference Time				This choice may only be present if SAS operates in SAS-centric mode.
>>UE GANSS Timing of Cell Frames	M		INTEGER(0. .8639999999 9750 by step of 250)	GANSS Time of Day (TOD) in ns
>>GANSS Time ID	0		GANSS ID 9.2.2.130	Absence of this IE means Galileo.
>>GANSS TOD Uncertainty	0		INTEGER(0127)	Provides the accuracy of the relation between GANSS TOD and UTRAN time. Its coding is defined in [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(04095)	The SFN for which the location is valid. This IE indicates the SFN at which the UE timing of cell frames is captured.
>GANSS Reference Time Only				
>>GANSS TOD msec	M		INTEGER(03599999)	GANSS Time of Day (modulo 1 hour) in milliseconds (rounded down to the nearest millisecond unit).
>>GANSS Time ID	0		GANSS ID 9.2.2.130	Absence of this IE means Galileo.
>>GANSS TOD Uncertainty	0		INTEGER(0. .127)	Provides the accuracy of the GANSS TOD. Its coding is defined in [4].
GANSS Generic Measurement Information		1 <maxga NSS&gt;</maxga 		
>GANSS ID	0		9.2.2.130	Absence of this IE means Galileo.
>GANSS Signal ID	0		9.2.2.131	Absence of this field means Galileo L1 OS if GANSS ID

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
				refers to Galileo.
> GANSS Code Phase	0		INTEGER(0.	In milliseconds.
Ambiguity			.31)	Defined in [4].
> GANSS Measurement	M	1		
Parameters		<maxgan< td=""><td></td><td></td></maxgan<>		
Cat ID	M	SSSat>	INITECED/O	I doubition the potallite and in
>>Sat ID	IVI		INTEGER(063)	Identifies the satellite and is equal to (SV ID No - 1) where
			.03)	SV ID No is defined in [22].
>>C/N <sub>o</sub>	М		INTEGER(0.	the estimate of the carrier-to-
22 3/11 <sub>0</sub>	"		.63)	noise ratio of the received
			100,	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
	1			dB-Hz).
>>Multipath Indicator	М		ENUMERAT	Coding as in 9.2.2.12
			ED(NM, low,	
			medium, high)	
>>Carrier Quality Indicaton	0		BIT	Coded as defined in [4].
22 Garrier Quality indicator			STRING(2)	Coded as defined in [4].
>>GANSS Code Phase	М		INTEGER(0.	Defined in [4].
			.2 <sup>21</sup> -1)	
>>GANSS Integer Code	0		INTEGER(0.	IDefined in [4].
Phase			.63)	
>>Code Phase RMS Error	M		INTEGER	Coding as Pseudorange
			(063)	RMS Error in section 9.2.2.12
>>Doppler	M		INTEGER(-	m/s, scale factor 0.04. Doppler
			327683276	measured by the UE for the
			7)	particular satellite signal
>>ADR	0		INTEGER(0.	Meters, scale factor 2 <sup>-10</sup>
			.33554431)	ADR measurement measured
				by the UE for the particular
				satellite signal.

### Table 171A

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

# 9.2.2.118 GANSS Navigation Model

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

Table 172

IE/Group name	Presence	Range	IE Type and	Semantics description
			Reference	
Non-Broadcast Indication	0		ENUMERAT	If this IE is present, GANSS
			ED(true)	navigation model is not
				derived from satellite
				broadcast. See NOTE 1
T <sub>oe/c</sub> MSB	C-Orbit		INTEGER(0.	The most significant bits of
	model		.31)	parameters Time-of-
				Ephemeris and Time-of-Clock
				in seconds, scale factor 21600
e MSB	C-Orbit		INTEGER(0.	The most significant bits of eccentricity, scale factor 2 <sup>-8</sup>
	model		.127)	eccentricity, scale factor 2 <sup>-8</sup>

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
SqrtA MSB	C-Orbit model		INTEGER(063)	The most significant bits of Semi-Major Axis in (meters) <sup>1/2</sup> , scale factor 2 <sup>7</sup>
Satellite Information		1 <maxga NSSSat&gt;</maxga 		
>Sat ID	М		INTEGER(063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>SV Health	М		BIT STRING(5)	Coded as defined in [4].
>IOD	М		BIT STRING(10)	
>GANSS Clock Model	М		GANSS clock model 9.2.2.115	
>GANSS Orbit Model	М		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

#### Table 172B

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

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.

### 9.2.2.119 GANSS Orbit Model

This IE contains information for GANSS orbit model parameters.

Table 173

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE Orbit Model	М			
>Keplerian Parameters				
>>t <sub>oe_LSB</sub>	M		INTEGER(0. .511)	Least significant bits of Time- of-Ephemeris in seconds, scale factor 60
>>ω	M		BIT STRING(32)	Argument of Perigee (semicircles) [22]
>>∆n	M		BIT STRING(16)	Mean Motion Difference From Computed Value (semi- circles/sec) [22]
>>M <sub>0</sub>	М		BIT STRING(32)	Mean Anomaly at Reference Time (semi-circles) [22]
>>OMEGAdot	M		BIT STRING(24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [22]

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>>e_LSB	M		INTEGER(033554431)	Least significant bits of eccentricity, scale factor 2 <sup>-33</sup>
>>ldot	M		BIT STRING(14)	Rate of Inclination Angle (semi-circles/sec) [22]
>>sqrtA_LSB	M		INTEGER(0. .67108863)	Least significant bits of Semi- Major Axis in (meters) <sup>1/2</sup> , scale factor 2 <sup>-19</sup>
>>i0	M		BIT STRING(32)	Inclination Angle at Reference Time (semi-circles) [22]
>>OMEGA <sub>0</sub>	М		BIT STRING(32)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [22]
>>C <sub>rs</sub>	М		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) [22]
>>C <sub>is</sub>	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) [22]
>>C <sub>us</sub>	М		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) [22]
>>C <sub>rc</sub>	М		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) [22]
>>C <sub>ic</sub>	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) [22]
>>C <sub>uc</sub>	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) [22]

# 9.2.2.120 GANSS Positioning Instructions

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

Table 174

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Horizontal Accuracy Code	0		9.2.2.38	
Vertical Accuracy Code	0		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
				bits 2-8: 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
				bits 2-8: reserved for future GANSS.
Measurement Validity	0		ENUMERATED( CELL_DCH, all states except CELL_DCH, all states,)	

## 9.2.2.121 GANSS-UTRAN Time Relationship Uncertainty

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

Table 175

IE/Group Name	Presence	Range	IE Type and Reference	Semantics
				Description
GANSS-UTRAN Time	M		ENUMERATED	RNC estimate of
Relationship Uncertainty			(50ns, 500ns, 1us, 10us,	uncertainty in
			1ms, 10ms, 100ms,	GANSS-UTRAN time
			unreliable,)	relationship
GANSS ID	0		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	Semantics description
-		_	Reference	-

IE/Group name	Presence	Range	IE Type and	Semantics description
			Reference	
Satellite Information		1 <maxga< td=""><td></td><td></td></maxga<>		
		NSSSat>		
>Bad GANSS Sat ID	М		INTEGER(063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>Bad GANSS Signal ID	0		BIT STRING(8)	Coded as defined in [4].

### Table 176A

Range bound	Explanation
maxGANSSSat	Maximum number of satellites for which data is included in this IE.
	The value of maxGANSSSat is 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
GANSS Signal ID	0		9.2.2.131	Absence of this field means Galileo L1 OS if GANSS ID refers to Galileo.
Satellite Information		1 <maxga NSSSat&gt;</maxga 		
>Sat ID	M		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>Doppler (0 <sup>th</sup> order term)	М		INTEGER(- 20482047)	Scaling factor 0.5 m/s Conversion between m/s and Hz shall be made by using the nominal wavelength of the assisted signal.
>Extra Doppler		01		
>>Doppler (1 <sup>st</sup> order term)	М		INTEGER (- 4221)	Scaling factor 1/210 m/s <sup>2</sup>
>>Doppler Uncertainty	M		ENUMERAT ED (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	М		INTEGER(01023)	ms, scaling factor 2 <sup>-10</sup> Nominal chipping rate of the GNSS signal shall be used in conversion. Increasing binary values of the field signify increasing predicted pseudoranges.
>Integer Code Phase	М		INTEGER(0127)	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(031)	Expected code-phase is in the range "Code Phase – Code Phase Search Window" to "Code Phase + Code Phase

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
				Search Window". Coded as defined in [4].
>Azimuth and Elevation		01		
>>Azimuth	M		INTEGER(031)	Scaling factor 11.25 Degrees An angle of x degrees means the satellite azimuth a is in the range x ≤ a < x+11.25 degrees.
>>Elevation	M		INTEGER(07)	Scaling factor 11.25 Degrees An angle of y degrees means the satellite elevation e is in the range y ≤ e < y+11.25 degrees except for y=78.75 where the range is extended to include 90 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
GANSS Day	0		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 [4].  This IE may only be present if SAS operates in SAS-centric mode.
GANSS Time ID	0		GANSS ID 9.2.2.130	Absence of this IE means Galileo.
UTRAN GANSS Reference Time		01		This IE may only be present if SAS operates in SAS-centric mode.
>UTRAN GANSS Timing of Cell Frames	M		INTEGER(0 999999750 by step of 250)	UTRAN GANSS timing of cell frames in steps of 250 ns. Indicates sub-second part of GANSS TOD IE. See [4]
>UC-ID	0		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GANSS TOD-SFN relationship.
>SFN	M		Integer(040 95)	The SFN which the UTRAN GANSS timing of cell frames time stamps.

IE/Group name	Presence	Range	IE Type and	Semantics description
			Reference	
T <sub>UTRAN-GANSS</sub> Drift Rate	0		ENUMERAT	in 1/256 chips per sec.
			ED (0, 1, 2,	
			5, 10, 15, 25,	
			50, -1, -2, -5,	
			-10, -15, -25,	
			-50,)	

### 9.2.2.125 GANSS Time Model

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

Table 179

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
GANSS Time Model Reference Time	М		INTEGER(0. .37799)	GANSS reference time (modulo 1 week) in seconds. Scale Factor 2 <sup>4</sup>
T <sub>AO</sub>	M		INTEGER(- 2147483648. .2147483647	Seconds, scale factor 2 <sup>-35</sup>
T <sub>A1</sub>	0		INTEGER(- 838860883 88607)	sec/sec, scale factor 2 <sup>-51</sup>
T <sub>A2</sub>	0		INTEGER(- 6463)	sec/sec <sup>2</sup> , scale factor 2 <sup>-68</sup>
GNSS_TO_ID	M		ENUMERAT ED(GPS,)	
Week Number	0		INTEGER(08191)	Reference week of GANSS Time Model

### 9.2.2.126 GANSS UTC Model

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

Table 180

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
A <sub>1</sub>	М		BIT STRING(24)	sec/sec [22]
A <sub>0</sub>	М		BIT STRING(32)	seconds [22]
t <sub>ot</sub>	М		BIT STRING(8)	seconds [22]
WN <sub>t</sub>	М		BIT STRING(8)	weeks [22]
$\Delta t_{LS}$	М		BIT STRING(8)	seconds [22]
WN <sub>LSF</sub>	М		BIT STRING(8)	weeks [22]
DN	М		BIT STRING(8)	days [22]
Δt <sub>LSF</sub>	М		BIT STRING(8)	seconds [22]

## 9.2.2.127 GANSS Time Indicator

### Table 181

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Time Indicator			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(059,)	Refererence 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&gt;</maxgans 		
>Sat ID	M		INTEGER(063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [22].
>Data Bit Assistance		1 <maxsgnty< td=""><td></td><td></td></maxsgnty<>		
Sgn List		pe>		
>>GANSS Signal ID	M		9.2.2.131	
>>Data Bits	M		BIT STRING(11024)	Raw data bits as transmitted from a specific satellite at the time indicated by GANSS_TOD.

#### 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 IF. 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		01		
>GPS Week	М		INTEGER (01023)	GPS week number
>GPS_Toe	M		INTEGER (0167)	GPS time of ephemeris in hours of the latest ephemeris set
>T-Toe limit	М		Integer (010)	ephemeris age tolerance in hours
>Satellites related data		0 <maxsat></maxsat>		
>>SatID	М		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>>IODE	М		INTEGER (0255)	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
GANSS Reference Time	М		BOOLEAN	TRUE means requested
GANSS Reference Location	M		BOOLEAN	TRUE means requested
GANSS Ionospheric model	M		BOOLEAN	TRUE means requested
GANSS Requested Generic Assistance Data		1 <maxganss></maxganss>		
>GANSS ID	0		9.2.2.130	Absence of this IE means Galileo
>GANSS Real-Time Integrity	0		BOOLEAN	TRUE means requested
>GANSS Differential Corrections		01		
>>DGANSS Signal	М		BIT STRING (8)	Coded as defined in [4].
>GANSS Almanac	0		BOOLEAN	TRUE means requested
>GANSS Navigation Model	0		BOOLEAN	TRUE means requested
>GANSS Time Model GNSS-GNSS	0		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. Other bits are reserved.
>GANSS Reference Measurement Information	0		BOOLEAN	TRUE means requested
>GANSS Data Bits		01		
>>GANSS TOD	М		INTEGER (086399)	The GANSS TOD for which the data bits are requested.
>>Data Bit Assistance		1 <maxsgntype></maxsgntype>		
>>>GANSS Data Bit Assistance	М		BOOLEAN	TRUE means requested
>GANSS UTC model	0		BOOLEAN	TRUE means requested
>GANSS Navigation Model Additional data		01		
>>GANSS Week	М		INTEGER (04095)	
>>GANSS_Toe	М		INTEGER (0167)	GANSS time of ephemeris in hours of the latest ephemeris set contained by the UE.
>>T-Toe limit	М		INTEGER (010)	ephemeris age tolerance of the UE to UTRAN in hours. Five spare values needed.
>>Satellites list related data	М	1 <maxgansssat></maxgansssat>		
>>>Sat ID	M		INTEGER (063)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in e.g. [22].
>>>IOD	М		BIT STRING (10)	Issue of Data for Sat ID

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.
maxSgnType	Maximum number of GANSS signals included in this IE.
	The value of maxSgnType is 8.

#### 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(07)	Defines the GANSS and is coded as defined in [4]. All values are reserved in this version of the protocol.

# 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	М		INTEGER(03,)	Defines the GANSS and is coded as defined in [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	Σ		Integer (0127)	This element provides the accuracy of the provided GPS time, or alternatively the accuracy of the provided relation between GPS and UTRAN time. If "GPS TOW" is the provided GPS time, or alternatively the GPS time corresponding to the UTRAN time provided, then the true GPS time lies in the interval ["GPS TOW" - "GPS Reference Time Uncertainty", "GPS TOW" + "GPS Reference Time Uncertainty"]. The uncertainty r, expressed in microseconds, is mapped to a number K with the following formula: r = C*(((1+x)K)-1) with C = 0.0022 and x = 0.18. To encode any higher value of the uncertainty than that corresponding to K=127 in the formula above, or to indicate an undefined value of the "GPS TOW", the same value, K=127, shall be used.

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

### 9.3.0 General

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

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

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

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

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

# 9.3.1 Usage of private message mechanism for non-standard use

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

- for special operator- (and/or vendor) specific features considered not to be part of the basic functionality, i.e. the functionality required for a complete and high-quality specification in order to guarantee multivendor interoperability;
- by vendors for research purposes, e.g. to implement and evaluate new algorithms/features before such features are proposed for standardisation.

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

# 9.3.2 Elementary Procedure Definitions

<sup>--</sup> 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
                                             UNIQUE,
   &procedureCode
                                             DEFAULT ignore
    &criticality
                              Criticality
WITH SYNTAX {
                              &InitiatingMessage
    INITIATING MESSAGE
                              &SuccessfulOutcome]
    [SUCCESSFUL OUTCOME
                              &UnsuccessfulOutcome]
    [UNSUCCESSFUL OUTCOME
                              &Out.comel
    [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,
```

```
({PCAP-ELEMENTARY-PROCEDURES}{@procedureCode})
    value
                   PCAP-ELEMENTARY-PROCEDURE.&InitiatingMessage
SuccessfulOutcome ::= SEQUENCE
   procedureCode PCAP-ELEMENTARY-PROCEDURE.&procedureCode
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}),
   criticality
                   PCAP-ELEMENTARY-PROCEDURE.&criticality
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}{@procedureCode}),
    transactionID TransactionID,
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}{@procedureCode})
   value
                   PCAP-ELEMENTARY-PROCEDURE. & Successful Outcome
UnsuccessfulOutcome ::= SEQUENCE {
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}),
   procedureCode PCAP-ELEMENTARY-PROCEDURE.&procedureCode
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}{@procedureCode}),
   criticality
                   PCAP-ELEMENTARY-PROCEDURE.&criticality
   transactionID TransactionID,
                                                                 ({PCAP-ELEMENTARY-PROCEDURES} { @procedureCode } )
   value
                   PCAP-ELEMENTARY-PROCEDURE. &UnsuccessfulOutcome
Outcome ::= SEQUENCE {
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}),
   procedureCode PCAP-ELEMENTARY-PROCEDURE.&procedureCode
                   PCAP-ELEMENTARY-PROCEDURE.&criticality
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}{@procedureCode}),
   criticality
   transactionID TransactionID.
                                                                 ({PCAP-ELEMENTARY-PROCEDURES}{@procedureCode})
   value
                   PCAP-ELEMENTARY-PROCEDURE. &Outcome
     ****************
-- 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
                            PositionCalculationFailure
    UNSUCCESSFUL OUTCOME
                            id-PositionCalculation
    PROCEDURE CODE
    CRITICALITY
                            reject
informationExchangeInitiation PCAP-ELEMENTARY-PROCEDURE ::= {
                            InformationExchangeInitiationRequest
    INITIATING MESSAGE
                            InformationExchangeInitiationResponse
    SUCCESSFUL OUTCOME
    UNSUCCESSFUL OUTCOME
                            InformationExchangeInitiationFailure
                            id-InformationExchangeInitiation
    PROCEDURE CODE
    CRITICALITY
                            reject
positionInitiation PCAP-ELEMENTARY-PROCEDURE ::= {
                            PositionInitiationRequest
    INITIATING MESSAGE
    SUCCESSFUL OUTCOME
                            PositionInitiationResponse
    UNSUCCESSFUL OUTCOME
                            PositionInitiationFailure
                            id-PositionInitiation
    PROCEDURE CODE
    CRITICALITY
                            reject
positionActivation PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PositionActivationRequest
                            PositionActivationResponse
    SUCCESSFUL OUTCOME
    UNSUCCESSFUL OUTCOME
                            PositionActivationFailure
                            id-PositionActivation
    PROCEDURE CODE
    CRITICALITY
                            reject
informationReporting PCAP-ELEMENTARY-PROCEDURE ::=
                            InformationReport
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-InformationReporting
                            ignore
    CRITICALITY
informationExchangeTermination PCAP-ELEMENTARY-PROCEDURE ::= {
```

```
InformationExchangeTerminationRequest
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-InformationExchangeTermination
    CRITICALITY
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
                            id-privateMessage
    PROCEDURE CODE
    CRITICALITY
                            ignore
positionParameterModification PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PositionParameterModification
    PROCEDURE CODE
                            id-PositionParameterModification
                            ignore
    CRITICALITY
abort PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            Abort
    PROCEDURE CODE
                            id-Abort
    CRITICALITY
                            ignore
positionPeriodicReport PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PositionPeriodicReport
    PROCEDURE CODE
                            id-PositionPeriodicReport
    CRITICALITY
                            ignore
positionPeriodicResult PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PositionPeriodicResult
    PROCEDURE CODE
                            id-PositionPeriodicResult
    CRITICALITY
                            ignore
positionPeriodicTermination PCAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PositionPeriodicTermination
    PROCEDURE CODE
                            id-PositionPeriodicTermination
    CRITICALITY
                            ignore
```

```
}
END
```

## 9.3.3 PDU Definitions

```
__ ******************
-- PDU definitions for PCAP.
__ **********************************
PCAP-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) pcap(4) version1 (1) pcap-PDU-Contents (1) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
__ *********************
-- IE parameter types from other modules.
__ ********************
IMPORTS
   Cause,
   CriticalityDiagnostics,
   GPS-UTRAN-TRU,
   InformationExchangeID,
   InformationReportCharacteristics,
   InformationType,
   MeasuredResultsList,
   RequestedDataValue,
   RequestedDataValueInformation,
   UE-PositionEstimate,
   CellId-MeasuredResultsSets,
   OTDOA-MeasurementGroup,
   AccuracyFulfilmentIndicator,
   HorizontalAccuracyCode,
   VerticalAccuracyCode,
   RequestType,
   UE-PositioningCapability,
   UC-ID,
   ResponseTime,
   PositioningPriority,
   ClientType,
   PositioningMethod,
   UTDOAPositioning,
   GPSPositioning.
   OTDOAAssistanceData,
   UTDOA-Group,
```

```
Positioning-ResponseTime,
    EnvironmentCharacterisation,
    PositionData.
    IncludeVelocity,
    VelocityEstimate,
    UE-PositionEstimateInfo,
    OTDOA-MeasuredResultsSets.
    PeriodicPosCalcInfo.
    PeriodicLocationInfo,
    AmountOfReporting,
   MeasInstructionsUsed,
    RRCstateChange,
    PeriodicTerminationCause,
    CellIDPositioning,
    GANSS-MeasuredResultsList,
    GANSSPositioning,
    GANSS-UTRAN-TRU,
    AdditionalGPSAssistDataRequired,
    AdditionalGanssAssistDataRequired
FROM PCAP-TES
   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-Rgst,
   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
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 ::=
```

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```
ID id-CellId-MeasuredResultsSets
                                        CRITICALITY reject EXTENSION CellId-MeasuredResultsSets
                                                                                                PRESENCE optional
     ID id-OTDOA-MeasurementGroup
                                        CRITICALITY reject EXTENSION OTDOA-MeasurementGroup
                                                                                                PRESENCE optional
                                                                                                PRESENCE optional
                                        CRITICALITY ignore EXTENSION HorizontalAccuracyCode
     ID id-HorizontalAccuracyCode
                                        CRITICALITY ignore EXTENSION VerticalAccuracyCode
     ID id-VerticalAccuracyCode
                                                                                                PRESENCE optional
     ID id-UTDOA-Group
                                        CRITICALITY reject EXTENSION UTDOA-Group
                                                                                                PRESENCE optional
     ID id-Positioning-ResponseTime
                                        CRITICALITY ignore EXTENSION Positioning-ResponseTime
                                                                                                PRESENCE optional
     ID id-IncludeVelocity
                                        CRITICALITY ignore EXTENSION IncludeVelocity
                                                                                                PRESENCE optional
     ID id-PeriodicPosCalcInfo
                                        CRITICALITY ignore EXTENSION PeriodicPosCalcInfo
                                                                                                PRESENCE optional
     ID id-GANSS-MeasuredResultsList
                                        CRITICALITY reject EXTENSION GANSS-MeasuredResultsList
                                                                                                PRESENCE optional },
   ****************
  POSITION CALCULATION RESPONSE
  PositionCalculationResponse ::= SEQUENCE {
                      ProtocolIE-Container
                                                 {PositionCalculationResponseIEs} },
   protocolIEs
   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 {
                     ProtocolIE-Container
                                                 {PositionCalculationFailureIEs} },
   protocolIEs
   protocolExtensions ProtocolExtensionContainer { {PositionCalculationFailureExtensions} }
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 }
                                                                                                                          PRESENCE conditional },
    { ID id-GPS-UTRAN-TRU
                                                      CRITICALITY reject TYPE GPS-UTRAN-TRU
    -- This IE shall be present if the information requested in the Information Type IE contains GPS-related data
InformationExchangeInitiationRequest-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-GANSS-UTRAN-TRU
                                                   CRITICALITY reject EXTENSION GANSS-UTRAN-TRU
                                                                                                                          PRESENCE conditional \},
    -- This IE shall be present if the information requested in the Information Type IE contains GANSS-related data
    . . .
InformationExchangeObjectType-InfEx-Rgst ::= CHOICE {
    referencePosition
                                                           RefPosition-InfEx-Rqst,
    extension-InformationExchangeObjectType-InfEx-Rqst
                                                           Extension-InformationExchangeObjectType-InfEx-Rqst
RefPosition-InfEx-Rqst ::= SEQUENCE {
    referencePositionEstimate
                                   UE-PositionEstimate,
                                   ProtocolExtensionContainer { { RefPositionItem-InfEx-Rqst-ExtIEs} }
    iE-Extensions
                                                                                                            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-Rgst
                                                                                   PRESENCE mandatory } |
     UC-ID-InfEx-Rgst ::= SEQUENCE {
   referenceUC-ID
                                UC-ID.
                                ProtocolExtensionContainer { { UCIDItem-InfEx-Rqst-ExtIEs} }
   iE-Extensions
                                                                                           OPTIONAL,
UCIDItem-InfEx-Rqst-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
-- INFORMATION EXCHANGE INITIATION RESPONSE
__ **********************
InformationExchangeInitiationResponse ::= SEQUENCE {
                                               {{InformationExchangeInitiationResponse-IEs}},
   protocolIEs
                         ProtocolIE-Container
                         ProtocolExtensionContainer {{InformationExchangeInitiationResponse-Extensions}}
   protocolExtensions
                                                                                                      OPTIONAL.
InformationExchangeInitiationResponse-IEs PCAP-PROTOCOL-IES ::= {
          id-InformationExchangeID
                                                  CRITICALITY ignore TYPE InformationExchangeID
                                                                                                                 PRESENCE mandatory } |
          id-InformationExchangeObjectType-InfEx-Rsp CRITICALITY ignore TYPE InformationExchangeObjectType-InfEx-Rsp
                                                                                                                 PRESENCE optional } |
     ID
          id-CriticalityDiagnostics
                                                                                                                 PRESENCE optional },
     ID
                                                  CRITICALITY ignore TYPE CriticalityDiagnostics
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 {
                         ProtocolIE-Container
                                               {{InformationExchangeInitiationFailure-IEs}},
                         ProtocolExtensionContainer {{InformationExchangeInitiationFailure-Extensions}}
   protocolExtensions
                                                                                                      OPTIONAL,
InformationExchangeInitiationFailure-IEs PCAP-PROTOCOL-IES ::= {
          id-InformationExchangeID
                                       CRITICALITY ignore TYPE InformationExchangeID
                                                                                       PRESENCE
                                                                                                 mandatory }
     ID
          id-Cause
                                        CRITICALITY ignore TYPE Cause
                                                                                       PRESENCE
                                                                                                 mandatory }
    ID
          id-CriticalityDiagnostics
                                       CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                       PRESENCE
                                                                                                 optional },
   . . .
InformationExchangeInitiationFailure-Extensions PCAP-PROTOCOL-EXTENSION ::= {
-- POSITION INITIATION REQUEST
          *************
PositionInitiationRequest ::= SEQUENCE {
   protocolIEs
                     ProtocolIE-Container
                                                {PositionInitiationRequestIEs} },
   protocolExtensions ProtocolExtensionContainer { {PositionInitiationRequestExtensions} }
                                                                                       OPTIONAL,
   . . .
PositionInitiationRequestIEs PCAP-PROTOCOL-IES ::= {
     ID id-RequestType
                                    CRITICALITY reject TYPE RequestType
                                                                                    PRESENCE mandatory
     ID id-UE-PositioningCapability
                                    CRITICALITY reject TYPE UE-PositioningCapability
                                                                                   PRESENCE mandatory
     ID id-UC-id
                                    CRITICALITY reject TYPE UC-ID
                                                                                   PRESENCE mandatory
     ID id-VerticalAccuracyCode
                                    CRITICALITY ignore TYPE VerticalAccuracyCode
                                                                                    PRESENCE optional
     ID id-ResponseTime
                                    CRITICALITY ignore TYPE ResponseTime
                                                                                    PRESENCE optional
     ID id-PositioningPriority
                                    CRITICALITY ignore TYPE PositioningPriority
                                                                                   PRESENCE optional
    { ID id-ClientType
                                    CRITICALITY ignore TYPE ClientType
                                                                                   PRESENCE optional },
PositionInitiationRequestExtensions PCAP-PROTOCOL-EXTENSION ::=
     ID id-IncludeVelocity
                                    CRITICALITY ignore EXTENSION IncludeVelocity
                                                                                       PRESENCE optional }
    ID id-PeriodicLocationInfo
                                    CRITICALITY ignore EXTENSION PeriodicLocationInfo
                                                                                       PRESENCE optional },
__ ***********************
```

```
-- POSITION INITIATION RESPONSE
__ ********************
PositionInitiationResponse ::= SEQUENCE {
                    ProtocolIE-Container
                                               {PositionInitiationResponseIEs} },
   protocolIEs
   protocolExtensions ProtocolExtensionContainer { {PositionInitiationResponseExtensions} }
PositionInitiationResponseIEs PCAP-PROTOCOL-IES ::= {
     ID id-UE-PositionEstimate
                                      CRITICALITY reject TYPE UE-PositionEstimate
                                                                                         PRESENCE mandatory }
     ID id-PositionData
                                      CRITICALITY ignore TYPE PositionData
                                                                                         PRESENCE mandatory }
                                      CRITICALITY ignore TYPE AccuracyFulfilmentIndicator
   { ID id-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 {
```

```
{PositionActivationRequestIEs} },
                       ProtocolIE-Container
    protocolIEs
   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
                                      CRITICALITY ignore EXTENSION AmountOfReporting
                                                                                              PRESENCE optional
     ID id-AmountOfReporting
     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
                                                                                              PRESENCE optional
                                          CRITICALITY reject TYPE CellId-MeasuredResultsSets
                                                                                                 PRESENCE optional }
     ID id-OTDOA-MeasuredResultsSets
                                          CRITICALITY reject TYPE OTDOA-MeasuredResultsSets
     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 }
                                          CRITICALITY reject EXTENSION GANSS-MeasuredResultsList PRESENCE optional }
     ID id-GANSS-MeasuredResultsList
                                                  CRITICALITY ignore EXTENSION Additional GPSAssist Data Required
                                                                                                                     PRESENCE optional } |
     ID id-AdditionalGPSAssistDataRequired
     ID id-AdditionalGanssAssistDataRequired
                                                  CRITICALITY ignore EXTENSION AdditionalGanssAssistDataRequired
                                                                                                                  PRESENCE optional },
```

```
******************
-- POSITION ACTIVATION FAILURE
  *****************
PositionActivationFailure ::= SEQUENCE {
              ProtocolIE-Container
                                             {PositionActivationFailureIEs} },
   protocolIEs
   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-InformationExchangeID
   { ID
                                                   CRITICALITY ignore TYPE InformationExchangeID
                                                                                                             PRESENCE mandatory
} |
         id-InformationExchangeObjectType-InfEx-Rprt
                                                   CRITICALITY ignore TYPE InformationExchangeObjectType-InfEx-Rprt PRESENCE mandatory
   { ID
   . . .
InformationReport-Extensions PCAP-PROTOCOL-EXTENSION ::= {
InformationExchangeObjectType-InfEx-Rprt ::= CHOICE {
                              RefPosition-InfEx-Rprt,
   referencePosition
   . . .
```

```
RefPosition-InfEx-Rprt ::= SEQUENCE
   requestedDataValueInformation
                                 RequestedDataValueInformation,
   iE-Extensions
                                 ProtocolExtensionContainer {{ RefPositionItem-InfEx-Rprt-ExtIEs }}
RefPositionItem-InfEx-Rprt-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  *****************
-- INFORMATION EXCHANGE TERMINATION REQUEST
  ********************
InformationExchangeTerminationRequest ::= SEQUENCE
                                                    {{InformationExchangeTerminationRequest-IEs}},
   protocolIEs
                         ProtocolIE-Container
   protocolExtensions
                         ProtocolExtensionContainer
                                                   {{InformationExchangeTerminationRequest-Extensions}} OPTIONAL,
   . . .
InformationExchangeTerminationRequest-IEs PCAP-PROTOCOL-IES ::=
   { ID
          id-InformationExchangeID
                                                           ignore TYPE InformationExchangeID
                                                                                                  PRESENCE mandatory },
                                            CRITICALITY
   . . .
InformationExchangeTerminationRequest-Extensions PCAP-PROTOCOL-EXTENSION ::= {
-- INFORMATION EXCHANGE FAILURE INDICATION
__ *********************
InformationExchangeFailureIndication ::= SEQUENCE {
   protocolIEs
                                                    {{InformationExchangeFailureIndication-IEs}},
                         ProtocolIE-Container
                         ProtocolExtensionContainer
                                                   {{InformationExchangeFailureIndication-Extensions}}
   protocolExtensions
                                                                                                     OPTIONAL,
InformationExchangeFailureIndication-IES PCAP-PROTOCOL-IES ::= {
                                            CRITICALITY ignore
          id-InformationExchangeID
                                                                      TYPE InformationExchangeID
                                                                                                     PRESENCE mandatory
    ID
          id-Cause
                                            CRITICALITY ignore
                                                                      TYPE Cause
                                                                                                     PRESENCE mandatory
    . . .
InformationExchangeFailureIndication-Extensions PCAP-PROTOCOL-EXTENSION ::= {
```

```
***************
-- ERROR INDICATION
__ ******************
ErrorIndication ::= SEOUENCE {
  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 {
                 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 ::= {
  -- 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 ::= {
                        CRITICALITY ignore TYPE Cause
                                                            PRESENCE mandatory },
    { ID id-Cause
    . . .
AbortExtensions PCAP-PROTOCOL-EXTENSION ::= {
-- POSITION PERIODIC REPORT
PositionPeriodicReport ::= SEQUENCE {
    protocolIEs
                            ProtocolIE-Container
                                                         {{PositionPeriodicReport-IEs}},
                            ProtocolExtensionContainer {{PositionPeriodicReport-Extensions}}
    protocolExtensions
                                                                                                  OPTIONAL,
PositionPeriodicReport-IEs PCAP-PROTOCOL-IES ::= {
      ID id-UE-PositionEstimateInfo
                                                                                                  PRESENCE optional
                                            CRITICALITY ignore TYPE UE-PositionEstimateInfo
                                                                                                  PRESENCE optional
      ID id-VelocityEstimate
                                            CRITICALITY ignore TYPE VelocityEstimate
     ID id-GPS-MeasuredResultsList
                                            CRITICALITY ignore TYPE MeasuredResultsList
                                                                                                  PRESENCE optional
                                            CRITICALITY ignore TYPE CellId-MeasuredResultsSets
      ID id-CellId-MeasuredResultsSets
                                                                                                  PRESENCE optional
     ID id-OTDOA-MeasuredResultsSets
                                            CRITICALITY ignore TYPE OTDOA-MeasuredResultsSets
                                                                                                  PRESENCE optional
    { ID id-Cause
                                            CRITICALITY ignore TYPE Cause
                                                                                                  PRESENCE optional }
    . . .
```

```
PositionPeriodicReport-Extensions PCAP-PROTOCOL-EXTENSION ::= {
     ID id-GANSS-MeasuredResultsList
                                               CRITICALITY ignore EXTENSION GANSS-MeasuredResultsList
                                                                                                             PRESENCE optional
     ID id-AdditionalGPSAssistDataRequired
                                               CRITICALITY ignore EXTENSION Additional GPSAssist Data Required
                                                                                                             PRESENCE optional
     ID id-AdditionalGanssAssistDataRequired
                                               CRITICALITY ignore EXTENSION AdditionalGanssAssistDataRequired
                                                                                                             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
                                        CRITICALITY ignore TYPE VelocityEstimate
                                                                                            PRESENCE optional
     ID id-VelocityEstimate
     ID id-PositionData
                                        CRITICALITY ignore TYPE PositionData
                                                                                            PRESENCE optional
                                        CRITICALITY ignore TYPE AccuracyFulfilmentIndicator
                                                                                            PRESENCE optional
     ID id-AccuracyFulfilmentIndicator
                                        CRITICALITY ignore TYPE Cause
                                                                                            PRESENCE optional },
     ID id-Cause
   . . .
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 ::=
                                   CRITICALITY ignore TYPE PeriodicTerminationCause
                                                                                            PRESENCE optional },
   { ID id-PeriodicTerminationCause
   . . .
PositionPeriodicTermination-Extensions PCAP-PROTOCOL-EXTENSION ::= {
END
```

## 9.3.4 Information Element Definitions

```
-- Information Element Definitions
__ *********************
PCAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) pcap(4) version1 (1) pcap-IEs (2) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
IMPORTS
   maxNrOfErrors,
   maxSat,
   maxSatAlmanac,
   maxNrOfLevels,
   maxNrOfMeasNCell,
   maxNrOfMeasurements,
   maxNrOfPoints,
   maxNrOfExpInfo,
   maxNrOfSets,
   maxRateMatching,
   maxNrOfTFs,
   maxTTI-count,
   maxTS-1,
   maxCCTrCH,
   maxTF,
   maxTFC,
   maxPRACH,
   maxTrCH,
   maxTGPS,
   maxNoOfMeasurements,
   maxCellMeas,
   maxNrOfEDPCCH-PO-QUANTSTEPs,
   maxNrOfRefETFCI-PO-QUANTSTEPs,
   maxNrOfRefETFCIs,
   maxSet,
   maxGANSS,
    maxGANSSSat,
    maxGANSSSet,
    maxSgnType,
    maxGANSSSatAlmanac,
    maxGANSSClockMod.
```

id-UTRAN-GPSReferenceTime,
id-UTRAN-GPSReferenceTimeResult.

id-GPS-UTRAN-TRU,
id-UTRAN-GPS-DriftRate,

```
id-OTDOA-AddMeasuredResultsInfo,
   id-GPS-ReferenceLocation.
   id-rxTimingDeviation768Info,
   id-rxTimingDeviation384extInfo,
   id-MeasurementValidity,
   id-ExtendedRoundTripTime,
   id-roundTripTimeInfoWithType1,
   id-AddMeasurementInfo,
   id-Extended-RNC-ID,
   id-GANSS-CommonAssistanceData,
   id-GANSS-GenericAssistanceDataList,
   id-GANSS-PositioningDataSet,
   id-GNSS-PositioningMethod,
   id-NetworkAssistedGANSSSuport,
   id-TUTRANGANSSMeasurementValueInfo,
   id-angleOfArrivalLCR,
   id-extendedTimingAdvanceLCR,
   id-additionalMeasurementInforLCR,
   id-timingAdvanceLCR-R7,
   id-rxTimingDeviationLCR,
   id-GPSReferenceTimeUncertainty
FROM PCAP-Constants
   Criticality,
   ProcedureCode,
   ProtocolIE-ID,
   TransactionID,
   TriggeringMessage
FROM PCAP-CommonDataTypes
   ProtocolExtensionContainer{},
   PCAP-PROTOCOL-EXTENSION
FROM PCAP-Containers;
  ****************
-- Accuracy Fulfilment Indicator
  *****************
AccuracyFulfilmentIndicator ::= ENUMERATED{
   requested-Accuracy-Fulfilled,
   requested-Accuracy-Not-Fulfilled,
```

```
****************
-- Additional Method Type
__ **********************
AdditionalMethodType ::= ENUMERATED {
   ue-assisted,
   ue-based,
   ue-based-preferred-but-ue-assisted-allowed,
   ue-assisted-preferred-but-ue-based-allowed,
-- Almanac and Satellite Health SIB
__ *********************
AlmanacAndSatelliteHealthSIB ::=
                             SEQUENCE {
   qpsAlmanacAndSatelliteHealth
                                GPS-AlmanacAndSatelliteHealth,
   satMask
                                BIT STRING (SIZE (1..32)),
   lsbTOW
                                BIT STRING (SIZE (8)),
                                ProtocolExtensionContainer { { AlmanacAndSatelliteHealthSIB-ExtIEs } } OPTIONAL,
   iE-Extensions
   . . .
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
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 ::=
                                  SEOUENCE (SIZE (1..maxNrOfMeasurements)) OF
   CellId-MeasuredResultsInfoList
CellId-MeasuredResultsInfoList ::=
                                  SEOUENCE (SIZE (1..maxNrOfMeasNCell)) OF
   CellId-MeasuredResultsInfo
CellId-MeasuredResultsInfo ::=
                                  SEQUENCE {
   uC-ID
                                  UC-ID,
   uTRANAccessPointPositionAltitude
                                  UTRANAccessPointPositionAltitude,
                                  UE-PositionEstimate
   ue-PositionEstimate
                                                           OPTIONAL.
   roundTripTimeInfo
                                  RoundTripTimeInfo
                                                           OPTIONAL, -- FDD only
                                                           OPTIONAL, -- 3.84Mcps TDD only
   rxTimingDeviationInfo
                                  RxTimingDeviationInfo
                                  RxTimingDeviationLCRInfo
                                                           OPTIONAL, -- 1.28Mcps TDD only
   rxTimingDeviationLCRInfo
   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 },
   . . .
                                  SEQUENCE {
RoundTripTimeInfo ::=
   ue-RxTxTimeDifferenceTvpe2
                                  UE-RxTxTimeDifferenceTvpe2.
                                  UE-PositioningMeasQuality,
   ue-PositioningMeasQuality
   roundTripTime
                                  RoundTripTime,
   iE-Extensions
                                  OPTIONAL,
RoundTripTimeInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
   PRESENCE optional }, -- FDD only
RoundTripTimeInfoWithType1 ::=
                                  SEOUENCE {
   ue-RxTxTimeDifferenceType1
                                  UE-RxTxTimeDifferenceType1,
                                  RoundTripTime,
   roundTripTime
   extendedRoundTripTime
                                  ExtendedRoundTripTime
                                                           OPTIONAL, -- FDD only
   iE-Extensions
                                  OPTIONAL,
   . . .
```

```
RoundTripTimeInfoWithType1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
UE-RxTxTimeDifferenceType2 ::=
                                      INTEGER (0..8191)
UE-RxTxTimeDifferenceType1 ::=
                                      INTEGER (768..1280)
UE-PositioningMeasQuality ::=
                                      SEQUENCE {
                                      BIT STRING (SIZE (2)),
   stdResolution
   numberOfMeasurements
                                      BIT STRING (SIZE (3)),
   stdOfMeasurements
                                      BIT STRING (SIZE (5)),
   iE-Extensions
                                      ProtocolExtensionContainer { { UE-PositioningMeasQuality-ExtIEs } }
                                                                                                             OPTIONAL,
UE-PositioningMeasQuality-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
RoundTripTime ::=
                                      INTEGER (0..32766)
-- Actual value RoundTripTime = IE value * 0.0625 + 876
ExtendedRoundTripTime ::=
                                              INTEGER (32767..103041)
-- Actual value RoundTripTime = IE value * 0.0625 + 876
UTRANAccessPointPositionAltitude ::=
                                      SEQUENCE {
   geographicalCoordinates
                                      GeographicalCoordinates,
   ga-AltitudeAndDirection
                                      GA-AltitudeAndDirection
                                                                                                                   OPTIONAL,
   iE-Extensions
                                      ProtocolExtensionContainer { { UTRANAccessPointPositionAltitude-ExtIEs } }
                                                                                                                   OPTIONAL,
    . . .
UTRANAccessPointPositionAltitude-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
RxTimingDeviationInfo ::=
                                      SEQUENCE {
   rxTimingDeviation
                                      RxTimingDeviation,
    timingAdvance
                                      TimingAdvance,
                                      ProtocolExtensionContainer { { RxTimingDeviationInfo-ExtIEs } }
   iE-Extensions
                                                                                                       OPTIONAL,
RxTiminqDeviationInfo-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
                                      . . .
```

```
RxTimingDeviationLCRInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
PRESENCE optional }, -- 1.28Mcps TDD only
ExtendedTimingAdvanceLCR ::=
                                     INTEGER (2048..8191)
RxTimingDeviation768Info ::=
                                     SEQUENCE {
   rxTimingDeviation768
                                     RxTimingDeviation768,
   timingAdvance768
                                     TimingAdvance768,
                                     ProtocolExtensionContainer { { RxTimingDeviation768Info-ExtIEs } }
   iE-Extensions
RxTimingDeviation768Info-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
                                     SEQUENCE {
RxTimingDeviation384extInfo ::=
   rxTimingDeviation384ext
                                     RxTimingDeviation384ext,
   timingAdvance384ext
                                     TimingAdvance384ext,
   iE-Extensions
                                     ProtocolExtensionContainer { { RxTimingDeviation384extInfo-ExtIEs } }
                                                                                                        OPTIONAL,
RxTimingDeviation384extInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
AddMeasurementInfo ::=
                                     SEQUENCE ·
                  CPICH-RSCP
                                                                                  OPTIONAL,
   cpich-RSCP
   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 } }
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 [4] subclause 10.3.7.3
CPICH-EcNo ::=
                                      INTEGER (0..49)
-- According to CPICH Ec/No in [13]
CPICH-RSCP ::=
                                     INTEGER (-5..91)
-- According to CPICH RSCP in [13]
AOA-LCR ::=
                                     INTEGER (0..719) -- According to mapping in [14]
AOA-LCR-Accuracy-Class ::=
                                      ENUMERATED {
                                         a,b,c,d,e,f,g,h, ...}
  *****************
-- Cell-ID Positioning (Position Activation Request Message)
__ *******************
CellIDPositioning ::= SEQUENCE {
   requestedCellIDMeasurements
                                  RequestedCellIDMeasurements,
   iE-Extensions
                                  ProtocolExtensionContainer { { CellIDPositioning-ExtIEs } } OPTIONAL,
    . . .
CellIDPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
RequestedCellIDMeasurements ::= CHOICE {
   fdd
                                      SEQUENCE {
       roundTripTimeInfoWanted
                                         BOOLEAN,
       pathlossWanted
                                         BOOLEAN,
       roundTripTimeInfoWithType1Wanted
                                         BOOLEAN,
       cpichRSCPWanted
                                         BOOLEAN,
```

```
cpicEcNoWanted
                                    BOOLEAN,
      iE-Extensions
                                    ProtocolExtensionContainer
                                                           t.dd
                                 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 ::= {
     -- 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,
```

```
OPTIONAL,
   procedureCriticality
                              Criticality
   transactionID
                              TransactionID
                                                                                       OPTIONAL,
   iEsCriticalityDiagnostics
                              CriticalityDiagnostics-IE-List OPTIONAL,
                              ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,
   iE-Extensions
CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
   SEQUENCE {
       iECriticality
                              Criticality,
       iE-ID
                              ProtocolIE-ID,
                              CriticalityDiagnosticsRepetition
       repetitionNumber
                                                                                                  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 {
   qps-TOW-sec
                                     INTEGER (0..604799),
   statusHealth
                                     DiffCorrectionStatus,
                                     DGPS-CorrectionSatInfoList
   dgps-CorrectionSatInfoList
                                                                                               OPTIONAL,
   -- not included if satelliteHealth is equal to noData or invalidData
                                     ProtocolExtensionContainer { { DGPSCorrections-ExtIEs } }
   iE-Extensions
                                                                                               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
                                  OPTIONAL,
DGPS-CorrectionSatInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
                               ENUMERATED {
UDRE ::=
                                  lessThan1,
                                  between1-and-4,
                                  between4-and-8,
                                  over8 }
PRC ::=
                               INTEGER (-2047..2047)
RRC ::=
                               INTEGER (-127..127)
    -- UE-PositionEstimate (i.e., Geographical Area)
__ *******************
-- UE-PositionEstimate is based on Geographical Area Description in 23.032
UE-PositionEstimate ::= CHOICE {
   point
                           GA-Point,
   pointWithUnCertainty
                           GA-PointWithUnCertainty,
                           GA-Polygon,
   pointWithUncertaintyEllipse GA-PointWithUnCertaintyEllipse,
   pointWithAltitude
                           GA-PointWithAltitude,
   pointWithAltitudeAndUncertaintyEllipsoid
                                             GA-PointWithAltitudeAndUncertaintyEllipsoid,
```

```
GA-EllipsoidArc,
    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,
                                ProtocolExtensionContainer { GA-Point-ExtIEs} } OPTIONAL,
    iE-Extensions
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),
                                INTEGER (0..100),
    confidence
    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 },
ReferenceTimeChoice ::= CHOICE {
   utran-GPSReferenceTimeResult
                                    UTRAN-GPSReferenceTimeResult,
   qps-ReferenceTimeOnly
                                    INTEGER (0..604799999, ...),
   cell-Timing
                                    Cell-Timing,
   . . .
Cell-Timing ::= SEQUENCE {
                     INTEGER (0..4095),
   sfn
   iE-Extensions ProtocolExtensionContainer { { Cell-Timing-ExtIEs } } OPTIONAL,
Cell-Timing-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
__ ***************
-- Position Data
PositionData ::= SEQUENCE {
   positioningDataDiscriminator
                                    PositioningDataDiscriminator,
   positioningDataSet
                                    PositioningDataSet
                                                             OPTIONAL,
-- This IE shall be present if the PositioningDataDiscriminator IE is set to the value "0000" --
                     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 ::=
                              SEOUENCE {
    qps-TOW-1msec
                                      INTEGER (0..604799999),
    satelliteInformationList
                                      AcquisitionSatInfoList,
    iE-Extensions
                                      ProtocolExtensionContainer { GPS-AcquisitionAssistance-ExtIEs } } OPTIONAL,
GPS-AcquisitionAssistance-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-UTRAN-GPSReferenceTime
                                      CRITICALITY ignore EXTENSION
                                                                    UTRAN-GPSReferenceTime
                                                                                                PRESENCE optional }
    {ID id-GPSReferenceTimeUncertainty CRITICALITY ignore EXTENSION
                                                                    GPSReferenceTimeUncertainty PRESENCE optional } ,
AcquisitionSatInfoList ::=
                                  SEQUENCE (SIZE (1..maxSat)) OF
                                      AcquisitionSatInfo
AcquisitionSatInfo ::=
                                  SEQUENCE {
                                      INTEGER (0..63),
    doppler0thOrder
                                      INTEGER (-2048..2047),
    extraDopplerInfo
                                      ExtraDopplerInfo
                                                                                                   OPTIONAL,
    codePhase
                                      INTEGER (0..1022),
    integerCodePhase
                                      INTEGER (0..19),
    aps-BitNumber
                                      INTEGER (0..3),
    codePhaseSearchWindow
                                      CodePhaseSearchWindow,
    azimuthAndElevation
                                      AzimuthAndElevation
                                                                                                   OPTIONAL,
                                      ProtocolExtensionContainer { { AcquisitionSatInfo-ExtIEs } }
    iE-Extensions
                                                                                                  OPTIONAL,
```

```
AcquisitionSatInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
ExtraDopplerInfo ::=
                                SEQUENCE {
   doppler1stOrder
                                    INTEGER (-42..21),
   dopplerUncertainty
                                    DopplerUncertainty,
                                    ProtocolExtensionContainer { { ExtraDopplerInfo-ExtIEs } } OPTIONAL,
   iE-Extensions
ExtraDopplerInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
DopplerUncertainty ::=
                                ENUMERATED {
                                    hz12-5, hz25, hz50, hz100, hz200, ...}
CodePhaseSearchWindow ::=
                                 ENUMERATED {
                                    w1023, w1, w2, w3, w4, w6, w8,
                                    w12, w16, w24, w32, w48, w64,
                                    w96, w128, w192 }
AzimuthAndElevation ::=
                                SEQUENCE {
   azimuth
                                    INTEGER (0..31),
   elevation
                                    INTEGER (0..7),
   iE-Extensions
                                    ProtocolExtensionContainer { { AzimuthAndElevation-ExtIEs } } OPTIONAL,
AzimuthAndElevation-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
-- GANSS Elements
__ *******************************
DGANSS-Corrections ::= SEQUENCE {
   dGANSS-ReferenceTime
                                INTEGER (0..119),
   dGANSS-Information
                                DGANSS-Information,
                                ie-Extensions
                                                                                              OPTIONAL,
DGANSS-Corrections-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
```

```
DGANSS-Information ::= SEQUENCE (SIZE (1..maxSgnType)) OF DGANSS-InformationItem
DGANSS-InformationItem ::= SEQUENCE {
   qANSS-SignalId
                                      GANSS-SignalID
                                                                                                 OPTIONAL,
   qANSS-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
   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
                                      INTEGER (-2047..2047),
   ganss-prc
   ganss-rrc
                                      INTEGER (-127..127),
                                      ie-Extensions
                                                                                                                OPTIONAL,
DGANSS-SignalInformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    . . .
GANSS-AlmanacAndSatelliteHealth ::= SEQUENCE {
   weekNumber
                          INTEGER (0..255),
   gANSS-AlmanacModel
                          GANSS-AlmanacModel,
                          ProtocolExtensionContainer { { GANSS-AlmanacAndSatelliteHealth-ExtIEs } }
   ie-Extensions
                                                                                                         OPTIONAL,
GANSS-AlmanacAndSatelliteHealth-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-AlmanacModel ::= CHOICE {
   qANSS-keplerianParameters
                                      GANSS-KeplerianParametersAlm,
    . . .
GANSS-AzimuthAndElevation ::= SEQUENCE {
```

```
azimuth
                              INTEGER(0..31),
   elevation
                              INTEGER (0..75),
   ie-Extensions
                              ProtocolExtensionContainer { GANSS-AzimuthAndElevation-ExtIEs } }
                                                                                                               OPTIONAL,
GANSS-AzimuthAndElevation-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-Clock-Model ::= SEOUENCE (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,
                                      ProtocolExtensionContainer { GANSS-CommonAssistanceData-ExtIEs } }
   ie-Extensions
                                                                                                               OPTIONAL,
GANSS-CommonAssistanceData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-Data-Bit-Assistance ::= SEQUENCE {
   ganssTod
                                      INTEGER (0..59,...),
                                      GANSS-DataBitAssistanceList,
   dataBitAssistancelist
                                      ie-Extensions
                                                                                                               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,
                                  ProtocolExtensionContainer { GANSS-DataBitAssistanceItem-ExtIEs } }
                                                                                                               OPTIONAL,
   ie-Extensions
GANSS-DataBitAssistanceItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-DataBitAssistanceSgnList ::= SEQUENCE (SIZE (1..maxSgnType)) OF GANSS-DataBitAssistanceSgnItem
```

```
GANSS-DataBitAssistanceSqnItem ::= SEQUENCE
   ganss-SignalId
                          GANSS-SignalID,
   ganssDataBits
                          BIT STRING (SIZE (1..1024)),
   ie-Extensions
                          OPTIONAL,
GANSS-DataBitAssistanceSqnItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-ExtraDoppler ::= SEQUENCE
   dopplerFirstOrder
                              INTEGER (-42..21),
   dopplerUncertainty
                              ENUMERATED { dH40, dH20, dH10, dH5, dH2-5 },
                              ie-Extensions
                                                                                          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,
   qanss-UTC-Model
                                     GANSS-UTC-Model
                                                                       OPTIONAL,
   ganss-Time-Model
                                     GANSS-Time-Model
                                                                       OPTIONAL,
                                     GANSS-Navigation-Model
                                                                       OPTIONAL,
   ganss-Navigation-Model
                                     ProtocolExtensionContainer { GANSSGenericAssistance-ExtIEs } }
   ie-Extensions
                                                                                                             OPTIONAL,
GANSSGenericAssistance-ExtIEs PCAP-PROTOCOL-EXTENSION ::=
GANSS-GenericMeasurementInfo ::= SEQUENCE(SIZE(1..maxGANSS)) OF SEQUENCE {
   ganssId
                             GANSSID
                                                                                                 OPTIONAL,
                             GANSS-SignalID
   ganssSignalId
                                                                                                 OPTIONAL,
   ganssCodePhaseAmbiguity
                             INTEGER (0..31)
                                                                                                 OPTIONAL,
   ganssMeasurementParameters GANSS-MeasurementParameters,
                              ProtocolExtensionContainer { GANSS-GenericMeasurementInfo-ExtIEs } } OPTIONAL,
   ie-Extensions
```

```
GANSS-GenericMeasurementInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSSID ::= SEQUENCE {
    ganss-ID
                       INTEGER(0..7),
    ie-Extensions
                       ProtocolExtensionContainer { GANSSID-ExtIEs } } OPTIONAL,
GANSSID-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,
                                        ProtocolExtensionContainer { { GANSS-IonosphereRegionalStormFlags-ExtIEs } } OPTIONAL,
    ie-Extensions
GANSS-IonosphereRegionalStormFlags-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-KeplerianParametersAlm ::= SEQUENCE {
                                        INTEGER(0..255),
    t-oa
```

```
iod-a
                                        INTEGER(0..3),
    qANSS-SatelliteInformationKP
                                        GANSS-SatelliteInformationKP,
    ie-Extensions
                                        ProtocolExtensionContainer { GANSS-KeplerianParametersAlm-ExtIEs } }
                                                                                                                         OPTIONAL,
GANSS-KeplerianParametersAlm-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-KeplerianParametersOrb ::= SEQUENCE {
    toe-1sb-nav
                                        INTEGER (0..511),
    ganss-omega-nav
                                        BIT STRING (SIZE (32)),
    delta-n-nav
                                        BIT STRING (SIZE (16)),
    m-zero-nav
                                        BIT STRING (SIZE (32)),
    omegadot-nav
                                        BIT STRING (SIZE (24)),
    ganss-e-1sb-nav
                                        INTEGER (0..33554431),
    idot-nav
                                        BIT STRING (SIZE (14)),
    a-sgrt-lsb-nav
                                        INTEGER (0..67108863),
    i-zero-nav
                                        BIT STRING (SIZE (32)),
    omega-zero-nav
                                        BIT STRING (SIZE (32)),
    c-rs-nav
                                        BIT STRING (SIZE (16)),
    c-is-nav
                                        BIT STRING (SIZE (16)),
    c-us-nav
                                        BIT STRING (SIZE (16)),
    c-rc-nav
                                        BIT STRING (SIZE (16)),
    c-ic-nav
                                        BIT STRING (SIZE (16)),
    c-uc-nav
                                        BIT STRING (SIZE (16)),
                                        ProtocolExtensionContainer { GANSS-KeplerianParametersOrb-ExtIEs } }
    ie-Extensions
                                                                                                                         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 ::= {
GANSS-MeasuredResultsList ::= SEOUENCE (SIZE (1..maxNrOfSets)) OF GANSS-MeasuredResults
GANSS-MeasuredResults ::= SEQUENCE {
    referenceTime CHOICE {
       utranReferenceTime
                                UTRAN-GANSSReferenceTimeUL,
        ganssReferenceTimeOnly GANSS-ReferenceTimeOnly,
    ganssGenericMeasurementInfo GANSS-GenericMeasurementInfo,
                                ProtocolExtensionContainer { { GANSS-MeasuredResults-ExtIEs } } OPTIONAL,
GANSS-MeasuredResults-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-Navigation-Model ::= SEQUENCE {
    non-broadcastIndication
                                ENUMERATED{true}
                                                        OPTIONAL,
-- The three following IEs shall be present if the GANSS Orbit Model IE indicates "Keplerian Parameters'
    toe-c-msb
                                INTEGER(0..31)
                                                        OPTIONAL,
    e-msb
                                INTEGER (0..127)
                                                        OPTIONAL,
                               INTEGER (0..63)
                                                        OPTIONAL,
    sgrtA-msb
                                GANSS-Sat-Info-Nav,
    ganssSatInfoNav
    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,
                                        ProtocolExtensionContainer { { GANSS-RealTimeInformationItem-ExtIEs } }
    ie-Extensions
                                                                                                                     OPTIONAL,
```

```
GANSS-RealTimeInformationItem-ExtlEs 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,
                                ProtocolExtensionContainer { GANSS-ReferenceMeasurementInfo-ExtIEs } }
    ie-Extensions
                                                                                                                     OPTIONAL,
GANSS-ReferenceMeasurementInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-Reference-Time ::= SEQUENCE {
    qanssDay
                                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,
                                ProtocolExtensionContainer { GANSS-Reference-Time-ExtIEs } } OPTIONAL,
    ie-Extensions
    . . .
GANSS-Reference-Time-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-ReferenceTimeOnly ::= SEQUENCE {
   qANSS-tod
                                INTEGER (0..3599999),
   qANSS-timeId
                                GANSSID
                                                OPTIONAL,
    qANSS-TimeUncertainty
                                INTEGER (0..127) OPTIONAL,
```

```
ProtocolExtensionContainer { GANSS-ReferenceTimeOnly-ExtIEs } } OPTIONAL,
    ie-Extensions
GANSS-ReferenceTimeOnly-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-SatelliteClockModelItem ::= SEQUENCE {
    t-oc-lsb
                                        INTEGER(0..511),
    a-i2
                                        BIT STRING (SIZE(12)),
    a-i1
                                        BIT STRING (SIZE(18)),
    a-i0
                                        BIT STRING (SIZE(28)),
    t-qd
                                        BIT STRING (SIZE(10))
                                                                         OPTIONAL,
    model-id
                                        INTEGER (0..3)
                                                                         OPTIONAL,
                                        ProtocolExtensionContainer { { GANSS-SatelliteClockModelItem-ExtIEs } }
    ie-Extensions
                                                                                                                      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,
                                ProtocolExtensionContainer { GANSS-SatelliteInformationItem-ExtIEs } }
    ie-Extensions
                                                                                                                     OPTIONAL,
GANSS-SatelliteInformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-SatelliteInformationKP ::= SEQUENCE (SIZE (1..maxGANSSSatAlmanac)) OF GANSS-SatelliteInformationKPItem
GANSS-SatelliteInformationKPItem ::= SEQUENCE {
    satId
                                        INTEGER (0..63),
    ganss-e-alm
                                        BIT STRING (SIZE (11)),
    ganss-delta-I-alm
                                        BIT STRING (SIZE (11)),
    ganss-omegadot-alm
                                        BIT STRING (SIZE (11)),
```

```
ganss-svhealth-alm
                                        BIT STRING (SIZE (4)),
    ganss-delta-a-sqrt-alm
                                        BIT STRING (SIZE (17)),
    ganss-omegazero-alm
                                        BIT STRING (SIZE (16)),
    ganss-m-zero-alm
                                        BIT STRING (SIZE (16)),
    ganss-omega-alm
                                        BIT STRING (SIZE (16)),
    ganss-af-zero-alm
                                        BIT STRING (SIZE (14)),
    ganss-af-one-alm
                                        BIT STRING (SIZE (11)),
                                        ProtocolExtensionContainer { { GANSS-SatelliteInformationKPItem-ExtIEs } } OPTIONAL,
    ie-Extensions
GANSS-SatelliteInformationKPItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-Sat-Info-Nav ::= SEQUENCE (SIZE(1..maxGANSSSat)) OF SEQUENCE {
                                INTEGER (0..63),
    satId
    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,...),
                        ProtocolExtensionContainer { { GANSS-SignalID-ExtIEs } } OPTIONAL,
    ie-Extensions
GANSS-SignalID-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    . . .
GANSS-StatusHealth ::= ENUMERATED {
  udre-scale-1dot0,
   udre-scale-0dot75,
   udre-scale-0dot5,
   udre-scale-0dot3,
   udre-scale-Odot2,
  udre-scale-0dot1,
  no-data,
   invalid-data
```

```
GANSS-Time-Model ::= SEQUENCE {
    ganss-time-model-refTime
                                         INTEGER (0..37799),
    ganss-t-a0
                                         INTEGER (-2147483648..2147483647),
                                        INTEGER (-8388608..8388607)
                                                                                                                       OPTIONAL,
    ganss-t-a1
                                        INTEGER (-64..63)
                                                                                                                       OPTIONAL,
    ganss-t-a2
    gnss-to-id
                                        ENUMERATED{gps,...},
    ganss-wk-number
                                        INTEGER (0..8191)
                                                                                                                       OPTIONAL,
    ie-Extensions
                                         ProtocolExtensionContainer { GANSS-Time-Model-ExtIEs } }
                                                                                                                       OPTIONAL,
GANSS-Time-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-UTRAN-TimeRelationshipUncertainty ::= ENUMERATED {
    qANSS-UTRAN-TRU-50nano,
    gANSS-UTRAN-TRU-500nano,
    qANSS-UTRAN-TRU-1micro,
    qANSS-UTRAN-TRU-10micro,
    qANSS-UTRAN-TRU-1milli,
    qANSS-UTRAN-TRU-10milli,
    gANSS-UTRAN-TRU-100milli,
    gANSS-UTRAN-TRU-unreliable,
GANSS-UTRAN-TRU ::= SEQUENCE {
    gANSS-UTRAN-TimeRelationshipUncertainty
                                                 GANSS-UTRAN-TimeRelationshipUncertainty,
                                                 GANSSID
    ganssId
                                                                                                                      OPTIONAL,
                                                 ProtocolExtensionContainer { { GANSS-UTRAN-TRU-ExtIEs } }
    ie-Extensions
                                                                                                                       OPTIONAL,
GANSS-UTRAN-TRU-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSS-UTC-Model ::= SEQUENCE {
    a-one-utc
                                        BIT STRING (SIZE (24)),
                                        BIT STRING (SIZE (32)),
    a-zero-utc
    t-ot-utc
                                        BIT STRING (SIZE (8)),
    w-n-t-utc
                                        BIT STRING (SIZE (8)),
    delta-t-ls-utc
                                        BIT STRING (SIZE (8)),
    w-n-lsf-utc
                                        BIT STRING (SIZE (8)),
```

```
dn-utc
                                    BIT STRING (SIZE (8)),
   delta-t-lsf-utc
                                    BIT STRING (SIZE (8)),
   ie-Extensions
                                    ProtocolExtensionContainer { { GANSS-UTC-Model-ExtIEs } }
                                                                                                        OPTIONAL,
GANSS-UTC-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::=
TUTRAN-GANSS-DriftRate ::= ENUMERATED
   uTRAN-GANSSDrift0,
                        uTRAN-GANSSDrift1,
                                              uTRAN-GANSSDrift2,
   uTRAN-GANSSDrift5,
                        uTRAN-GANSSDrift10,
                                              uTRAN-GANSSDrift15,
   uTRAN-GANSSDrift25,
                        uTRAN-GANSSDrift50,
                                              uTRAN-GANSSDrift-1,
   uTRAN-GANSSDrift-2,
                        uTRAN-GANSSDrift-5,
                                              uTRAN-GANSSDrift-10,
   uTRAN-GANSSDrift-15,
                        uTRAN-GANSSDrift-25,
                                              uTRAN-GANSSDrift-50,
UTRAN-GANSSReferenceTimeDL ::= SEQUENCE {
   utran-GANSSTimingOfCellFrames
                                INTEGER (0..3999999),
   uC-ID
                                UC-ID
                                                         OPTIONAL,
   referenceSfn
                                INTEGER (0..4095),
                                ie-Extensions
                                                                                                        OPTIONAL,
UTRAN-GANSSReferenceTimeDL-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
UTRAN-GANSSReferenceTimeUL ::= SEQUENCE
   ue-GANSSTimingOfCellFrames INTEGER(0..345599999999),
   gANSS-TimeId
                             GANSSID
                                                      OPTIONAL,
   gANSS-TimeUncertainty
                            INTEGER (0..127)
                                                      OPTIONAL,
   uC-ID
                            UC-ID,
   referenceSfn
                            INTEGER (0..4095),
                            ProtocolExtensionContainer { { UTRAN-GANSSReferenceTimeUL-ExtIEs } }
   ie-Extensions
                                                                                                        OPTIONAL,
UTRAN-GANSSReferenceTimeUL-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  *****************
-- GPS Almanac and Satellite Health
__ *********************
```

```
GPS-AlmanacAndSatelliteHealth ::= SEOUENCE {
   wn-a
                                     BIT STRING (SIZE (8)),
   almanacSatInfoList
                                     AlmanacSatInfoList,
   svGlobalHealth
                                     BIT STRING (SIZE (364)) OPTIONAL,
                                     ProtocolExtensionContainer { { GPS-AlmanacAndSatelliteHealth-ExtIEs } }
   iE-Extensions
                                                                                                            OPTIONAL,
GPS-AlmanacAndSatelliteHealth-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
AlmanacSatInfoList ::=
                                 SEQUENCE (SIZE (1..maxSatAlmanac)) OF
                                     AlmanacSatInfo
AlmanacSatInfo ::=
                                 SEQUENCE {
   dataID
                                     BIT STRING (SIZE (2)),
   satID
                                     INTEGER (0..63),
   е
                                     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-Sgrt
                                     BIT STRING (SIZE (24)),
   omega0
                                     BIT STRING (SIZE (24)),
                                     BIT STRING (SIZE (24)),
                                     BIT STRING (SIZE (24)),
   omega
   af0
                                     BIT STRING (SIZE (11)),
                                     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)),
   12Pflag
                                     BIT STRING (SIZE (1)),
```

```
sf1Revd
                                     SubFrame1Reserved,
   t.-GD
                                     BIT STRING (SIZE (8)),
   t-oc
                                     BIT STRING (SIZE (16)),
   af2
                                     BIT STRING (SIZE (8)),
   af1
                                     BIT STRING (SIZE (16)),
   af0
                                     BIT STRING (SIZE (22)),
   c-rs
                                     BIT STRING (SIZE (16)),
   delta-n
                                     BIT STRING (SIZE (16)),
   mΩ
                                     BIT STRING (SIZE (32)),
   c-uc
                                     BIT STRING (SIZE (16)),
                                     BIT STRING (SIZE (32)),
   е
                                     BIT STRING (SIZE (16)),
   c-us
   a-Sgrt
                                     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)),
                                     BIT STRING (SIZE (32)),
   omegaDot
                                     BIT STRING (SIZE (24)),
   iDot
                                     BIT STRING (SIZE (14)),
                                     ProtocolExtensionContainer { { GPS-ClockAndEphemerisParameters-ExtIEs } }
   iE-Extensions
                                                                                                               OPTIONAL,
GPS-ClockAndEphemerisParameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
SubFrame1Reserved ::=
                                 SEQUENCE {
   reserved1
                                  BIT STRING (SIZE (23)),
   reserved2
                                   BIT STRING (SIZE (24)),
                                   BIT STRING (SIZE (24)),
   reserved3
   reserved4
                                     BIT STRING (SIZE (16))
   *****************
-- GPS Ionospheric Model
__ *******************
 GPS-Ionospheric-Model ::=
                                 SEQUENCE {
   alfa0
                                     BIT STRING (SIZE (8)),
   alfa1
                                     BIT STRING (SIZE (8)),
   alfa2
                                   BIT STRING (SIZE (8)),
   alfa3
                                     BIT STRING (SIZE (8)),
   beta0
                                     BIT STRING (SIZE (8)),
```

```
beta1
                                     BIT STRING (SIZE (8)),
   beta2
                                     BIT STRING (SIZE (8)),
   beta3
                                     BIT STRING (SIZE (8)),
   iE-Extensions
                                     ProtocolExtensionContainer { GPS-Ionospheric-Model-ExtIEs } }
                                                                                                     OPTIONAL,
GPS-Ionospheric-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  *****************
-- GPS Measured Results
__ ********************
MeasuredResultsList ::=
                                  SEQUENCE (SIZE (1..maxNrOfSets)) OF
   GPS-MeasuredResults
GPS-MeasuredResults ::=
                                  SEQUENCE {
                                     INTEGER (0..604799999),
   qps-TOW-1msec
   qps-MeasurementParamList
                                     GPS-MeasurementParamList.
   iE-Extensions
                                     ProtocolExtensionContainer { { GPS-MeasuredResults-ExtIEs } } OPTIONAL,
    . . .
GPS-MeasuredResults-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-UTRAN-GPSReferenceTimeResult CRITICALITY ignore EXTENSION
                                                                    UTRAN-GPSReferenceTimeResult PRESENCE optional}
    {ID id-GPSReferenceTimeUncertainty CRITICALITY ignore EXTENSION
                                                                    GPSReferenceTimeUncertainty PRESENCE optional },
GPS-MeasurementParamList ::=
                                  SEQUENCE (SIZE (1..maxSat)) OF
                                     GPS-MeasurementParam
GPS-MeasurementParam ::=
                                  SEQUENCE {
                                      INTEGER (0..63),
   satelliteID
   c-N0
                                     INTEGER (0..63),
   doppler
                                     INTEGER (-32768..32768),
   wholeGPS-Chips
                                     INTEGER (0..1022),
    fractionalGPS-Chips
                                     INTEGER (0..1023),
   multipathIndicator
                                     MultipathIndicator,
   pseudorangeRMS-Error
                                     INTEGER (0..63),
                                     ProtocolExtensionContainer { GPS-MeasurementParam-ExtIEs } } OPTIONAL,
   iE-Extensions
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
                                    ProtocolExtensionContainer { { NavigationModelSatInfo-ExtIEs } } OPTIONAL,
   iE-Extensions
NavigationModelSatInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
SatelliteStatus ::=
                                 ENUMERATED {
                                    ns-NN,
                                    es-SN,
                                    es-NN,
                                    rev2,
                                    rev }
-- GPS Real Time Integrity
__ *******************
GPS-RealTimeIntegrity ::= CHOICE {
                      BadSatList,
   badSatellites
   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 {
                                   INTEGER (0..1023),
   aps-Week
   gps-TOW-1msec
                                   INTEGER (0..604799999),
   gps-TOW-AssistList
                                   GPS-TOW-AssistList
                                                                                          OPTIONAL,
   iE-Extensions
                                   ProtocolExtensionContainer { GPS-ReferenceTime-ExtIEs } } OPTIONAL,
GPS-ReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
   {ID id-UTRAN-GPSReferenceTime
                                   CRITICALITY ignore EXTENSION
                                                                UTRAN-GPSReferenceTime
                                                                                          PRESENCE optional } |
   {ID id-GPS-UTRAN-TRU
                                                                                          PRESENCE optional } |
                                   CRITICALITY ignore EXTENSION
                                                                GPS-UTRAN-TRU
                                                                                          PRESENCE optional } |
   {ID id-UTRAN-GPS-DriftRate
                                   CRITICALITY ignore EXTENSION
                                                                UTRAN-GPS-DriftRate
   {ID id-GPSReferenceTimeUncertainty CRITICALITY ignore EXTENSION
                                                                 GPSReferenceTimeUncertainty PRESENCE optional },
   . . .
GPS-TOW-AssistList ::=
                                SEQUENCE (SIZE (1..maxSat)) OF
                                   GPS-TOW-Assist
GPS-TOW-Assist ::=
                                SEQUENCE {
   satID
                                   INTEGER (0..63),
   tlm-Message
                                   BIT STRING (SIZE (14)),
   antiSpoof
                                   BOOLEAN,
   alert
                                   BOOLEAN,
   tlm-Reserved
                                   BIT STRING (SIZE (2)),
```

```
ProtocolExtensionContainer { { GPS-TOW-Assist-ExtIEs } } OPTIONAL,
   iE-Extensions
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 {
   qps-RefTimeUNC
                INTEGER (0..127),
                ProtocolExtensionContainer { { GPSReferenceTimeUncertainty-ExtIEs } } OPTIONAL,
   iE-Extensions
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)),
```

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wn-t
                                    BIT STRING (SIZE (8)),
   wn-lsf
                                    BIT STRING (SIZE (8)),
   dn
                                    BIT STRING (SIZE (8)),
   delta-t-LSF
                                    BIT STRING (SIZE (8)),
                                    ProtocolExtensionContainer { GPS-UTCmodel-ExtIEs } } OPTIONAL,
   iE-Extensions
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
                                    SEQUENCE {
AdditionalGPSAssistDataRequired ::=
   almanacRequest
                                    BOOLEAN,
   utcModelRequest
                                    BOOLEAN,
   ionosphericModelRequest
                                    BOOLEAN,
   navigationModelRequest
                                    BOOLEAN,
   dgpsCorrectionsRequest
                                    BOOLEAN,
   referenceLocationRequest
                                    BOOLEAN,
   referenceTimeRequest
                                    BOOLEAN,
   aquisitionAssistanceRequest
                                    BOOLEAN,
   realTimeIntegrityRequest
                                    BOOLEAN,
   navModelAddDataRequest
                                    NavModelAdditionalData
                                                              OPTIONAL,
                                    ProtocolExtensionContainer { { AdditionalGPSAssistDataRequired-ExtIEs } } OPTIONAL,
   iE-Extensions
```

```
AdditionalGPSAssistDataRequired-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
   *****************
-- Additional GANSS Assistance Data Required
__ *******************
AdditionalGanssAssistDataRequired::= SEQUENCE {
   ganssReferenceTime
                                      BOOLEAN,
   ganssreferenceLocation
                                      BOOLEAN,
   ganssIonosphericModel
                                      BOOLEAN,
   qanssRequestedGenericAssistanceDataList GanssRequestedGenericAssistanceDataList,
                                      ProtocolExtensionContainer { { AdditionalGanssAssistDataRequired-ExtIEs } } OPTIONAL,
   iE-Extensions
    . . .
AdditionalGanssAssistDataRequired-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GanssRequestedGenericAssistanceDataList ::= SEQUENCE (SIZE (1..maxGANSS)) OF
                                      GanssRegGenericData
GanssReqGenericData ::=
                                  SEQUENCE {
   ganssId
                                      GANSSID
                                                                                 OPTIONAL,
   ganssRealTimeIntegrity
                                      BOOLEAN
                                                                                 OPTIONAL,
    ganssDifferentialCorrection
                                      DGANSS-Sig-Id-Reg
                                                                                 OPTIONAL,
   qanssAlmanac
                                      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 ::= {
    . . .
DGANSS-Sig-Id-Req ::=
                                  BIT STRING (SIZE (8))
                                  SEQUENCE {
GanssDataBits ::=
                              INTEGER (0..86399),
   ganssTod
   dataBitAssistancelist
                              ReqDataBitAssistanceList,
   iE-Extensions
                              ProtocolExtensionContainer { GanssDataBits-ExtIEs } } OPTIONAL,
    . . .
```

```
GanssDataBits-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
ReqDataBitAssistanceList ::=
                              SEQUENCE (SIZE (1..maxSgnType)) OF SEQUENCE {
   ganssDataBitAssistance
                          BOOLEAN,
   iE-Extensions
                           ProtocolExtensionContainer { { ReqDataBitAssistanceList-ExtIEs } } OPTIONAL,
RegDataBitAssistanceList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ****************
-- Information Exchange ID
__ *********************
InformationExchangeID ::= INTEGER (0..1048575)
  *****************
-- Information Report Characteristics
  *****************
InformationReportCharacteristics ::= SEQUENCE {
                       InformationReportCharacteristicsType,
                       InformationReportPeriodicity
   periodicity
                                                     OPTIONAL,
   -- present if type indicates periodic
InformationReportCharacteristicsType ::= ENUMERATED {
   onDemand,
   periodic,
   onModification,
InformationReportPeriodicity ::= CHOICE {
                INTEGER (1..60, ...),
-- Unit min, Step 1min
   hour
                INTEGER (1..24, ...),
-- Unit hour, Step 1hour
```

```
*****************
-- Information Type
__ ******************
InformationType ::= CHOICE {
   implicitInformation
                              MethodType,
   explicitInformation
                              ExplicitInformationList,
ExplicitInformationList ::= SEQUENCE (SIZE (1..maxNrOfExpInfo)) OF ExplicitInformation
ExplicitInformation ::= CHOICE {
   almanacAndSatelliteHealth
                                     AlmanacAndSatelliteHealth,
   utcModel
                                     UtcModel,
   ionosphericModel
                                     IonosphericModel,
                                     NavigationModel,
   navigationModel
                                     DqpsCorrections,
   dqpsCorrections
    referenceTime
                                      ReferenceTime,
    acquisitionAssistance
                                     AcquisitionAssistance,
    realTimeIntegrity
                                     RealTimeIntegrity,
    almanacAndSatelliteHealthSIB
                                     AlmanacAndSatelliteHealthSIB-InfoType,
    referenceLocation
                                     ReferenceLocation,
   ganss-Common-DataReq
                                     GANSSCommonDataReq,
   ganss-Generic-DataList
                                     GANSSGenericDataList
DganssCorrectionsReq ::= SEQUENCE {
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
   iE-Extensions
                              ProtocolExtensionContainer { { DganssCorrectionsReq-ExtIEs} } OPTIONAL,
    . . .
DganssCorrectionsReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
Ganss-almanacAndSatelliteHealthReq ::= SEQUENCE {
   transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
                              ProtocolExtensionContainer { { Ganss-almanacAndSatelliteHealthReq-ExtIEs} } OPTIONAL,
   iE-Extensions
    . . .
Ganss-almanacAndSatelliteHealthReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
```

```
GANSSCommonDataReg ::= SEQUENCE{
   ganss-ReferenceTime
                                   ENUMERATED {requested, not-requested}
                                                                          OPTIONAL,
   ganss-IonosphericModel
                                   ENUMERATED {requested, not-requested}
                                                                          OPTIONAL,
   ganss-ReferenceLocation
                                   ENUMERATED {requested, not-requested}
                                                                          OPTIONAL,
    ie-Extensions
                                   OPTIONAL,
GANSSCommonDataReg-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GANSSGenericDataList ::= SEQUENCE (SIZE(1..maxGANSS)) OF GANSSGenericDataReq
GANSSGenericDataReq ::= SEQUENCE {
    ganssID
                                                                              OPTIONAL,
   ganss-realTimeIntegrity
                                       Ganss-realTimeIntegrityReq
                                                                              OPTIONAL,
    ganss-dataBitAssistance
                                       GanssDataBits
                                                                              OPTIONAL,
    dganssCorrections
                                       DganssCorrectionsReq
                                                                              OPTIONAL,
    ganss-almanacAndSatelliteHealth
                                       Ganss-almanacAndSatelliteHealthReg
                                                                              OPTIONAL,
                                       Ganss-referenceMeasurementInfoReq
    ganss-referenceMeasurementInfo
                                                                              OPTIONAL,
   ganss-utcModel
                                       Ganss-utcModelReq
                                                                              OPTIONAL,
   ganss-TimeModel-Gnss-Gnss
                                       Ganss-TimeModel-Gnss-Gnss
                                                                              OPTIONAL,
   navigationModel
                                       NavigationModelGANSS
                                                                              OPTIONAL,
    . . .
Ganss-utcModelReq ::= SEQUENCE
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
   iE-Extensions
                               ProtocolExtensionContainer { { Ganss-utcModelReq-ExtIEs} } OPTIONAL,
Ganss-utcModelReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    . . .
Ganss-realTimeIntegrityReg ::= SEQUENCE {
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
   iE-Extensions
                               ProtocolExtensionContainer { { Ganss-realTimeIntegrityReq-ExtIEs} } OPTIONAL,
Ganss-realTimeIntegrityReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
Ganss-referenceMeasurementInfoReg ::= SEQUENCE {
   transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
   iE-Extensions
                               ProtocolExtensionContainer { { Ganss-referenceMeasurementInfoReq-ExtIEs} } OPTIONAL,
```

```
Ganss-referenceMeasurementInfoReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
Ganss-TimeModel-Gnss-Gnss ::= SEQUENCE{
    ganssTimeModelGnssGnssExt
                                    BIT STRING (SIZE(9)),
    transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
                                    ProtocolExtensionContainer { { Ganss-TimeModel-Gnss-Gnss-ExtIEs} } OPTIONAL,
    iE-Extensions
Ganss-TimeModel-Gnss-Gnss-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
TransmissionGanssTimeIndicator ::= ENUMERATED {
    requested,
    not-Requested
AlmanacAndSatelliteHealth ::= NULL
UtcModel ::= SEQUENCE {
                                TransmissionTOWIndicator,
    transmissionTOWIndicator
                                ProtocolExtensionContainer { { UtcModel-ExtIEs } } OPTIONAL,
    iE-Extensions
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,
                                ProtocolExtensionContainer { { NavigationModel-ExtIEs } } OPTIONAL,
    iE-Extensions
    . . .
```

```
NavigationModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
NavModelAdditionalData ::= SEQUENCE {
   qps-Week
                               INTEGER (0..1023),
   qps-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),
                               ProtocolExtensionContainer { { SatelliteRelatedData-ExtIEs } } OPTIONAL,
   iE-Extensions
SatelliteRelatedData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
NavigationModelGANSS ::= SEQUENCE {
   qanssWeek
                               INTEGER (0..4095),
   qanssT0E
                               INTEGER (0..167),
    t-toe-limit
                             INTEGER (0..10),
    satRelatedDataListGANSS SatelliteRelatedDataListGANSS
    iE-Extensions
                               ProtocolExtensionContainer { { NavigationModelGANSS-ExtIEs } } OPTIONAL,
NavigationModelGANSS-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
SatelliteRelatedDataListGANSS ::= SEOUENCE (SIZE (0..maxGANSSSat)) OF SatelliteRelatedDataGANSS
SatelliteRelatedDataGANSS ::= SEOUENCE {
    satID
                               INTEGER (0..63),
   iod
                               BIT STRING (SIZE(10)),
                               ProtocolExtensionContainer { { SatelliteRelatedDataGANSS-ExtIEs } } OPTIONAL,
    iE-Extensions
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
                         Measurement Validity,
   iE-Extensions
                         ProtocolExtensionContainer { { MeasInstructionsUsed-ExtIEs } } OPTIONAL,
MeasInstructionsUsed-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  *****************
-- Measurement Validity
     MeasurementValidity ::= SEQUENCE {
                   ENUMERATED { cell-DCH, all-States-Except-Cell-DCH, all-States, ... },
                   ProtocolExtensionContainer { { MeasurementValidity-ExtIEs } } OPTIONAL,
   iE-Extensions
MeasurementValidity-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
__ *********************
-- Method Type
__ **********************
MethodType ::= ENUMERATED {
   ue-assisted,
   ue-based
  *****************
-- OTDOA Measurement Group
__ *********************
OTDOA-MeasurementGroup ::=
                            SEOUENCE {
                                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,
                                       ProtocolExtensionContainer { { OTDOA-ReferenceCellInfo-ExtIEs } }
    iE-Extensions
                                                                                                           OPTIONAL,
OTDOA-ReferenceCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
     ID id-TUTRANGANSSMeasurementValueInfo
                                                   CRITICALITY ignore EXTENSION TUTRANGANSSMeasurementValueInfo
                                                                                                                          PRESENCE optional } |
    { ID id-additionalMeasurementInforLCR
                                                   CRITICALITY ignore EXTENSION Additional Measurement Infor LCR
                                                                                                                          PRESENCE optional },
    -- 1.28Mcps TDD only
    . . .
OTDOA-NeighbourCellInfoList ::=
                                       SEQUENCE (SIZE (1..maxNrOfMeasNCell)) OF
    OTDOA-NeighbourCellInfo
OTDOA-NeighbourCellInfo ::=
                                       SEQUENCE {
    11C-TD
                                       UC-ID,
    uTRANAccessPointPositionAltitude
                                       UTRANAccessPointPositionAltitude,
    relativeTimingDifferenceInfo
                                       RelativeTimingDifferenceInfo,
                                       ProtocolExtensionContainer { { OTDOA-NeighbourCellInfo-ExtIEs } }
    iE-Extensions
                                                                                                           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,
    ue-SFNSFNTimeDifferenceType2Info
                                       UE-SFNSFNTimeDifferenceType2Info,
                                       ProtocolExtensionContainer { { OTDOA-MeasuredResultsInfo-ExtIEs } }
    iE-Extensions
                                                                                                              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
                           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-TD
                                        INTEGER (0..65535),
                                        ProtocolExtensionContainer { { UC-ID-ExtIEs } }
    iE-Extensions
                                                                                             OPTIONAL,
UC-ID-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-Extended-RNC-ID
                                CRITICALITY reject
                                                        EXTENSION
                                                                                                 optional},
                                                                    Extended-RNC-ID PRESENCE
Extended-RNC-ID ::= INTEGER (4096..65535)
RelativeTimingDifferenceInfo ::= CHOICE {
    sFNSFNMeasurementValueInfo
                                        SFNSFNMeasurementValueInfo.
    tUTRANGPSMeasurementValueInfo
                                        TUTRANGPSMeasurementValueInfo,
    tUTRANGANSSMeasurementValueInfo
                                        TUTRANGANSSMeasurementValueInfo
SFNSFNMeasurementValueInfo ::= SEQUENCE {
    sFNSFNValue
                                        SFNSFNValue,
    sFNSFNQuality
                                        SFNSFNQuality
                                                                                                         OPTIONAL,
    sFNSFNDriftRate
                                        SFNSFNDriftRate,
    sFNSFNDriftRateQuality
                                        SFNSFNDriftRateOuality
                                        ProtocolExtensionContainer { { SFNSFNMeasurementValueInfo-ExtIEs } } OPTIONAL,
    iE-Extensions
SFNSFNMeasurementValueInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
SFNSFNValue ::=
                                        INTEGER (0..614399)
```

```
SFNSFNOuality ::=
                                        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 {
    t.UTRANGPS
                                        TUTRANGPS,
    tUTRANGPSQuality
                                        TUTRANGPSQuality
                                                                                                           OPTIONAL.
    tUTRANGPSDriftRate
                                        TUTRANGPSDriftRate,
    tUTRANGPSDriftRateQuality
                                        TUTRANGPSDriftRateQuality
                                                                                                           OPTIONAL,
                                        ProtocolExtensionContainer { { TUTRANGPSMeasurementValueInfo-ExtIEs } } OPTIONAL,
    iE-Extensions
TUTRANGPSMeasurementValueInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
SFN ::=
                                        INTEGER (0..4095)
TUTRANGPS ::=
                                        SEQUENCE {
   ms-part
                                        INTEGER (0..16383),
   ls-part
                                        INTEGER (0..4294967295)
TUTRANGPSQuality ::=
                                        INTEGER (0..255)
-- Unit chip, Step 1/16 chip, Range 0.. 255/16 chip
TUTRANGPSDriftRate ::=
                                        INTEGER (-50..50)
-- Unit chip/s, Step 1/256 chip/s, Range -50/256..+50/256 chip/s
TUTRANGPSDriftRateQuality ::=
                                        INTEGER (0..50)
-- Unit chip/s, Step 1/256 chip/s, Range 0..50/256 chip/s
TUTRANGANSSMeasurementValueInfo ::= SEQUENCE {
    ganssID
                                    GANSSID
                                                            OPTIONAL.
    sFN
                                    SFN,
                                    TUTRANGANSS,
    tUTRANGANSS
   tUTRANGANSSQuality
tUTRANGANSSDriftRate
                                  INTEGER (0..255)
                                                            OPTIONAL,
                                   INTEGER (-50..50),
    tUTRANGANSSDriftRateQuality INTEGER(0..50)
                                                            OPTIONAL,
    iE-Extensions
                                        ProtocolExtensionContainer { { TUTRANGANSSMeasurementValueInfo-ExtIEs } } OPTIONAL,
    . . .
TUTRANGANSSMeasurementValueInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
```

```
TUTRANGANSS ::=
                                      SEQUENCE {
   ms-part
                                  INTEGER (0..16383),
   ls-part
                                  INTEGER (0..4294967295)
AdditionalMeasurementInforLCR ::= SEQUENCE
   timingAdvanceLCR-R7
                           TimingAdvanceLCR-R7,
   rxTimingDeviationLCR
                           RxTimingDeviationLCR,
   angleOfArrivalLCR
                           AngleOfArrivalLCR
                                                    OPTIONAL,
   iE-Extensions
                           ProtocolExtensionContainer { { AdditionalMeasurementInforLCR-ExtIEs } } OPTIONAL,
   . . .
AdditionalMeasurementInforLCR-ExtIEs PCAP-PROTOCOL-EXTENSION ::=
TimingAdvanceLCR-R7 ::=
                        INTEGER (0..8191)
  *****************
-- Periodic Position Calculation Info
__ *********************
PeriodicPosCalcInfo ::= SEQUENCE {
   referenceNumber
                           INTEGER (0..32767, ...),
   amountOutstandingRequests INTEGER (1..8639999, ...),
   reportingInterval
                           INTEGER (1..8639999, ...),
                           ProtocolExtensionContainer { { PeriodicPosCalcInfo-ExtIEs } }
   iE-Extensions
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,
   qNSS,
   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 } }
   . . .
RRCstateChange-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
     ********************
-- Requested Data Value
       RequestedDataValue ::= SEQUENCE {
   gpsAlmanacAndSatelliteHealth
                                GPS-AlmanacAndSatelliteHealth
                                                                                 OPTIONAL,
   qps-UTC-Model
                                GPS-UTC-Model
                                                                                 OPTIONAL,
   qps-Ionospheric-Model
                                GPS-Ionospheric-Model
                                                                                 OPTIONAL,
   qps-NavigationModel
                                GPS-NavigationModel
                                                                                 OPTIONAL,
   dapsCorrections
                                DGPSCorrections
                                                                                 OPTIONAL,
                                GPS-ReferenceTime
   referenceTime
                                                                                 OPTIONAL,
   gps-AcquisitionAssistance
                                GPS-AcquisitionAssistance
                                                                                 OPTIONAL,
   qps-RealTime-Integrity
                                GPS-RealTimeIntegrity
                                                                                 OPTIONAL,
                                AlmanacAndSatelliteHealthSIB
   almanacAndSatelliteHealthSIB
                                                                                 OPTIONAL,
   qps-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-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,
                         ProtocolExtensionContainer { { InformationAvailable-ExtIEs} }
   iE-Extensions
InformationAvailable-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
InformationNotAvailable ::= NULL
    ****************
-- Request Type
__ *******************************
RequestType ::= SEQUENCE {
                  RequestTypeEvent,
   event
                  RequestTypeReportArea,
   reportArea
   horizontalaccuracyCode RequestTypeAccuracyCode
   iE-Extensions ProtocolExtensionContainer { { RequestType-ExtIEs} }
                                                                     OPTIONAL,
   . . .
RequestType-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
RequestTypeEvent ::= ENUMERATED {
   stop-change-of-service-area,
   direct,
   change-of-service-area,
   stop-direct,
   . . . ,
   periodic,
   stop-periodic
RequestTypeReportArea ::= ENUMERATED {
   service-area,
   geographical-area,
```

```
RequestTypeAccuracyCode ::= INTEGER (0..127)
__ *********************
-- Response Time
__ *********************
ResponseTime ::= ENUMERATED
   low-delay,
   delay-tolerant,
   . . .
  *****************
-- Horizontal Accuracy Code
  *****************
HorizontalAccuracyCode
                           ::= INTEGER (0..127)
    ******************
-- UE Positioning Capability
UE-PositioningCapability ::= SEQUENCE {
   standAloneLocationMethodsSupported BOOLEAN,
   ueBasedOTDOASupported
                                  BOOLEAN,
   networkAssistedGPSSupport
                                  NetworkAssistedGPSSuport,
   supportGPSTimingOfCellFrame
                                  BOOLEAN,
   supportForIPDL
                                  BOOLEAN,
   supportForRxTxTimeDiff
                                  BOOLEAN,
   supportForUEAGPSinCellPCH
                                  BOOLEAN
   supportForSFNSFNTimeDiff
                                  BOOLEAN,
   iE-Extensions
                                  ProtocolExtensionContainer { {UE-PositioningCapability-ExtIEs} } OPTIONAL,
UE-PositioningCapability-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
   { ID id-NetworkAssistedGANSSSuport
                                         CRITICALITY ignore EXTENSION NetworkAssistedGANSSSupport
                                                                                                  PRESENCE optional },
   . . .
NetworkAssistedGANSSSupport ::= SEQUENCE (SIZE (1..maxGANSS)) OF SEQUENCE {
   qanssID
                                  GANSSID
                                                                           OPTIONAL,
   ganssMode
                                  ENUMERATED {
      networkBased,
      ue-Based,
      both,
      none
      },
   ganssSignalID
                                  GANSS-SignalID
                                                                           OPTIONAL,
```

```
supportGANSSTimingOfCellFrame
   supportGANSSCarrierPhaseMeasurement BOOLEAN,
   iE-Extensions ProtocolExtensionContainer { { NetworkAssistedGANSSSuport-ExtIEs} } OPTIONAL,
NetworkAssistedGANSSSuport-ExtlEs PCAP-PROTOCOL-EXTENSION ::= {
NetworkAssistedGPSSuport ::= ENUMERATED {
   network-based,
   ue-based,
   both,
   none,
  *****************
-- UTDOA Positioning (Position Activation Request Message)
  *****************
UTDOAPositioning ::= SEQUENCE {
   utdoa-BitCount
                       UTDOA-BitCount,
   utdoa-timeInterval
                       UTDOA-TimeInterval,
   iE-Extensions
                 ProtocolExtensionContainer { { UTDOAPositioning-ExtIEs } } OPTIONAL,
UTDOAPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
UTDOA-BitCount ::= INTEGER (0..5000)
UTDOA-TimeInterval ::= INTEGER (0..3000)
EnvironmentCharacterisation ::= ENUMERATED { heavyMultipathandNLOSconditions,
             noOrLightMultipathAndUsuallyLOSconditions,
             notDefinedOrMixedEnvironment,
             . . .
  -- GPS and GANSS Positioning (Position Activation Request Message)
__ ********************
GPSPositioning ::= SEQUENCE {
```

```
gpsPositioningInstructions
                                   GPSPositioningInstructions,
   requestedDataValue
                                   RequestedDataValue
                                                              OPTIONAL.
   iE-Extensions
                                   ProtocolExtensionContainer { { GPSPositioning-ExtIEs } } OPTIONAL,
GPSPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
GPSPositioningInstructions ::= SEQUENCE {
   horizontalAccuracyCode
                                      HorizontalAccuracyCode
                                                                      OPTIONAL,
   verticalAccuracyCode
                                      VerticalAccuracyCode
                                                                      OPTIONAL,
   gpsTimingOfCellWanted
                                      BOOLEAN,
    additionalAssistanceDataRequest
                                      BOOLEAN,
   iE-Extensions
                                       ProtocolExtensionContainer
                                                                  { GPSPositioningInstructions-ExtIEs } } OPTIONAL,
    . . .
GPSPositioningInstructions-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-MeasurementValidity CRITICALITY ignore EXTENSION MeasurementValidity PRESENCE optional},
    . . .
GANSSPositioning ::= SEQUENCE {
   ganssPositioningInstructions
                                   GANSS-PositioningInstructions,
   requestedDataValue
                                   RequestedDataValue
                                                                  OPTIONAL,
   iE-Extensions
                                   ProtocolExtensionContainer { GANSSPositioning-ExtIEs } } OPTIONAL,
GANSSPositioning-ExtlEs 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,
                                       ProtocolExtensionContainer { GANSS-PositioningInstructions-ExtIEs } } OPTIONAL,
   iE-Extensions
    . . .
GANSS-PositioningInstructions-ExtIEs PCAP-PROTOCOL-EXTENSION ::=
       -- OTDOA Assistance Data
```

```
__ **********************
OTDOAAssistanceData ::= SEQUENCE {
    uE-Positioning-OTDOA-AssistanceData
                                             UE-Positioning-OTDOA-AssistanceData,
                                     ProtocolExtensionContainer { { OTDOAAssistanceData-ExtIEs } } OPTIONAL,
   iE-Extensions
    . . .
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 {
                                                                        OPTIONAL,
   modeSpecificInfo CHOICE {
       fdd
                                             SEQUENCE {
           primaryCPICH-Info
                                             PrimaryScramblingCode,
                                             SEQUENCE {
       tdd
           cellParameterID
                                             CellParameterID,
       --- coding is FFS
       },
    frequencyInfo
                                     FrequencyInfo
                                                                        OPTIONAL,
   positioningMode CHOICE {
       ueBased
                                             SEOUENCE {
           cellPosition
                                                     ReferenceCellPosition
                                                                           OPTIONAL,
           -- actual value roundTripTime = (IE value * 0.0625) + 876
           roundTripTime
                                             INTEGER (0..32766)
                                                                           OPTIONAL,
           . . .
       ueAssisted
                                             SEQUENCE {
           . . .
```

```
ue-positioning-IPDL-Paremeters
                                                UE-Positioning-IPDL-Parameters OPTIONAL,
                                        ProtocolExtensionContainer { { UE-Positioning-OTDOAReferenceCellInfo-ExtIEs } } OPTIONAL,
    iE-Extensions
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,
                                        GA-PointWithAltitude,
    ellipsoidPointWithAltitude
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, ... }
                                    ENUMERATED {
IP-Length ::=
                                        ipl5, ipl10, ... }
BurstModeParameters ::=
                                    SEQUENCE {
```

```
burstStart
                                        INTEGER (0..15),
    burstLength
                                        INTEGER (10..25),
    burstFreq
                                        INTEGER (1..16).
    iE-Extensions
                                        ProtocolExtensionContainer { { BurstModeParameters-ExtIEs } } OPTIONAL,
BurstModeParameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
UE-Positioning-OTDOA-NeighbourCellList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
                                            UE-Positioning-OTDOA-NeighbourCellInfo
UE-Positioning-OTDOA-NeighbourCellInfo ::= SEQUENCE {
    modeSpecificInfo CHOICE {
        fdd
                                        SEQUENCE {
           primaryCPICH-Info
                                                PrimaryScramblingCode,
       tdd
                                        SEOUENCE {
           cellParameterID
                                                 CellParameterID,
            -- coding is FFS
        },
        . . .
                                        FrequencyInfo
                                                                             OPTIONAL,
    frequencyInfo
    ue-positioning-IPDL-Paremeters
                                        UE-Positioning-IPDL-Parameters
                                                                             OPTIONAL,
    sfn-SFN-RelTimeDifference
                                        SFN-SFN-RelTimeDifference1,
                                                                             OPTIONAL,
    sfn-Offset-Validity
                                        SFN-Offset-Validity
    sfn-SFN-Drift
                                        SFN-SFN-Drift
                                                                             OPTIONAL,
    searchWindowSize
                                        OTDOA-SearchWindowSize,
    positioningMode
                        CHOICE {
       ueBased
                                                SEQUENCE {
           relativeNorth
                                                 INTEGER (-20000..20000)
                                                                                      OPTIONAL,
           relativeEast
                                                                                      OPTIONAL,
                                                 INTEGER (-20000..20000)
           relativeAltitude
                                                INTEGER (-4000..4000)
                                                                                      OPTIONAL,
           fineSFN-SFN
                                                FineSFNSFN
                                                                                      OPTIONAL,
            -- actual value roundTripTime = (IE value * 0.0625) + 876
           roundTripTime
                                                 INTEGER (0.. 32766)
                                                                                     OPTIONAL,
       ueAssisted
                                                 SEQUENCE {
                                        ProtocolExtensionContainer { { UE-Positioning-OTDOANeighbourCellInfo-ExtIEs } } OPTIONAL,
    iE-Extensions
    . . .
```

```
UE-Positioning-OTDOANeighbourCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
   PRESENCE optional }, -- FDD only
SFN-SFN-RelTimeDifference1 ::=
                              SEQUENCE {
                                  INTEGER (0 .. 4095),
   sfn-Offset
   sfn-sfn-Reltimedifference
                                  INTEGER (0.. 38399),
                                  ProtocolExtensionContainer { { SFN-SFN-RelTimeDifference1-ExtIEs } } OPTIONAL,
   iE-Extensions
SFN-SFN-RelTimeDifference1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
                           ENUMERATED { false }
SFN-Offset-Validity ::=
                               ENUMERATED {
OTDOA-SearchWindowSize ::=
                                  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,
                                        ProtocolExtensionContainer { { UTDOA-Group-ExtIEs } }
    iE-Extensions
                                                                                                 OPTIONAL,
UTDOA-Group-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
FrequencyInfo ::=
                                    SEQUENCE {
    modeSpecificInfo
                                        CHOICE {
       fdd
                                            FrequencyInfoFDD,
       tdd
                                            FrequencyInfoTDD,
       },
                                ProtocolExtensionContainer { { FrequencyInfo-ExtIEs } }
    iE-Extensions
                                                                                           OPTIONAL,
FrequencyInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
                                    SEQUENCE {
FrequencyInfoFDD ::=
   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
                                ProtocolExtensionContainer { { UL-DPCHInfoFDD-ExtIEs} } OPTIONAL,
            iE-Extensions
            . . .
       tdd
                                            SEQUENCE {
           cellParameterID
                                                CellParameterID,
           tFCI-Coding
                                                TFCI-Coding,
           punctureLimit
                                                PuncturingLimit,
           repetitionPeriod
                                                RepetitionPeriod,
           repetitionLength
                                                RepetitionLength,
            tdd-DPCHOffset
                                                TDD-DPCHOffset,
           uL-Timeslot-Information
                                                UL-Timeslot-Information,
            frameOffset
                                                FrameOffset,
            specialBurstScheduling
                                                SpecialBurstScheduling,
           iE-Extensions
                                ProtocolExtensionContainer { { UL-DPCHInfoTDD-ExtIEs} } OPTIONAL,
                            PCAP-PROTOCOL-EXTENSION ::= {
UL-DPCHInfoFDD-ExtIEs
```

```
UL-DPCHInfoTDD-ExtIEs
                            PCAP-PROTOCOL-EXTENSION ::= {
Compressed-Mode-Assistance-Data ::=
                                        SEQUENCE
           dl-information
                                           DL-InformationFDD,
           ul-information
                                           UL-InformationFDD,
                                           ProtocolExtensionContainer { { Compressed-Mode-Assistance-DataFDD-ExtIEs} } OPTIONAL,
           iE-Extensions
Compressed-Mode-Assistance-DataFDD-ExtIEs
                                                PCAP-PROTOCOL-EXTENSION ::= {
                                    SEQUENCE {
DL-InformationFDD ::=
           primaryScramblingCode
                                                    PrimaryScramblingCode,
           chipOffset
                                            ChipOffset,
           frameOffset
                                            FrameOffset,
           iE-Extensions ProtocolExtensionContainer { { DL-InformationFDD-ExtIEs} } OPTIONAL,
                               PCAP-PROTOCOL-EXTENSION ::= {
DL-InformationFDD-ExtIEs
UL-InformationFDD ::=
           transmissionGapPatternSequenceInfo
                                                        Transmission-Gap-Pattern-Sequence-Information,
                                                        Active-Pattern-Sequence-Information,
           activePatternSequenceInfo
           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,
                                ProtocolExtensionContainer { {Transmission-Gap-Pattern-Sequence-Information-ExtIEs} } OPTIONAL,
       iE-Extensions
Transmission-Gap-Pattern-Sequence-Information-ExtlEs 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
    transmission-Gap-Pattern-Sequence-Status
                                                Transmission-Gap-Pattern-Sequence-Status-List OPTIONAL,
                                                ProtocolExtensionContainer { {Active-Pattern-Sequence-Information-ExtIEs} } OPTIONAL,
    iE-Extensions
Active-Pattern-Sequence-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
Transmission-Gap-Pattern-Sequence-Status-List ::= SEQUENCE (SIZE (1..maxTGPS)) OF
    SEQUENCE ·
        tGPSID
                            TGPSID,
        t.GPRC
                            TGPRC,
        tGCFN
                            ProtocolExtensionContainer { { Transmission-Gap-Pattern-Sequence-Status-List-ExtIEs } } OPTIONAL,
        iE-Extensions
        . . .
Transmission-Gap-Pattern-Sequence-Status-List-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
DCH-Information ::=
                        SEQUENCE {
    tFCS
                                                TFCS,
    trChInfo
                                                TrChInfoList,
```

```
ProtocolExtensionContainer { { DCH-Information-ExtIEs} } OPTIONAL,
    iE-Extensions
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 ::= {
                    ENUMERATED {dch, usch, ...}
UL-TrCHType ::=
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 [16]
E-TFCS-Information ::= SEQUENCE {
    e-DCH-TFCS-Index
                                                     E-DCH-TFCS-Index,
    reference-E-TFCI-Information
                                                     Reference-E-TFCI-Information
                                                     ProtocolExtensionContainer { {E-TFCS-Information-ExtIEs} }
    iE-Extensions
                                                                                                                     OPTIONAL,
    . . .
```

```
E-TFCS-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
E-DCH-TFCS-Index ::= INTEGER (1..4,...)
Reference-E-TFCI-Information ::= SEOUENCE (SIZE (1..maxNrOfRefETFCIs)) OF Reference-E-TFCI-Information-Item
Reference-E-TFCI-Information-Item ::= SEQUENCE {
    reference-E-TFCI
                                    Reference-E-TFCI-PO,
    reference-E-TFCI-PO
                                    ProtocolExtensionContainer { { Reference-E-TFCI-Information-Item-ExtIEs} }
   iE-Extensions
                                                                                                                     OPTIONAL,
Reference-E-TFCI-Information-Item-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
Reference-E-TFCI-PO ::= INTEGER (0.. maxNrOfRefETFCI-PO-QUANTSTEPs)
    -- FFS according to mapping in [17]
E-TFCI ::= INTEGER (0..127)
E-TTI ::= ENUMERATED {
    e-TTI-2ms,
    e-TTI-10ms,
    . . .
E-DPCCH-PO ::= INTEGER (0..maxNrOfEDPCCH-PO-QUANTSTEPs)
CellParameterID ::= INTEGER (0..127,...)
TFCI-Coding ::= ENUMERATED {
   v4,
    v8,
    v16,
    v32,
    . . .
RepetitionLength ::= INTEGER (1..63)
RepetitionPeriod ::= ENUMERATED {
    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
                            INTEGER ::= 15
maxNrOfULTSs
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)
                                    CHOICE {
MidambleShiftAndBurstType ::=
    type1
                                        SEQUENCE
        midambleConfigurationBurstType1And3 MidambleConfigurationBurstType1And3,
        midambleAllocationMode
                                            CHOICE {
            defaultMidamble
                                                NULL,
            commonMidamble
                                                NULL,
            ueSpecificMidamble
                                                MidambleShiftLong,
    },
                                        SEQUENCE
        midambleConfigurationBurstType2
                                            MidambleConfigurationBurstType2,
        midambleAllocationMode
                                            CHOICE
            defaultMidamble
                                                NULL,
            commonMidamble
                                                NULL,
            ueSpecificMidamble
                                                MidambleShiftShort,
                                        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
                            INTEGER ::= 240
maxNrOfDPCHs
TDD-UL-Code-InformationItem ::= SEQUENCE {
    tdd-ChannelisationCode
                                             TDD-ChannelisationCode,
                                             ProtocolExtensionContainer { { TDD-UL-Code-InformationItem-ExtIEs} }
    iE-Extensions
                                                                                                                          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,
                           PCAP-PROTOCOL-EXTENSION ::= {
UTDOA-CELLFACH-ExtIEs
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,
                               PCAP-PROTOCOL-EXTENSION ::= {
PRACH-ChannelInfo-ExtIEs
PRACH-Info ::=
                                   CHOICE {
        fdd
                                       SEQUENCE ·
           availableSignatures
                                               AvailableSignatures,
           availableSF
                                               SF-PRACH,
           preambleScramblingCodeWordNumber
                                               PreambleScramblingCodeWordNumber,
           puncturingLimit
                                               PuncturingLimit,
                                               AvailableSubChannelNumbers,
           availableSubChannelNumbers
           iE-Extensions
                                   ProtocolExtensionContainer { { PRACH-Info-FDD-ExtIEs} } OPTIONAL,
```

```
t.dd
                                         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 ::= {
                            PCAP-PROTOCOL-EXTENSION ::= {
PRACH-Info-TDD-ExtIEs
                                     ENUMERATED {
SF-PRACH ::=
                                         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
    SEOUENCE {
       rlc-Size
                                    RLC-Size,
       numberOfTbsTTIList
                                    SEQUENCE (SIZE (1..maxNrOfTFs)) OF TbsTTIInfo,
                                    ProtocolExtensionContainer { { TransportFormatSet-DynamicPartList-ExtIEs} }
       iE-Extensions
                                                                                                                   OPTIONAL,
TransportFormatSet-DynamicPartList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
TbsTTIInfo ::= SEQUENCE {
    tTTTnfo
                        TransportFormatSet-TransmissionTimeIntervalDynamic
                                                                                 OPTIONAL,
    numberOfTbs
                        TransportFormatSet-NrOfTransportBlocks,
                        ProtocolExtensionContainer { { TbsTTIInfo-ExtIEs} } OPTIONAL,
    iE-Extensions
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,
                                    TransportFormatSet-CRC-Size,
    cRC-Size
                                     ProtocolExtensionContainer { { TransportFormatSet-Semi-staticPart-ExtIEs} }
    iE-Extensions
                                                                                                                      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
__************
                                  ENUMERATED { ms250, ms500, s1, s2, s3, s4, s6,
Positioning-ResponseTime ::=
                         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
                                                   Horizontal Velocity,
    horizontalWithVerticalVelocity
                                                   HorizontalWithVerticalVelocity,
    horizontalVelocityWithUncertainty
                                                   Horizontal Velocity With Uncertainty,
    horizontalWithVerticalVelocityAndUncertainty
                                                   HorizontalWithVerticalVelocityAndUncertainty,
HorizontalVelocity ::= SEQUENCE {
    horizontalSpeedAndBearing
                                   HorizontalSpeedAndBearing,
    iE-Extensions
                       ProtocolExtensionContainer { { HorizontalVelocity-ExtIEs} } OPTIONAL,
Horizontal Velocity-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
HorizontalWithVerticalVelocity ::= SEQUENCE {
    horizontalSpeedAndBearing
                                                   Horizontal Speed And Bearing,
    verticalVelocity
                                                       Vertical Velocity,
    iE-Extensions
                       ProtocolExtensionContainer { { HorizontalWithVerticalVelocity-ExtIEs} } OPTIONAL,
HorizontalWithVerticalVelocity-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
HorizontalVelocityWithUncertainty ::= SEQUENCE {
    horizontalSpeedAndBearing
                                                   HorizontalSpeedAndBearing,
    uncertaintySpeed
                                                       INTEGER (0..255),
                       ProtocolExtensionContainer { { HorizontalVelocityWithUncertainty-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
HorizontalVelocityWithUncertainty-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
HorizontalWithVerticalVelocityAndUncertainty ::= SEQUENCE
    horizontalSpeedAndBearing
                                                   HorizontalSpeedAndBearing,
    verticalVelocity
                                                   Vertical Velocity,
    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 {
                                               INTEGER (0..255),
   verticalSpeed
                                               VerticalSpeedDirection
   verticalSpeedDirection
VerticalSpeedDirection ::= ENUMERATED {
   upward,
   downward
__*************
-- UTRAN-GPS Reference Time
__************
UTRAN-GPSReferenceTime ::= SEQUENCE {
   utran-GPSTimingOfCell
                                    INTEGER (0..2322431999999, ...),
   uC-ID
                                    UC-ID
                                                                    OPTIONAL,
                                    INTEGER (0..4095),
   sfn
   iE-Extensions
                                    ProtocolExtensionContainer { { UTRAN-GPSReferenceTime-ExtIEs } } OPTIONAL,
UTRAN-GPSReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
__************
-- UTRAN-GPS Reference Time Result
__************
UTRAN-GPSReferenceTimeResult ::= SEQUENCE {
                            INTEGER (0..37158911999999, ...),
   ue-GPSTimingOfCell
                            UC-ID,
                            INTEGER (0..4095),
   sfn
   iE-Extensions
                            ProtocolExtensionContainer { { UTRAN-GPSReferenceTimeResult-ExtIEs } } OPTIONAL,
```

```
UTRAN-GPSReferenceTimeResult-ExtlEs 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
                                   INTEGER ::= 65535
maxProtocolIEs
__ ********************
-- 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)
```

#### 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
                               ProcedureCode ::= 11
id-Abort
id-PositionPeriodicReport
                               ProcedureCode ::= 12
```

id-PositionPeriodicResult

id-PositionPeriodicTermination

```
__ *********************
-- Lists
__ *********************
maxNrOfErrors
                                INTEGER ::= 256
maxSat.
                                INTEGER ::= 16
maxSatAlmanac
                                INTEGER ::= 32
                                INTEGER ::= 256
maxNrOfLevels
                                INTEGER ::= 15
maxNrOfPoints
maxNrOfExpInfo
                                INTEGER ::= 32
maxNrOfMeasNCell
                                INTEGER ::= 32
maxNrOfMeasurements
                                INTEGER ::= 16
maxNrOfSets
                                INTEGER ::= 3
maxRateMatching
                                INTEGER ::= 256
                                INTEGER ::= 32
maxNrOfTFs
maxTTI-count
                                INTEGER ::= 4
maxTS-1
                                INTEGER ::= 13
                                INTEGER ::= 8
maxCCTrCH
maxTF
                                INTEGER ::= 32
maxTFC
                                INTEGER ::= 1024
maxPRACH
                                INTEGER ::= 16
                                INTEGER ::= 32
maxTrCH
maxTGPS
                                INTEGER ::= 6
maxNoOfMeasurements
                                INTEGER ::= 16
maxCellMeas
                                INTEGER ::= 32
maxNrOfEDPCCH-PO-OUANTSTEPs
                                INTEGER ::= 8 -- FFS
                                INTEGER ::= 8 -- FFS
maxNrOfRefETFCI-PO-QUANTSTEPs
maxNrOfRefETFCIs
                                INTEGER ::= 8
                                INTEGER ::= 9
maxSet
maxGANSSSat
                                INTEGER ::= 64
maxSgnType
                                INTEGER ::= 8
                                INTEGER ::= 8
maxGANSS
maxGANSSSet
                                INTEGER ::= 9
maxGANSSSatAlmanac
                                INTEGER ::= 36
maxGANSSClockMod
                                INTEGER ::= 4
__ ******************
-- IEs
id-Cause
                                           ProtocolIE-ID ::= 1
id-CriticalityDiagnostics
                                           ProtocolIE-ID ::= 2
```

ProcedureCode ::= 13

ProcedureCode ::= 14

id-GPS-UTRAN-TRU	ProtocolIE-ID ::= 3
id-InformationExchangeID	ProtocoliE-ID ::= 3 ProtocolIE-ID ::= 4
id-InformationExchangeObjectType-InfEx-Rprt	ProtocoliE-ID ::= 4 ProtocoliE-ID ::= 5
id-InformationExchangeObjectType-InfEx-Rgst	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 ::= 9 ProtocolIE-ID ::= 10
id-MethodType	ProtocolIE-ID ::= 10 ProtocolIE-ID ::= 11
id-RefPosition-InfEx-Rqst	ProtocolIE-ID ::= 11 ProtocolIE-ID ::= 12
id-RefPosition-InfEx-Rsp	ProtocolIE-ID ::= 12 ProtocolIE-ID ::= 13
id-RefPosition-Inf-Rprt	ProtocolIE-ID ::= 13 ProtocolIE-ID ::= 14
id-RequestedDataValue	ProtocolIE-ID ::= 15
id-RequestedDataValueInformation	ProtocoliE-ID ::= 15
id-TransactionID	ProtocolIE-ID ::= 16 ProtocolIE-ID ::= 17
id-UE-PositionEstimate	ProtocolIE-ID ::= 17 ProtocolIE-ID ::= 18
id-CellId-MeasuredResultsSets	ProtocolIE-ID ::= 16 ProtocolIE-ID ::= 20
id-OTDOA-MeasurementGroup	ProtocolIE-ID ::= 20 ProtocolIE-ID ::= 22
id-AccuracyFulfilmentIndicator	ProtocoliE-ID ::= 22 ProtocolIE-ID ::= 23
id-HorizontalAccuracyCode	ProtocolIE-ID ::= 23 ProtocolIE-ID ::= 24
id-VerticalAccuracyCode	ProtocoliE-ID ::= 24 ProtocoliE-ID ::= 25
id-UTDOA-Group	ProtocoliE-ID ::= 25 ProtocoliE-ID ::= 26
<u> -</u>	ProtocoliE-ID ::= 28
id-RequestType	ProtocoliE-ID ::= 28
<pre>id-UE-PositioningCapability id-UC-id</pre>	ProtocoliE-ID ::= 29 ProtocoliE-ID ::= 30
id-ResponseTime	ProtocolIE-ID ::= 31
id-PositioningPriority	ProtocolIE-ID ::= 32
id-ClientType	ProtocolIE-ID ::= 33
<pre>id-PositioningMethod id-UTDOAPositioning</pre>	ProtocolIE-ID ::= 34
id-GPSPositioning	ProtocolIE-ID ::= 35 ProtocolIE-ID ::= 36
id-OTDOAAssistanceData	ProtocolIE-ID ::= 37
<pre>id-Positioning-ResponseTime id-EnvironmentCharacterisation</pre>	ProtocolIE-ID ::= 38
	ProtocolIE-ID ::= 39
id-PositionData	ProtocolIE-ID ::= 40
id-IncludeVelocity	ProtocolIE-ID ::= 41 ProtocolIE-ID ::= 42
id-VelocityEstimate	
id-rxTimingDeviation768Info	ProtocolIE-ID ::= 43
id-UC-ID-InfEx-Rqst	ProtocolIE-ID ::= 44
id-UE-PositionEstimateInfo id-UTRAN-GPSReferenceTime	ProtocolIE-ID ::= 45
	ProtocolIE-ID ::= 46
id-UTRAN-GPSReferenceTimeResult	ProtocolIE-ID ::= 47
id-UTRAN-GPS-DriftRate	ProtocolIE-ID ::= 48
id-OTDOA-AddMeasuredResultsInfo	ProtocolIE-ID ::= 49
id-GPS-ReferenceLocation	ProtocolIE-ID ::= 50
id-OTDOA-MeasuredResultsSets	ProtocolIE-ID ::= 51
id-rxTimingDeviation384extInfo	ProtocolIE-ID ::= 55
id-ExtendedRoundTripTime	ProtocolIE-ID ::= 56
id-PeriodicPosCalcInfo	ProtocolIE-ID ::= 57
id-PeriodicLocationInfo	ProtocolIE-ID ::= 58
id-AmountOfReporting	ProtocolIE-ID ::= 59
id-MeasInstructionsUsed	ProtocolIE-ID ::= 60
id-RRCstateChange	ProtocolIE-ID ::= 61
id-PeriodicTerminationCause	ProtocolIE-ID ::= 62

```
id-MeasurementValidity
                                                ProtocolIE-ID ::= 63
id-roundTripTimeInfoWithType1
                                                ProtocolIE-ID ::= 64
id-CellIDPositioning
                                                ProtocolIE-ID ::= 66
id-AddMeasurementInfo
                                                ProtocolIE-ID ::= 67
id-Extended-RNC-ID
                                                ProtocolIE-ID ::= 68
id-GANSS-CommonAssistanceData
                                                ProtocolIE-ID ::= 69
id-GANSS-GenericAssistanceDataList
                                                ProtocolIE-ID ::= 70
id-GANSS-MeasuredResultsList
                                                ProtocolIE-ID ::= 71
id-GANSS-UTRAN-TRU
                                                ProtocolIE-ID ::= 72
id-GANSSPositioning
                                                ProtocolIE-ID ::= 73
id-GANSS-PositioningDataSet
                                                ProtocolIE-ID ::= 74
id-GNSS-PositioningMethod
                                                ProtocolIE-ID ::= 75
id-NetworkAssistedGANSSSuport
                                                ProtocolIE-ID ::= 76
id-TUTRANGANSSMeasurementValueInfo
                                                ProtocolIE-ID ::= 77
id-AdditionalGPSAssistDataRequired
                                                ProtocolIE-ID ::= 78
id-AdditionalGanssAssistDataRequired
                                                ProtocolIE-ID ::= 79
id-angleOfArrivalLCR
                                                ProtocolIE-ID ::= 80
id-extendedTimingAdvanceLCR
                                                ProtocolIE-ID ::= 81
id-additionalMeasurementInforLCR
                                                ProtocolIE-ID ::= 82
id-timingAdvanceLCR-R7
                                                ProtocolIE-ID ::= 83
id-rxTimingDeviationLCR
                                                ProtocolIE-ID ::= 84
id-GPSReferenceTimeUncertainty
                                                ProtocolIE-ID ::= 85
```

END

#### 9.3.7 Container Definitions

```
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 {
                   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 {
                   PrivateIE-ID,
   &criticality
                   Criticality,
```

```
&Value,
   &presence
                     Presence
WITH SYNTAX {
                     &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} ::= SEOUENCE {
                                                    ({IEsSetParam}),
                    PCAP-PROTOCOL-IES.&id
   criticality
                    PCAP-PROTOCOL-IES.&criticality
                                                    ({IEsSetParam}{@id}),
                    PCAP-PROTOCOL-IES.&Value
                                                    ({IEsSetParam}{@id})
   value
        -- 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} ::=
   SEOUENCE (SIZE (1..maxProtocolExtensions)) OF
       ProtocolExtensionField {{ExtensionSetParam}}
ProtocolExtensionField {PCAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE
                                                        ({ExtensionSetParam}),
                    PCAP-PROTOCOL-EXTENSION.&id
                                                        ({ExtensionSetParam}{@id}),
   criticality
                     PCAP-PROTOCOL-EXTENSION. & criticality
   extensionValue
                    PCAP-PROTOCOL-EXTENSION. & Extension
                                                        ({ExtensionSetParam}{@id})
```

## 9.4 Message Transfer Syntax

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

## Handling of Unknown, Unforeseen and Erroneous Protocol Data

#### 10.1 General

Protocol Error cases can be divided into three classes:

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

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

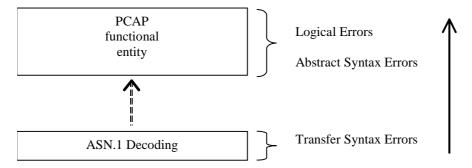


Figure 10: Protocol Errors in PCAP

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

## 10.2 Transfer Syntax Error

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

Examples for Transfer Syntax Errors are:

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

## 10.3 Abstract Syntax Error

#### 10.3.1 General

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

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

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

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

### 10.3.2 Criticality Information

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

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

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

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

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

- 1. IE or IE group: When one new or modified IE or IE group is implemented for one EP from a standard version, then other new or modified IEs or IE groups specified for that EP in that standard version shall be considered comprehended by a receiving entity (some may still remain unsupported).
- 2. EP: The comprehension of different EPs within a standard version or between different standard versions is not mandated. Any EP that is not supported may be considered not comprehended, even if another EP from that standard version is comprehended, and action based on criticality shall be applied.

#### 10.3.3 Presence Information

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

The presence field of the indicated classes supports three values:

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

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

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

#### 10.3.4 Not comprehended IE/IE group

#### 10.3.4.1 Procedure Code

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

#### **Reject IE:**

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

#### Ignore IE and Notify Sender:

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

#### **Ignore IE:**

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

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

#### 10.3.4.1A Type of Message

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

#### 10.3.4.2 IEs other than the Procedure Code and Type of Message

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

#### **Reject IE:**

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the rejection of one or more IEs/IE groups using the message

normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

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

#### Ignore IE and Notify Sender:

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

#### **Ignore IE:**

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

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

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

## 10.3.5 Missing IE or IE group

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

#### **Reject IE:**

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Reject IE*"; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the missing IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a received message *initiating* a procedure that does not have a message to report unsuccessful outcome is missing one or more IEs/IE groups with specified criticality "*Reject IE*", the receiving node shall initiate the Error Indication procedure.
- If a received *response* message is missing one or more IEs/IE groups with specified criticality "*Reject IE*, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

#### Ignore IE and Notify Sender:

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and report in the response message of the procedure that one or more IEs/IE groups were missing. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a received message *initiating* a procedure that does not have a message to report the outcome of the procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.
- If a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.

#### **Ignore IE:**

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

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

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

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

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

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

message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication.

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

## 10.4 Logical Error

Logical error situations occur when a message is comprehended correctly, but the information contained within the message is not valid (i.e. semantic error), or describes a procedure which is not compatible with the state of the receiver. In these conditions, the following behaviour shall be performed (unless otherwise specified) as defined by the class of the elementary procedure, irrespective of the criticality of the IEs/IE groups containing the erroneous values.

#### Class 1:

#### Protocol Causes:

Where the logical error occurs in a request message of a class 1 procedure, and the procedure has a message to report this unsuccessful outcome, this message shall be sent with an appropriate cause value. Typical cause values are:

- 1. Semantic Error.
- 2. Message not compatible with receiver state.

Where the logical error is contained in a request message of a class 1 procedure, and the procedure does not have a message to report this unsuccessful outcome, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value.

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

#### Class 2:

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

## 10.5 Exceptions

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

- If any type of error (Transfer Syntax Error, Abstract Syntax Error or Logical Error) is detected in the ERROR INDICATION message, it shall not trigger the Error Indication procedure in the receiving Node but local error handling.
- In case a response message or Error Indication message needs to be returned, but the information necessary to
  determine the receiver of that message is missing, the procedure shall be considered as unsuccessfully terminated
  and local error handling shall be initiated.
- If an error that terminates a procedure occurs, the returned cause value shall reflect the error that caused the termination of the procedure even if one or more abstract syntax errors with criticality "ignore and notify" have earlier occurred within the same procedure.

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

## A.1 EXAMPLE MESSAGE Layout

Assume the following message format:

Table A.1

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M				YES	Reject
Transaction ID	M				_	
Α	M				YES	reject
В	M				YES	reject
>E		1 <maxe></maxe>			EACH	ignore
>>F		1 <maxf></maxf>			-	
>>>G		03,			EACH	ignore
>>H		1 <maxh></maxh>			EACH	ignore
>>>G		03,			EACH	ignore and notify
>>G	M				YES	reject
>>J		1 <maxj></maxj>			-	
>>>G		03,			EACH	reject
С	M				YES	reject
>K		1 <maxk></maxk>			EACH	ignore and notify
>>L		1 <maxl></maxl>			-	
>>>M	0				-	
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.

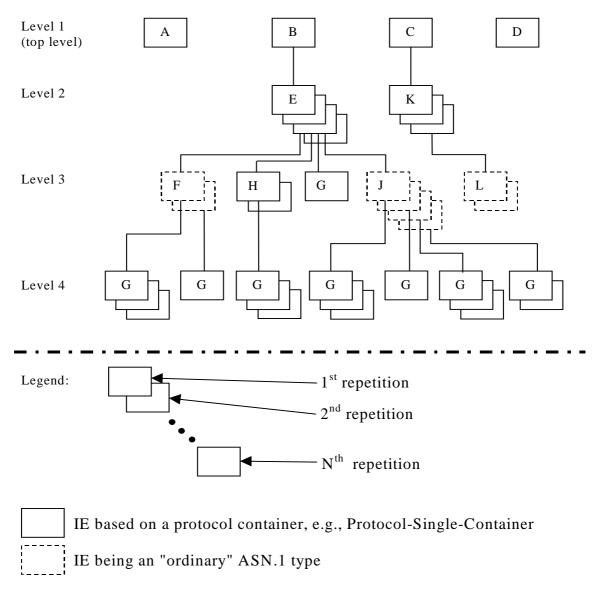
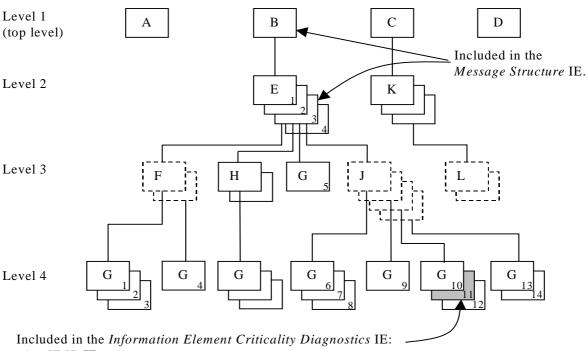


Figure A.1: Example of content of a received PCAP message based on the EXAMPLE MESSAGE

## A.3 Content of Criticality Diagnostics

## A.3.1 Example 1



- a) IE ID IE
- b) Repetition Number IE

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* IEas in table A.2.

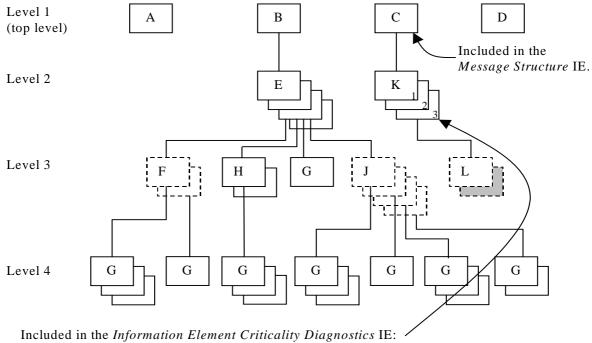
Table A.2

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

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

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

## A.3.2 Example 2



- a) IE ID IE
- b) Repetition Number IE

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

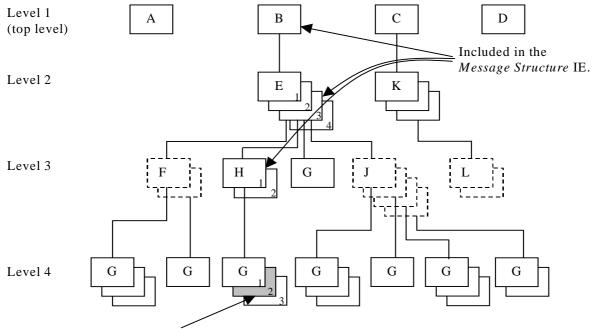
If there is an error within the second instance (marked as grey) in the sequence (IE L in the tabular format) on level 3 below IE K in the structure shown in the figure A.3, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IEas in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

Table A.3

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

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

## A.3.3 Example 3



Included in the Information Element Criticality Diagnostics IE:

- a) IE ID IE
- b) Repetition Number IE

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

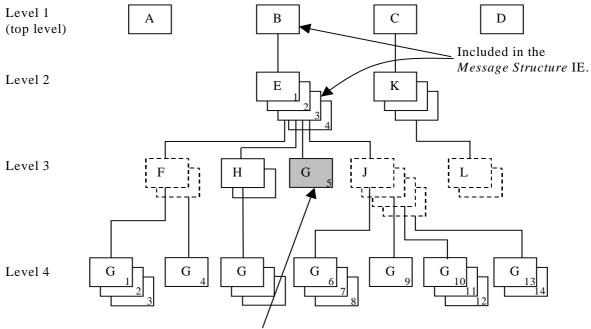
If there is an error within the instance marked as grey in the IE G in the IE H shown in the figure A.4, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IEas in table A.4.

Table A.4

IE name	Value	Comment	
IE Criticality	ignore and notify	Criticality for IE on the reported level, i.e. level 4.	
IE ID	id-G	IE ID from the reported level, i.e. level 4.	
Repetition Number	2	Repetition number on the reported level, i.e. level 4.	
Type of Error	not underst ood		
Message Structur	e, first repe	etition	
>IE ID	id-B	IE ID from level 1.	
Message Structur	e, second	repetition	
>IE ID	id-E	IE ID from level 2.	
>Repetition Number	3	Repetition number from level 2.	
Message Structure, third repetition			
>IE ID	id-H	IE ID from the lowest level above the reported level, i.e. level 3.	
>Repetition Number	1	Repetition number from the lowest level above the reported level, i.e. level 3.	

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

## A.3.4 Example 4



Included in the Information Element Criticality Diagnostics IE:

- a) IE ID IE
- b) Repetition Number IE

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

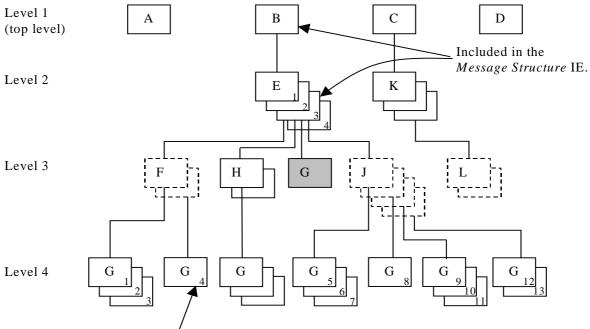
If there is an error within the instance marked as grey in the IE G in the IE E shown in the figure A.5, this will be reported within the *Information Element Criticality Diagnostics* IE within the *Criticality Diagnostics* IE, as in table A.5.

Table A.5

IF	Value	Comment			
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	5	Repetition number on the reported level, i.e. level 3.			
Number		(Since the IE E (level 2) is the lowest level included in the Message Structure			
		IE this is the fifth occurrence of IE G within the IE E (level 2).			
Type of Error	not				
	underst				
	ood				
Message Structur	e, first rep	etition			
>IE ID	id-B	IE ID from level 1.			
Message Structur	e, second	repetition			
>IE ID	id-E	E ID from the lowest level above the reported level, i.e. level 2.			
>Repetition	3	Repetition number from the lowest level above the reported level, i.e. level 2			
Number					

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



Included in the Information Element Criticality Diagnostics IE:

- a) IE ID IE
- b) Repetition Number IE

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			
Message Structur	e, first repe	etition		
>IE ID	id-B	IE ID from level 1.		
Message Structur	e, second	repetition		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.		
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.		

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

## A.4 ASN.1 of EXAMPLE MESSAGE

```
ExampleMessage ::= SEQUENCE {
    ProtocolIEs
                          ProtocolIE-Container
                                                         {{ExampleMessage-IEs}},
    ProtocolExtensions ProtocolExtensionContainer {{ExampleMessage-Extensions}}
                                                                                          OPTIONAL.
{\tt ExampleMessage-IEs\ PCAP-PROTOCOL-IES\ ::=\ \{}
      ID id-A
                CRITICALITY reject TYPE A
                                                PRESENCE mandatory}
                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-List.
                   ProtocolExtensionContainer { {B-ExtIEs} } OPTIONAL,
    iE-Extensions
}
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-List,
    h
                     H-List.
    g
                     G-List1,
                     J-List,
    iE-Extensions ProtocolExtensionContainer { {E-ExtIEs} } OPTIONAL,
}
E-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
F-List ::= SEQUENCE (SIZE (1..maxF)) OF F
F ::= SEQUENCE {
                     G-List2 OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { {F-ExtIEs} } OPTIONAL,
}
            PCAP-PROTOCOL-EXTENSION ::= {
F-ExtIEs
\texttt{G-List2} \ ::= \ \texttt{SEQUENCE} \ (\texttt{SIZE} \ (1...3, \ \ldots)) \ \texttt{OF} \ \texttt{ProtocolIE-Single-Container} \ \left\{ \ \{\texttt{G2-IEs}\} \ \right\}
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-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 ::= {
   J-List ::= SEQUENCE (SIZE (1..maxJ)) OF J
J ::= SEQUENCE {
                  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-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 ::= {
   \{ \ \ \mbox{ID id-K} \ \ \ \mbox{CRITICALITY notify} \ \ \mbox{TYPE K} \ \ \mbox{PRESENCE mandatory} \ \ \}
K ::= SEQUENCE {
                   L-List.
   iE-Extensions ProtocolExtensionContainer { {K-ExtIEs} } OPTIONAL,
K-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
L-List ::= SEQUENCE (SIZE (1..maxL)) OF L
L ::= SEQUENCE {
                   M OPTIONAL,
   iE-Extensions ProtocolExtensionContainer { {L-ExtIEs} } OPTIONAL,
L-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
ExampleMessage-Extensions PCAP-PROTOCOL-EXTENSION ::= {
}
```

# Annex B (informative): Change history

	I=00 ::	1=000		_	Change history		1
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
06/2001	12	RP-010402			Approved at TSG RAN #12 and placed under Change Control	-	5.0.0
09/2001	13	RP-010603	002	1	Correction to the Error handling of the ERROR INDICATION message	5.0.0	5.1.0
09/2001	13	RP-010603	003		Proposed CR to 25.453 on Semantics Description of C/No	5.0.0	5.1.0
09/2001	13	RP-010603	004		Proposed CR to 25.453 on Clause 10	5.0.0	5.1.0
09/2001	13	RP-010603		1	Error handling of the Erroneously Present Conditional les	5.0.0	5.1.0
09/2001	13	RP-010603		1	Clarification of chapter 10	5.0.0	5.1.0
09/2001	13	RP-010603			PCAP Criticality	5.0.0	5.1.0
12/2001	14	RP-010875		1	Bitstrings ordering	5.1.0	5.2.0
12/2001	14	RP-010875		1	Reference corrections	5.1.0	5.2.0
12/2001	14	RP-010875		1	Clarification for the definition of the ASN.1 constants	5.1.0	5.2.0
12/2001	14	RP-010875		1	Procedure Code Criticality in Error Indication	5.1.0	5.2.0
12/2001	14	RP-010875		2	Addition of amendment to clarify the PER encoding of bitstrings	5.1.0	5.2.0
12/2001	14	RP-010875		1	Clarification of the Transaction ID	5.1.0	5.2.0
12/2001	14	RP-010875			Correction the Clause 10 Error Handling	5.1.0	5.2.0
-3/2002	15	RP-020211			Modification on the Object Identifier	5.2.0	5.3.0
06/2002	16	RP-020432		2	Criticality Information Decoding Failure Handling	5.3.0	5.4.0
06/2002	16	RP-020432		1	Clarification for the usage of the cause value	5.3.0	5.4.0
03/2003	19	RP-030065			CR on GPS Almanac and Satellite Health	5.4.0	5.5.0
03/2003	19	RP-030065			CR on GPS Measured Results	5.4.0	5.5.0
03/2003	19	RP-030067			Alignment of "Uncertainty Ellipse" with RRC	5.4.0	5.5.0
03/2003	19	RP-030070			Correction for the Information Exchange Initiation procedure	5.4.0	5.5.0
03/2003	19	RP-030084		2	CR on revising the position calculation function and definition of SAS to support all REL-4 UE positioning methods	5.5.0	6.0.0
06/2003	20	RP-030324	032	1	Alignment of the Requested Data Value Information IE description	6.0.0.	6.1.0
06/2003	20	RP-030325			GPS trigger condition	6.0.0.	6.1.0
06/2003	20	RP-030341			Position Calculation Extension for TDD	6.0.0.	6.1.0
06/2003	20	RP-030322		1	"On Modification" and "Periodic" reporting alignment for Information	6.0.0.	6.1.0
					Exchange procedures		
06/2003	20	RP-030322	044		CR on Criticality Aspects	6.0.0.	6.1.0
06/2003	20	RP-030322	045		CR on Information Exchange Initiation Request for GPS Navigation Model	6.0.0.	6.1.0
06/2003	20	RP-030322	046		CR on DGPS Parameters	6.0.0.	6.1.0
06/2003	20	RP-030322	047		CR on Removal of Information Exchange Object Type	6.0.0.	6.1.0
06/2003	20	RP-030322	048		CR on Information Report of GPS Almanac and Satellite Health	6.0.0.	6.1.0
06/2003	20	RP-030326	050		Correction of Failure message used for logical errors	6.0.0.	6.1.0
09/2003	21	RP-030442	052		Correction to an incorrect implementation in the Requested Data Value Information IE	6.1.0	6.2.0
09/2003	21	RP-030445	054		Alignment of title and sub-clause text of chapter 10.3.4.2	6.1.0	6.2.0
09/2003	21	RP-030446	059		Removal of the note in chapter 10	6.1.0	6.2.0
09/2003	21	RP-030454	060		Improvement of position calculation with pathloss	6.1.0	6.2.0
12/2003	22	RP-030697	061		Improvement of position calculation through set enlargement	6.2.0	6.3.0
12/2003	22	RP-030683			Information Exchange Initiation behavior correction	6.2.0	6.3.0
03/2004	23	RP-040053			Alignment with 23.032 correction of Included Angle for Ellipsoid Arc	6.3.0	6.4.0
03/2004	23	RP-040075			Initial UE Position IE only mandatory necessary for GPS	6.3.0	6.4.0
03/2004	23	RP-040072			PCAP Review	6.3.0	6.4.0
06/2004	24	RP-040184		1	Correction to usage of INITIAL UE POSITION	6.4.0	6.5.0
09/2004	25	RP-040306	074	1	Introduction of the requested accuracy and an indication of achieved accuracy in Position Calculation procedure over lupc interface	6.5.0	6.6.0
12/2004	26	RP-040441	076		outdated ITU-T reference	6.6.0	6.7.0
03/2005	27	RP-050055	078	1	Corrections to descriptions of GPS Almanac and Ephemeris fields	6.7.0	6.8.0
06/2005	28	RP-050217	082	2	Correction of deletion of Information Exchange Context	6.8.0	6.9.0
09/2005	29	RP-050441		1	Addition of the U-TDOA positioning method to the UTRAN	6.9.0	7.0.0
12/2005	30	RP-050705		2	Addition of TDD aspects of the U-TDOA positioning method	7.0.0	7.1.0
12/2005	30	RP-050701	087		PCAP Review	7.0.0	7.1.0
12/2005	30	RP-050706	880		Wording Alignment for Procedure Text	7.0.0	7.1.0
03/2006	31	RP-060072		10	Enabling the Providing of Velocity	7.1.0	7.2.0
03/2006	31	RP-060071		1	Completion of SAS-centric mode	7.1.0	7.2.0
03/2006	31	RP-060073		1	Introduction of 7.68Mcps TDD option	7.1.0	7.2.0
06/2006	32	RP-060290	093	2	Release 7 Timing Advance (3.84 Mpcs and 7.68 Mcps TDD)	7.2.0	7.3.0
06/2006	32	RP-060386	094	1	Correction of positioning confidence reporting inconsistencies	7.2.0	7.3.0

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
09/2006	33	RP-060510	095	3	Addition of Periodic Location Procedures	7.3.0	7.4.0
09/2006	33	RP-060509	096	2	Extended WCDMA Cell Range	7.3.0	7.4.0
12/2006	34	RP-060705	097		Correction of Round Trip Time for Extended Cell Range	7.4.0	7.5.0
12/2006	34	RP-060837	098	1	Consistency of Specification Notations	7.4.0	7.5.0
03/2007	35	RP-070052	101	1	Presence inconsistency	7.5.0	7.6.0
03/2007	35	RP-070064	102	2	UE Rx-Tx Time Difference Type 1	7.5.0	7.6.0
06/2007	36	RP-070340	103	2	Support for additional measurements in Cell-ID positioning method	7.6.0	7.7.0
					and Information Exchange		
06/2007	36	RP-070337	105	2	Introduction of GANSS (Galileo and Additional Navigation Systems)	7.6.0	7.7.0
					in PCAP		
06/2007	36	RP-070474	106	2	Introduction of Extended RNC-ID	7.6.0	7.7.0
09/2007	37	RP-070727	104	8	SAS-Centric A-GPS UE requesting additional Assistance Data	7.7.0	7.8.0
09/2007	37	RP-070579	108		Corrections for ASN.1	7.7.0	7.8.0
12/2007	38	RP-070842	109	1	PCAP Review	7.8.0	7.9.0
12/2007	38	RP-070845	110		Addition of GPS Reference Time Uncertainty	7.8.0	7.9.0
12/2007	38	RP-070844	111	1	Some corrections for 1.28Mcps TDD	7.8.0	7.9.0
03/2008	39	RP-080075	112	1	Impacts of RRC GANSS changes	7.9.0	7.10.0

## History

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